

Building Research Capacity in Bolivian Universities

**Erik W. Thulstrup
Manuel Ramiro Muñoz
Jean-Jacques Decoster**

**Department for
Research Cooperation**

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Sida Evaluation 06/12

**Department for
Research Cooperation**

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Authors: Erik W. Thulstrup, Manuel Ramiro Muñoz, Jean-Jacques Decoster.

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SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
Address: SE-105 25 Stockholm, Sweden. Office: Sveavägen 20, Stockholm
Telephone: +46 (0)8-698 50 00. Telefax: +46 (0)8-20 88 64
E-mail: sida@sida.se. Homepage: <http://www.sida.se>

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1. Summary

The Sida program and the present evaluation. Since 2000 the Sida department for research cooperation, SAREC, has supported research in Bolivia both centrally, through the Vice Ministry for Education, Science and Technology and locally, through two universities, Universidad Mayor de San Andrés in La Paz (UMSA) and Universidad Mayor de San Simón in Cochabamba (UMSS). Within each of the two universities, the support has been provided a) through a research fund and a grant for development of research management for each university, and b) through specific support for a number of individual research projects.¹ These projects are supported through graduate training, laboratory upgrading, and provision of other research needs. In 2005 it was decided to perform an evaluation of the program, according to the Terms of Reference given in Annex 11.1. The evaluation team consists of Manuel Ramiro Muñoz, Colombia, Jean-Jacques Decoster, Peru, and Erik W. Thulstrup, Denmark (Team Leader).

The Team has performed a survey among the Sida-supported projects and has visited all the projects. It has conducted meetings with key university staff, responsible for management of the support, including the Rector of UMSS and the Vice Rector of UMSA, as well as with the Vice Minister in charge of Higher Education. The Team has also visited Sida staff in Stockholm, graduate students and their advisers in Lund, Sweden, and taken part in a workshop in Stockholm with participation of many stakeholders from Bolivia and Sweden. Finally, in November 2005 a workshop was organized in Cochabamba with the participation of representatives of Sida-supported projects, the management of the two universities, the Vice Ministry, and other Bolivian stakeholders.

How can universities support development and reduce the suffering of the poor? In some cases university research may directly provide assistance for weak local populations by carrying out research that improves, for example, health practices or environmental management. The most common contribution may, however, be in support of economic development that is a necessary condition for a more fair income distribution, thus benefiting poorest groups in society. Economic development depends overwhelmingly on the ability to select and use competitive technologies efficiently; these are today research-based, which makes access to research-trained manpower imperative. The Team concludes that a radical cultural change is urgently needed at Bolivian universities if they shall be able to effectively support the development of Bolivia this way. Especially the priority and incentives given to quality research and research-based education must be increased relative to the present dominant emphasis on traditional teaching. The support from Sida provides a unique opportunity to get started on these important reforms, as well as to test various mechanisms for the upgrading of Bolivian university research.

Major bureaucratic problems. In recent years, support on the part of successive governments for much needed university reforms has been very weak. In addition, severe administrative problems at Bolivian universities constitute major obstacles to the needed reforms and to the efficiency of the Sida program. Excessive bureaucracy may be the most prominent of those problems. This is hardly ever satisfactory, but in a stationary system that provides the same educational services year after year, it may work. In a dynamic system that gives high priority to research and innovation, it is destructive. The conflict between active and eager researchers, who have recently been given new opportunities for their research, and the slow bureaucratic systems at the universities is very serious and represents a real threat to the success of the Sida program, especially at UMSA. At UMSS it has been possible to create mechanisms that limit conflicts of this kind, and a promising quality control and incentive structure for research has been initiated.

¹ at UMSA not only through research projects, but also through a Master program and a project upgrading the ICT facilities on the campuses

Low priority for research: Lost opportunities? Much of the Sida support is given in the form of graduate training, especially at the PhD level. This provides a unique opportunity for an upgrading of the academic staff within the supported fields at UMSA and UMSS. Unfortunately, these months, when a large number of new PhDs are getting ready to return to Bolivia, it is still not clear to what extent they will be offered proper employment. This is partly a result of the difficult financial situation at both UMSA and UMSS (which also has other negative consequences), but is also caused by the low priority given to research at Bolivian universities. This situation has to change!

Positive developments. Fortunately, there are not only problems in the program, but also several very encouraging developments. Partly triggered by the access to greatly improved laboratories, the research projects are able to attract an impressive amount of talent among undergraduate students. Many of these young students are performing wonderful research, in a Problem Based Learning (PBL) mode that today is considered very effective. The young researchers are highly motivated, because much of the research deals with problems of obvious importance for their country. Also the graduate training and the cooperation with foreign advisers, who often play a wider role in the projects, is generally very successful.

Scientific communication. Most projects try to span the gap between basic research and related practical applications in a commendable way. However, it is still difficult for many to get established internationally as researchers, for example through international publishing of the (good) research they perform. This is a problem that could be solved within a few years with targeted help from Sida. Also other forms of scientific communication in Bolivia, especially with knowledge users in society (industry, etc.), have to be strengthened.

Will the Sida initiative succeed? In conclusion, the Sida program is targeting substantial needs of the two universities and the country in an effective way. Only modest adjustments are needed in the support program, while major reforms are required in the Bolivian higher education sector, especially at UMSA, within both management and priorities. The Sida program may help bring higher education in Bolivia into the 21st century by creating the needed experience on how to upgrade university research and research-based education; this may pave the way for wider reforms in support of national development, e.g. with the help of a development bank. Bolivia has an excess of talent and enthusiasm for this process to succeed, but it is not yet clear if the universities have the will to make the needed reforms.

2. Resumen

El Programa Sida y la presente evaluación. Desde el año 2000, Sida ha venido apoyando a la investigación en Bolivia, tanto en forma central, a través del Vice Ministerio para la Educación, Ciencia y Tecnología, como localmente, a través de dos Universidades: la Universidad Mayor de San Andrés (UMSA) en La Paz, y la Universidad Mayor de San Simón (UMSS) en Cochabamba. Dentro de cada una de las dos universidades, el apoyo ha sido proporcionado a) por medio de un fondo de investigación y una subvención para el desarrollo de una política de investigación para cada universidad, y b) por medio de un apoyo específico a varios proyectos individuales de investigación.² En el año 2005, se decidió realizar la evaluación del programa, de acuerdo con los TDRs adjuntos en anexo 11.1. El equipo de evaluación está integrado por Manuel Ramiro Muñoz, Colombia, Jean-Jacques Decoster, Perú, y Erik W. Thulstrup, Dinamarca, Jefe del Equipo.

El equipo dirigió una encuesta al conjunto de los proyectos apoyados por Sida, visitó todos aquellos proyectos, y tuvo reuniones con el personal clave, responsable en las universidades de todos los elementos de la gestión del programa de Sida, incluyendo al Rector de la UMSS y al Vicerrector de la UMSA. Asimismo, el equipo evaluador visitó a la oficina de Sida en Estocolmo, también a estudiantes de postgrado del programa y a sus asesores en Lund, y participó en un taller en Estocolmo. Finalmente, en noviembre del 2005, se organizó un taller en Cochabamba con la participación del conjunto de los proyectos, de los directivos de las dos universidades, del Vice Ministerio y de otros actores bolivianos.

¿Cómo pueden las universidades favorecer el desarrollo y reducir el sufrimiento de los pobres? En algunos casos, la investigación en universidades puede directamente aportar ayuda a las poblaciones locales a través de una investigación que por ejemplo mejore las prácticas de salud o la gestión del medioambiente. La contribución más obvia, sin embargo, puede ser en el apoyo al desarrollo económico que facilitara una más justa distribución de los ingresos, y por ende favorecer a las poblaciones indígenas pobres. El desarrollo económico depende mayormente de la capacidad de seleccionar tecnologías competitivas y aplicarlas de manera eficiente; hoy en día, aquellas tecnologías suelen estar basadas en la investigación, lo que hace imprescindible el acceso a una mano de obra entrenada a la investigación. El equipo evaluador llegó a la conclusión de que se necesita, en forma urgente, un cambio cultural radical en las universidades bolivianas, si es que ellas vayan a poder así fomentar el desarrollo de Bolivia. En particular, se debe dar más énfasis en la investigación y la educación basada en la investigación, en relación a la importancia excesiva acordada en la actualidad a la docencia tradicional. El apoyo de Sida otorgar una oportunidad única para empezar a dar las reformas tan necesarias, además de poder poner a prueba algunos mecanismos para la actualización de la investigación en universidades bolivianas.

Principales problemas burocráticos. En los últimos años, el apoyo por parte de los gobiernos de turno a las reformas universitarias necesarias ha sido bastante débil. Además, varios problemas graves en las universidades bolivianas, constituyen obstáculos importantes a las reformas necesarias y a la eficacia del programa de Sida. La burocracia excesiva puede ser el más notable de esos problemas. Esa situación nunca llega a ser satisfactoria, sin embargo en un sistema inmutable que provee año tras año los mismos servicios educacionales, puede que funcione. Pero en un sistema dinámico que prioriza la investigación y la innovación, aquella situación conduce al desastre. El conflicto entre investigadores activos y entusiasmos, a quienes recién se les han dado nuevas oportunidades para su investigación, de un lado, y del otro el lento sistema burocrático, es un problema sumamente grave y representa una seria amenaza al éxito del programa de Sida, en particular en la UMSA. A la UMSS, ha sido posible la creación de un

² En el caso de UMSA, esto se hizo no solamente a través de proyectos de investigación, sino también a través de un Programa de Maestría y de un Proyecto de actualización de las instalaciones de Tecnologías de Información y Comunicación (ICT).

mecanismo que mitigue, pero no obvia, tales conflictos y también poner en marcha una estructura alentadora de control de calidad incentiva a la investigación.

Baja prioridad dada a la investigación: ¿Oportunidades perdidas? Una parte importante del apoyo de Sida está proporcionado como formación de postgrado, en particular a nivel de doctorado. Ése garantiza una oportunidad única para la actualización del personal académico dentro de las facultades beneficiadas en la UMSS y la UMSA. Desgraciadamente, en estos meses, al momento cuando un número importante de nuevos doctores están a punto de regresar a Bolivia, no queda muy claro hasta que punto se les proporcionará un empleo adecuado. Ése tiene que ver en parte con la difícil situación económica tanto en la UMSA como en la UMSS (situación que tiene otras consecuencias negativas), pero también podría atribuirse a la baja prioridad dada a la investigación en las universidades bolivianas. ¡Ésa situación tiene que cambiar!

Resultados positivos. Afortunadamente, más allá de los problemas en el programa, encontramos varios resultados muy positivos. En parte gracias al acceso a laboratorios mejorados, los proyectos de investigación logran traer muchos talentos excepcionales en los estudiantes de pre-grado. Muchos de ellos están en la actualidad conduciendo investigaciones de punta en una modalidad hoy en día considerada como muy efectiva: el Aprendizaje Basado en Problemas (PBL). Los jóvenes investigadores están muy motivados porque la mayor parte de la investigación tiene que ver con problemas de gran importancia para el país. Adicionalmente, han tenido mucho éxito la formación de postgrado y la cooperación por parte de los asesores extranjeros, quienes a menudo juegan un papel mucho más importante en los proyectos.

Comunicación científica. La mayor parte de los proyectos pretenden colmar de manera satisfactoria la brecha existente entre la investigación básica y las aplicaciones prácticas derivadas. Sin embargo, para muchos de los investigadores, sigue siendo difícil establecerse a nivel internacional, por ejemplo a través de la publicación en revistas internacionales de los resultados de su valiosa investigación. Ése problema podría solucionarse dentro de unos pocos años, con una ayuda orientada por parte de Sida. Además, se necesita fortalecer otras formas de comunicación científica en Bolivia.

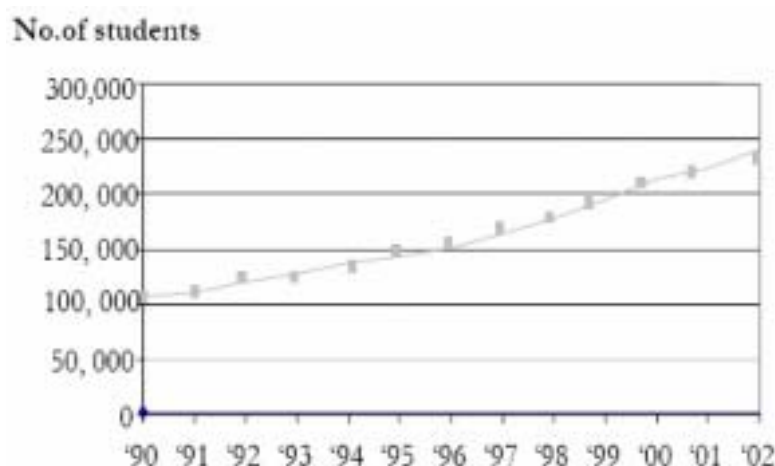
¿Puede tener éxito la iniciativa de Sida? En conclusión, el programa de Sida está enfocado en forma efectiva en las necesidades fundamentales de las dos universidades y del país en su conjunto. Solo se necesitan ajustes mínimos en el programa de apoyo. Pero hacen falta reformas importantes en la UMSA y la UMSS, tanto a nivel de gerencia como en términos de prioridades. El programa de Sida podría contribuir a llevar la educación boliviana hacia el siglo XXI, con la creación de la experiencia necesaria para mejorar la investigación en la universidad y la educación basada en la investigación. Ése podría preparar el camino para reformas más amplias que fomentarían el desarrollo nacional, por ejemplo con la ayuda de un banco de desarrollo. A Bolivia le sobran el talento y el entusiasmo necesario para que ese proceso tenga éxito, pero la pregunta esencial sigue siendo: ¿Tienen las universidades el empeño indispensable para lograr las reformas necesarias?

3. Background

Higher Education and Research in Bolivia

A fast growing number of university students. The trends in Bolivian higher education resemble those observed in the rest of Latin America and the Caribbean (see Annex 12.2). As enrollment numbers have increased (annual growth rate between 1990 and 2002: 6.5%, see Fig. 3.1), so have the number and range of higher education institutions and to a smaller extent their funding and the size of their staff. A greater participation of the private sector has occurred, and today private universities seriously challenge the traditional monopoly of the public universities. The growth in student enrollment has generated some macro universities (i.e. with more than 50,000 students); these remain almost exclusively dedicated to “teaching”. Throughout this development, the public policies have remained weak, with a Ministry lacking significant influence at the universities and with little middle- and long-term planning and with severe budget restrictions.

Figure 3.1. The student population in Bolivian universities



Source: Vice Ministry of Higher Education, S&T

Increasing problems in higher education. According to the Ministry of Education, Bolivia has 14 public universities (including a catholic and a military university) and 36 private universities, of which 19 are certified and 17 are not. 33 out of the 36 were established between 1996 and 2003. There are 14,463 professors (8,293 in public universities and 6,170 in private universities), and 1,397 students in post-graduate programs. Twenty percent of the present 300,000 Bolivian students are in private universities. The growth in student numbers (Fig. 3.1) has taken place in both public and private universities; much of the increase is due to a larger share of female students. Between 1995 and 2004 the student population at Universidad Mayor de San Andrés in La Paz (UMSA) grew from 39,212 to 70,411 and that of Universidad Mayor de San Simón in Cochabamba (UMSS) from 26,334 to 49,640. To summarize, the development of higher education in Bolivia has been characterized by a number of substantial changes, including:

- The higher education demand has come from a wider sector of the population – related to a strong expansion of Secondary Education
- the available resources per student in public universities have declined and thus also the quality
- the growing demand has led to increasing lack of available places at the universities

- increasing restrictions of access to state education through placement and examination systems have been necessary
- the decrease in funding has led to a series of conflicts
- a private tertiary education market has appeared and has grown fast
- the number (and share) of women in higher education has increased significantly
- the country has started to take note of advice on higher education reform from outside sources, e.g. donors, the Inter-American Development Bank, the World Bank, etc.

Table 3.1 University students according to field of study

Field	Public	Private
Agricultural Sciences	4.9%	1.1%
Urban Architecture	4.6%	2.8%
Social Sciences	14.8%	15.6%
Communication	3.4%	3.9%
Education	11.3%	13.5%
Basic Science	4.2%	1.0%
Health Sciences	13.9%	18.2%
Business, economics	23.3%	24.9%
Engineering	19.6%	19.0%
Total	100%	100%

Source: Vice Ministry of Higher Education, Science and Technology

Popular fields. The 300,000 university students represent well over 50% of the relevant age group (the 19–25 year olds), a very high number compared with most other countries. There is a significant concentration of students in Business and Economics as well as in Engineering and Technology (Table 3.1). Almost half of the students from both public (43%) and private universities (44%) have selected programs in these fields, where they can choose among a very large range of programs. It is interesting to note that individual private universities in general offer a much larger number of programs than the public universities. The public universities, however, have a fast increasing variety of programs in Engineering and Technology (132 programs), almost one third of their programs. In private universities Economics and Managerial Sciences offer the largest variety of programs, also about one third of the total number of programs..

Table 3.2 Students in public/private universities, according to origin

District	Public, 2002	Private, 2003
Beni	1.9%	1.0%
Chiquisaca	11.5%	2.6%
Cochabamba	19.6%	15.7%
La Paz	29.7%	41.9%
Oruro	7.0%	1.3%
Pando	0.3%	ND
Potosí	5.0%	ND
Santa Cruz	17.8%	37.6%
Tarija	5.3%	ND
Total	100.0%	100.0%

Source: Vice Ministry of Higher Education, Science and Technology

There is a high concentration of public and private universities in the cities along the axis: La Paz – Cochabamba – Santa Cruz and the largest number of students come from these populous cities (Table 3.2). In Santa Cruz, students in private universities outnumber those in public universities 2:1, and also in La Paz a majority of the university students attend private universities.

The growing number of students has also led to an increase in the number of graduates. Between 1990 and 2002 no less than 87,596 students graduated from public universities and 12,282 from private universities. Presently, the number of graduating students is growing about 13% annually, corresponding to a major increase in the educated work force.

University management. The administration of Bolivian universities is in a transition process from a system centered in collegiate organizations to a technocratic bureaucracy. The transition is far from complete, which generates a wide range of problems. For example, UMSS, one of the universities receiving support from Sida, is making a specific attempt to build a coherent research management system that respects the knowledge dynamics, but this has turned out to be very difficult. It is clear that knowledge production has no rigid limits – research is action, and does not easily fit into a static bureaucratic system, as will be discussed later.

University associations. Most of the public universities have joined the Bolivian University Executive Committee (CEUB), a highly bureaucratic organization. The university autonomy does not allow any intervention from the State, which makes CEUB quite independent relative to the Vice Ministry for Higher Education, Science and Technology. The 36 private universities are grouped in the Private University National Association (ANUP). These universities are relatively young, some are quite dynamic, but many have quality problems. The private universities are regulated by the Vice Ministry for Higher Education, S&T. The associations have done little to solve the main problem of the higher education sector, the insufficient contributions to national development.

The Vice Ministry for Higher Education, Science and Technology. The political instability of the recent years has led to frequent changes of the staff in the Vice Ministry, with five different Vice Ministers between 2000 and 2005. Since not only the Vice Minister changes frequently, but also the technical staff, the result is discontinuity in both policies and operational processes. An approved proposal for a “national science and technology plan” has been worked out, which should be implemented during 2004–2009, but this has not happened due to political uncertainty as well as a lack of funds, guidelines and relevant operational processes. This has prevented the establishment of state policies within the frame of a national science and technology system. As a result each research group functions isolated inside a fragmented higher education system.

University research in Bolivia. So far, only education has been discussed in connection with the Bolivian universities. There is a logical reason for this; traditionally, education has been considered not only the main activity at Bolivian universities, but also the only activity that deserve to be supported and rewarded.³ The dominant philosophy elsewhere, e.g. in most Western countries, that good higher education, at least in science based fields, must be founded on strong, active research within the university, so far have not much influenced the thinking in Bolivia. Thus, many research fields at universities are weak and the research groups have not gained access to the increasingly important, international and informal networks within their specific fields. It does not help much that 141 of a total of 183 official, but poorly funded, research and development centers are located within the public university system. As a consequence of the mostly unsatisfactory research activities, graduate programs and other research training activities in Bolivia are few and often weak.

³ While university staff in most other countries have some free time for research because the semester periods are well below 6 months, semester periods in Bolivia are long and leave less time for research outside periods with course obligations.

In general, little is spent on research in Bolivia. The total expenditures are about 0.25% of the GNP, compared with well over 1% in Brazil and 3% in the leading industrialized countries, such as Sweden. It may be added that “successful” developing countries, including China and India, are presently increasing (university) research funding fast. In recent years Pakistan has increased public support for research by 6,000%, in order to trigger a science based economic development. In Bolivia, the vast majority (about 70%) of the S&T trained manpower work at the universities; for this reason alone university research must be given high priority.

Poverty and development needs. The present weak university research is not conducive to meeting the urgent needs for industrial, economic, and social development and poverty reduction in Bolivia. Stronger university research in specific fields, such as health, environment, natural resources, etc. may help produce direct solutions to the suffering of the poor, mostly indigenous, groups in the country. But even more important, it may act as a trigger for economic development. Experience from many countries has shown that without economic growth it is very difficult to successfully redistribute wealth in order to benefit the poorest, while examples, especially from East Asia, e.g. Singapore and more recently China, show that it is possible to drastically reduce poverty through fast economic growth.

At a time when competitive technologies are increasingly based on modern research, the importance of university graduates with a research-based education is also increasing. In order to select, modify, adapt, and use research-based technologies, persons with a relevant research background are required, both in the public and private sector. The satisfaction of this need is a necessary condition for, especially, industrial success. Furthermore, university graduates, who will make their careers during times of frequently changing technologies, need a research background in order to be able to continuously update their knowledge. Thus it is imperative for the development of Bolivia that university graduates have had an opportunity to spend some time in active research environments.

The need for educational reforms. Thus the priorities at Bolivian universities must change – not away from education, but from traditional education to research-based education; from students copying and memorizing their textbooks and quoting their teachers to students designing their own solutions to real life problems. In other words, rote learning is out, creativity and individual design activities by students are in. The students must be trained in individual thinking and innovation, instead of in memorization. Very importantly, they must accept the main responsibility for their own education, while the role of their teachers will be to support, rather than lead, the students in this process. Planning educational activities in terms of teaching will have to be replaced by planning in terms of student learning for the future, and the skills the graduates need in the labor market (Taylor and Lee, 1996) must be emphasized. Internationally, participation of undergraduate students in research has attracted much interest in recent years. There are many examples, from the establishment of undergraduate “schools” by science academies in Eastern Europe to the new undergraduate research activities at the leading Chinese universities. Such problem- or project-based learning (PBL) strategies are gaining ground fast these years (Thulstrup, 1998b, 2000).

Research dissemination and cooperation: Weak areas. Another badly needed change has to do with the way research results are disseminated (for surveys of publishing habits within Sida supported projects, see Chapters 5 and 6). Ideally, results of university research should be made available to at least two groups:

- International experts in the given field, for quality control and exchange of information. This is usually done through subject-specific international research journals
- local users of the research results, such as small industry, authorities, local communities and others. This may best be done through local or national publications, in-service training, seminars, or through the media.

In general, dissemination from university research in Bolivia falls short in both of these categories, in spite of substantial talent and occasional very valuable research results, as discussed later.

Some subjects, such as Physics (which is not of main relevance for the presently supported projects) and Chemistry (that is relevant in many cases) have attempted to create professional national journals in Bolivia. The journal *Revista Boliviana de Química* covers a wide range of chemistry, including applied fields. It has become bilingual, with abstracts in both Spanish and English, and the main text in either Spanish or English, but it still needs, for example, to increase the number of international reviewers.

In spite of such progress of individual national journals, Bolivian research journals in general are not sufficiently supportive of the research. Much money and effort go into journals that have an insufficient readership and do not support the authors, e.g. through competent and critical reviews of submitted manuscripts. In the Nordic countries the situation in many science fields was similar 30–40 years ago, but the state-funded Nordic Publishing Board managed to merge a large number of more or less useless local journals into a small number of strong, international journals (Thulstrup, 2002). In Latin America, Brazil is presently going through a similar process. There is little doubt that Bolivian research would benefit greatly from stronger national journals.

Patents and publications. Another way of making research both useful and profitable is through patents. Table 3.3 shows the number of Bolivian patents applied for and granted to Bolivians and foreigners, and lists the number of papers published in the broad group of journals registered in Science Citation Index (SCI), and in specialized Chemistry (Chemical Abstracts), Biology (BIOSIS), and Medicine (Medline) databases.

Table 3.3. Bolivian patents/publications in international science journals

Indicator	1995	1996	1997	1998	1999	2000	2001	2002
Bolivian patent applications	30	48	40	40	35	30	40	
Non-Bolivian patent applications	95	52	100	160	180	245	260	
Number of patents granted to Bolivians				10	1	1	2	1
Number of patents to non-Bolivians				20	3	4	5	5
Publications in SCI	62	60	86	85	105	75	94	107
(World %)	.007	.007	.009	.009	.011	.008	.010	.010
Publ.s in Chemical Abstracts	14	8	19	11	17	21	23	20
(World %)	.002	.001	.003	.002	.002	.003	.003	.003
Publications in BIOSIS	18	16	25	32	32	25	19	29
(World %)	.003	.003	.005	.006	.006	.004	.003	.005
Publications in Medline	18	16	25	32	32	25	19	29
(World %)	.003	.003	.005	.006	.006	.004	.003	.005

Source: RICYT. *National Study of Research Policies in the Universities IESAL-UNESCO-UTEPSA*

As demonstrated in the table, Bolivia is not doing well at all. Patent applications by foreigners exceed those by Bolivians by a factor 5 or more, and the total number of papers published annually in all sciences and for the whole country corresponds to the typical number produced by a single science department in a Scandinavian country. In order for Bolivian research to join and benefit from the international research networks, a drastic improvement of the international publishing practices at Bolivian universities will be required.

Low mobility and lacking cooperation. Cooperation between researchers within Bolivia is generally weak. This reinforces the tendency to harmful inbreeding, since the mobility of young researchers between different universities in the country is correspondingly low, representing a waste of opportunities for renewal and upgrading of university research and education. The same weakness exists for exchange between universities and industry, by which opportunities are lost for upgrading industrial work processes and products, as well as for improving the relevance of university education and research.

Language skills. These years the international language of research in most fields is English. Researchers who are not able to communicate in English are often severely handicapped in their attempts to follow and participate in the international development in their field. Therefore students must learn English; fortunately, learning foreign languages is not particularly difficult at a young age. Within the Sida supported projects, many, but not all, young researchers have managed to learn English well; it is important that those who lag behind understand that language skills are not a luxury, but a necessity for a researcher.

The patients' view – workshop group work. During the Cochabamba workshop (see Annex 12.5) four groups of managers and researchers from UMSA and UMSS, involved in the Sida Program, discussed problems and their possible solutions for Bolivian universities (see Annex 12.7 for details). The enthusiasm demonstrated by all Bolivian participants was impressive, and there is little doubt that the workshop already has had an important effect for individual participants. However, the analyses and conclusions reached by four discussion groups may be of considerable, general interest for a wide range of stakeholders (donors, government, managers, and researchers). The major problems/solutions identified and discussed by the groups are listed below:

Group A: Policy and management – main problems

- Policies are not institutionalized
- administration dominates academic issues and programs
- the academic structures are weak
- government does not keep promises, no continuity in policies
- there are no institutional policies for training of researchers
- there is a lack of articulation of national policies and university policies
- application and even dissemination of knowledge are insufficient or lacking

Policy and management – solutions

- Define institutional options/academic policies with high priority to research
- take academic concerns into consideration in the decision-making processes
- define the status of professor/researcher within the institutional structure
- establish mechanisms to secure the job situation for researchers
- develop and evaluate research activities
- increase participation of researchers in the administration of research
- increase the incorporation of students in research
- increase the interaction of the Vice-Ministry with universities
- articulate the function of CEUB
- establish better diffusion strategies
- establish wide-ranging collaboration agreements between universities
- organize regular inter-institutional meetings/research seminars (possibly financed by Sida)
- increase exchange of researchers between universities and support common research projects.

Group B: Research dissemination – main problems

- Lack of a culture for research publishing
- few Bolivian publications appear in international or indexed journals
- no incentive for publishing
- no quality control of domestic journals
- no efficient diffusion of research within the academic community
- no effective dissemination of research results to the community

Research dissemination – solutions

- Create incentives for publishing through student journals and student participation in conferences
- organize courses on scientific (creative) writing
- encourage improvement of English skills
- provide editorial support
- work through external and internal scientific committees
- make better use of web pages for research dissemination and information
- use mechanisms such as easy reading texts, audiovisual aids, etc.
- seek assistance from Communication and Education departments.

Group C: The future of research at Bolivian universities – problems

- Lack of research training activities
- lack of knowledge (and implementation) of the proposed (2001) national research policies
- university plans are produced without participation of active researchers
- lack of job security for PhDs
- lack of adequate research structures
- no training opportunities for researchers
- too weak inclusion of undergraduate students in research
- no inclusion of research within the national university system
- inefficient administrative and financial structures

The future of research at Bolivian universities – solutions

- Provision of training in research administration (through short courses)
- institutionalization of research coordination
- participation in research of local social actors
- guaranteed employment for returning PhDs
- develop (at UMSA) and implement research directives
- create research vice-rectorates at the universities
- facilitate the mobility of researchers
- provide incentives for retraining and upgrading

- reform curricula to include research for undergraduate students
- implement university systems for S&T research
- reduce bureaucracy

Group D: Research activities at Bolivian universities in support of educational quality and national development – problems

- Lack of an academic model centered in research
- lack of an administrative structure for research
- insufficient support from research to development
- low priority given to S&T and innovation

Research activities at Bolivian universities in support of educational quality and national development – solutions

- Establish a new academic model centered in research and a curriculum that integrate research with education directed to the solution of social problems
- integrate PhDs in undergraduate education
- emphasize scientific excellence in connection with promotion and filling of positions
- encourage a modification of university government
- (re)introduce a spirit of competition and criticism to research
- use the present crisis to provoke epistemological breaks
- encourage inter- or multi-disciplinary projects, integrating multiple universities and societal needs.
- create strategic alliances between universities and business, local governments, and development institutions
- set up foundations for regional research based development

On the final day of the workshop, the Evaluation Team met with representatives of UMSA and UMSS and the Vice-Ministry to discuss the outcome. This group also produced a brief synthesis of issues and recommendations (Annex 12.8) and the Bolivian participants expressed their commitment to, in particular:

- Work towards a better articulation between the two universities
- promote research that is focused on national development issues
- advance the development of human resources that can be directly applied in fields of urgent needs
- transform both the academic curricula and the administrative structures in order to improve the integration of research into higher education

A final word on the background for research capacity building in Bolivia. The reader should keep in mind that creation of research capacity in a developing country is a process that often takes place under a range of very difficult conditions (Thulstrup, 1998a). These conditions affect everyone, government, managers, researchers, and students. Although frequently overlooked by others, this is fully understood by the Team. However, an evaluation can only be efficient if it tries to highlight all significant weaknesses, and this is what will be done in the following.

4. The Sida Initiative

The Sida-SAREC program. The Sida department for research cooperation, SAREC, has since 2000 supported university research in Bolivia. This has been done centrally, through the Vice Ministry for Higher Education, Science and Technology, and locally, through two of the leading Bolivian universities, UMSA in La Paz and UMSS in Cochabamba. The two universities have received support through university research funds and grants for development of university research management. In addition, support has been provided for a number of individual research projects at the two universities, as well as for a Master program and the establishment of an ICT network at UMSA.

The Sida support for research in Bolivia for the period 2000–2005 was: SEK 2.6 million for the Vice Ministry, SEK 42.3 million for UMSA and SEK 40.5 million for UMSS. For the year 2006 UMSA will receive SEK 18 million and UMSS SEK 10 million. In addition, a total of SEK 20 million will be provided for the ICT network at UMSA. This latter kind of investment is presently not required at UMSS.

Support for the Vice Ministry. The support for the Vice Ministry has been used to develop policies and work a national system for science and technology, including the National Plan for S&T and the National Information System of Higher Education (SNIES). With the support from Sida, the Vice Ministry has directed its efforts towards:

- Promoting research in Higher Education.
- improving the design of public research policies
- assisting in the modernization of two small public universities
- strengthening the capacity of the Vice Ministry.

Two studies have been initiated: “National Study on the Labor Market in Bolivia” and “Study of the Impact of Educational Reform in Bolivia”. The first of these seeks to quantify and qualify labor demand and cross-reference it with labor requirements. The plan is to collect information for the implementation of political guidelines to generate greater labor market relevance in Bolivian Higher Education. It is an initiative of Bolivian private (“productive”) sector and the private universities as well as an industrial foundation was involved. Sida funds covered more than 20% of the costs of the study. Two dissemination seminars have already been scheduled, but there is yet no proposal from the Vice Ministry on higher education reforms.

The other study focuses on two topics: The structure and capacity of the higher education system and possible higher education quality assurance systems. The study is now completed; it is expected to be approved by the Higher Education Administration and will then be disseminated through the Fund for Quality (FONCALIDAD).

In order to improve public research policies, the Vice Ministry has contracted UMSS to develop a diploma program on higher education studies, and the results obtained by the first students of this program have already been published. Two further studies are being performed – one in the field of gender policies, the other on the access of the native Indian population to higher education, requested by “native” towns. The study on gender policies has produced elements of a gender sensitive curricular reform and plans to publish guidelines for university staff. Workshops have already been held in La Paz and Santa Cruz. The study on the native population’s access to universities focuses, among other, on the role of private universities. Two universities, Universidad Pública del Alto and Universidad de Pando (located in the Bolivian Amazon region), are supported in their efforts to improve and modernize curricula and upgrade staff qualifications. Finally, the Vice Ministry has used Sida funds for consultants and participation in relevant international events.

In spite of these efforts by the Vice Ministry, its actions are too scattered and hardly sufficiently effective compared with the need for establishment of public research policies and a national science and technology system. It is a weakness that the Vice Ministry has very limited influence over public universities associated with CEUB.

Strengthening of the research management at UMSA and UMSS. The Sida support for research management at UMSA will amount to SEK 2.1 million for the period 2004–6. Research performed at UMSA is centrally managed by the Department for Research, Training and Services (DIPGIS) which in 2003 produced a plan for development of research at UMSA. The plan is presently being implemented with considerable difficulty, but is supposed to be operative by 2006. The main problem is the lack of a research management system with all its components (a Master Plan, explicit processes and procedures, a qualified management team, and clear rules, known to all researchers). Moreover, DIPGIS, as a department immersed in the many bureaucratic and political problems of the UMSA, seems to be too weak compared with the need for effective research management. The current plan defines some priority areas, including improved research dissemination, and has initiated workshops and training courses for DIPGIS staff as well as for university researchers; the latter were trained in research methodology, etc. Some foreign consultants were involved in the training. Sida considers the success of these activities as well as a solution to related problems crucial for the continuation of the support for UMSA after 2006.

At UMSS the upgrading of research management is located in the Department of S&T Research (DICYT). The planned support for 2004–6 is also SEK 2.1 million. In contrast to UMSA, UMSS does have a Master Plan, which has been reviewed by international experts, and is implemented through a modern administration, with management and accounting systems and support in the form of ICT. The system has processes, procedures, tools and clear rules known by most researchers. The main objectives of the Master Plan include an analysis of the need for development research in the region, and a plan for improvement of the strategies and structure for research at UMSS. Emphasis is given to the selection, monitoring and evaluation of research and to the training of DICYT staff. Bureaucratic problems have been considerably reduced since DICYT in many ways functions as an autonomous body – a shortcut between researchers and the central administration, avoiding the traditional slow and tangled bureaucratic procedures.

The university research funds. The Sida-financed university research funds support research through a research council mechanism. Based on proposals, researchers may receive funding for (mostly minor) equipment, small parts, consumables (such as chemicals), conference travel, fieldwork, etc. Also research dissemination may be included, e.g. by provision of funds for publication costs.⁴ At both UMSA and UMSS the research fund is divided into three categories that, respectively, provide support for:

- Natural Science
- Engineering and Technology
- Humanities and Social Sciences (H&SS)

At UMSA the fund will start distributing grants in 2006, SEK 700,000 per category for a total of SEK 2.1 million. At UMSS the fund has been active since 2003; by the end of 2006 it will have distributed SEK 2.3 million to Natural Science, SEK 2.3 million to Engineering and Technology, and SEK 2 million to H&SS. It has given high priority to university-small industry cooperation.

The projects. The core of the Sida support is the upgrading of a number of specific research fields through individual research groups. These are selected in different ways at the two universities.

⁴ Note that most of the research journals that demand page charges from authors do not really expect to receive such payments, especially not from developing countries. Nevertheless, some of the projects pay page charges. *The first reply to a demand for page charges should always be a request for a waiver!*

At UMSS an annual competition defines thematic areas, the requisites, and the procedures for the selection of projects for support. The importance of, for example, teamwork, connection with research centers, and relevance for concrete societal problems is stressed. The proposals submitted are evaluated according to:

- Compliance with the announced conditions
- scientific quality (evaluated by two international evaluators, from outside UMSS)
- pertinence (assessed by three relevant members of the community, from outside UMSS)
- budget

The proposal is finally approved by a committee composed of the Vice Rector, the Director of DICYT, and three recognized researchers from outside UMSS, and a contract is signed.

At UMSA the process starts in the individual faculties, led by the deans; there is no external evaluation. The projects selected by the faculties are presented to the Committee of Deans from the seven faculties that are supported by Sida, which then selects projects for support. Although the Deans Committee is not part of the official administrative structure of UMSA, it is still powerful, but it seems to be more political than academic in nature.

The projects receive support in the form of scholarships for Master and PhD students, upgrading of the research equipment in the science based groups, and funds for other research expenditures. Most graduate programs are designed as sandwich programs, in which the students spend study periods both at home and with selected advisers abroad. In science-based fields all foreign advisers are located in Sweden, mostly at Lund University, in other fields a few advisers are located in Sweden, especially at Uppsala University, but most are in Latin America. The advisers of the graduate students often have a wider role within the projects. They may, for example, provide assistance with the laboratory upgrading in the groups, according to their expertise. In most cases the laboratory upgrading is very substantial and provides much improved opportunities for laboratory research and research based education.

Recruitment of graduate students. Provision of research training, usually at the PhD level, may be the most important component of the program. As described in more detail below, graduate students in many of the projects may be selected from an impressive pool of talent among undergraduate students. Initially, UMSS had an open recruitment policy, contrary to UMSA, where graduate students were selected only among those already employed (at least part-time) at the university. The reason for the open policy at UMSS was the awareness that the UMSS faculty might not always have the required qualifications (or even talent) for graduate studies, and would not fit the age requirements or have the necessary readiness to relocate. By making the selection process open to the community at large, better students could be found, and several young researchers without employment at UMSS were selected at first. Difficulties linked with how to integrate the new graduates in the institution (see below) have since then led to a policy change and now the selection of candidates for graduate studies at UMSS takes place within the group of University employees.

At first, an age limit was set (either 35 or 40 years) for persons starting graduate studies with Sida support, either by Sida or by the universities. As a result of this, many potential candidates were disqualified at first. However, Latin American professionals tend to start graduate school much later than their European and North American counterparts – often long after the start of their university career and establishment of a family. It seems that the age requirement has been waived in several cases, although it is not clear to what extent it is still being maintained as a formal requirement. It must be added that there frequently are considerable practical difficulties connected with graduate studies abroad for older staff, who tends to have many obligations at home.

Sandwich programs. The international graduate studies are usually performed as sandwich programs, with study periods both in Bolivia and abroad, and lead to foreign degrees. The sandwich model is usually very effective; it preserves the contact to the home institution, while offering the student access to modern research facilities and international exposure. As mentioned above, the most important foreign partner institution is the University of Lund, Sweden, for S&T studies, and the University of Uppsala, Sweden, and a number of Latin American universities for studies in H&SS. The reason for the choice of Lund was, among others, that Bolivian universities had a good relationship with this institution already before the start of the program.

Positive developments within the Sida funded projects. In spite of many years of very modest support for university research and research-based education in Bolivia, and the overall unsatisfactory state of research at universities and elsewhere in the country, several important, bright spots have appeared as a result of the Sida projects. First of all, although research careers in the country may not seem particularly attractive at the moment, the newly strengthened research activities at UMSA and UMSS are able to attract an impressive number of dedicated and very talented young people. It is also surprising, and quite impressive, that problem-based learning (PBL) is actually practiced with great success in many of the Bolivian projects. Numerous undergraduate students are involved in ambitious research projects within the Sida supported activities, and they are often producing results of good quality and high interest. More than anything else, the upgrading of laboratories, mostly sponsored by Sida, has made this increased involvement of undergraduate students possible. Without up-to-date laboratories it would have been very difficult to identify and activate the full amount of talent available.

Gender balance. As discussed in more detail below, the gender balance within the projects in the science-based fields is excellent, much better than the international average (see, for example, Cetto et al, 2001). However, it is overall very poor in the H&SS projects, apparently because of a male stronghold in these fields.



Fig. 4.1 Real Life and the Ivory Tower

A typical developing country before (left) and after (right) a university capacity building project – that makes little difference! Can this be done better in Bolivia? (Kornhauser and Kos, by permission).

Development priorities. Another encouraging fact is that much of the research in the Sida funded projects deals with real life problems, including problems in very poor regions, such as Lake Poopó and Chapare. These regions are characterized by a high biodiversity and are inhabited by indigenous people of ancient cultures. The development awareness, that is clearly present, might also facilitate cooperation with real life partners such as social movements, small industry or public agencies. This kind of real life cooperation is not particularly common in developing countries (Fig. 4.1), where university research often remains within the ivory towers (Thulstrup, 1999; however, see also Soewandhi, 1996).

Indigenous groups. Recent political developments in Bolivia, especially the presidential elections in December 2005, have demonstrated the growing importance of the indigenous population in the national arena. The large cultural and ethnic diversity in Bolivia requires that the research is even more focused towards interculturality in a way that it can promote a knowledge interchange and a bilateral relation between researchers and “wise” members of the communities. In the two universities the topic of cultural diversity is often perceived more as a problem than as an asset and opportunity. The type of relations that are established with the indigenous people is often one-sided and concentrates more on academic interests (from a mono-cultural perspective) than on a dialogue with traditional knowledge, methods, etc. As indigenous people say

“If we want to stop being mute and speak wise words, we must stop being deaf to the voice of the community”

Similarly, there is a lack of knowledge about procedures and international laws that protect “traditional knowledge”, cultural heritage and biodiversity. It is important that research on plant, animal and human genetics does not lead to bio-piracy and become part of the plundering of Bolivia’s heritage.

Research proposals. A positive development has started in connection with the establishment of the research fund at UMSS, financed by Sida. Provision of research support to teams, based on proper, well-documented applications, is not only more efficient, it is also much more educational than e.g. research investments that are selected and financed by bureaucrats. The application process helps improve the research culture and seems to be working well at UMSS, where the important research team-building now seems to be taking place. For example, when the possibility of obtaining such grants (especially targeting cooperation with small industry) was first announced in 2003 at UMSS, no less than 50 proposals were submitted; 17 of them were given support in the end, based on expert reviews. Some feedback on the strengths and weaknesses of the proposals was actually given to both successful and unsuccessful applicants. This is important; there is little doubt that the processes connected with the funds provide a valuable opportunity for provision of research guidance to applicants who want to upgrade the quality of their research activities.

Graduate advisers. Also the involvement of accomplished Swedish and South American researchers as advisers for both Bolivian graduate students and for the research projects in a wider sense, may help introduce the Bolivian researchers to the international networks in each specialized field. Several of these advisers visit Bolivia every year, and these visits tend to be highly valued at both UMSA and UMSS.

Internationalization. The ongoing effort within research training, that is a key part of the Sida support for individual projects, will improve both the formal and the real qualifications of the academic staff within the projects. Although formal qualifications cannot replace experience obtained from real life activities, the return of staff with new research degrees might help strengthen the individual project fields immensely. The fact, that the new PhDs have worked in another country, have seen other research management systems, and have established international contacts, will be of lasting value.

Communication and cooperation. In spite of this, insufficient international communication, especially the small number of international research publications, remains a problem. As shown in Table 3.3, international scientific publication is very limited in Bolivia and this shortcoming still holds true in most projects, as discussed in the following chapters.

In general, communication and cooperation with other researchers and users of research are not satisfactory; although many projects have natural partners in industry or the public sector and have a wish to make a difference in real life, cooperation with such partners is still quite limited. Cooperation of the projects with other Bolivian researchers in similar fields is also weak. Even cooperation and information sharing between different Sida supported projects is often lacking. This is frequently the

case both for projects that work in neighboring fields and for projects that work in the same geographical area. For example, while one project at UMSA knew how to handle the considerable bureaucratic obstacles to the use of a university vehicle for visits to small villages, another project did not; instead the students had to walk long distances in order to do their fieldwork!

The evil ghost: Bureaucracy. The positive developments would seem to facilitate a significant strengthening of university research in Bolivia in the coming years. Unfortunately, this scenario is threatened by a growing conflict between the researchers and the extensive bureaucracy at Bolivian universities, especially at UMSA. Conflicts between bureaucrats and active and dedicated researchers are also known elsewhere – such researchers want to develop their ideas when they are still new and do not want to wait for bureaucratic formalities that are considered irrelevant. However, in Bolivia the bureaucratic traditions are unusually strong and excessive. They may possibly have worked in a stationary system providing the same kind of educational services year after year. But in a dynamic system of knowledge generation they do not work at all. As a result, a collision between the new breed of dedicated university researchers and the bureaucracy seems almost unavoidable at UMSA.

For example, the purchase of even minor items with Sida funds that have already been granted, may take half a year or more at UMSA. It requires numerous signatures, including that of the University Rector. The negative consequences of this delay are many; among other, it may do serious harm to graduate studies within a sandwich model, in which active laboratory or field research is performed in Bolivia. At UMSS it has been possible to avoid problems of this magnitude by letting the management of Sida funds follow special rules outside the usual university bureaucracy. Nevertheless, at UMSS too, there are complaints about slow and excessive bureaucracy.

An alternative control strategy? The main reason for the immense bureaucratic effort is probably a wish to prevent misuse of funds. However, experience shows that misuse (or lack of use) of research funding, facilities or materials is more likely to occur after the research equipment or materials have been purchased. It is therefore surprising that there is essentially no control of possible misuse at this stage. It would make much more sense to replace most of the extensive (and sometimes destructive) controls before the activity (e.g. a purchase) with a control of the later use of the facilities. The questions asked might be, for example:

- Are the items acquired being used at all?
- if so, how much are they used?
- is instrumentation given proper service and is it well maintained?
- is it shared with other researchers?
- are the items used for training of students?
- does the use produce interesting research results?
- if so, are the published?

Such controls would tend to increase research productivity and not discourage it, as the present control mechanisms do.

The mother ghost: Low priority for research. Excessive bureaucracy in connection with procurement is not the only problem that threatens the development of university research in Bolivia as well as the expected outcomes of the Sida program. There are also other serious problems. Some are connected with the sandwich periods that graduate students spend in Bolivia, at UMSA or UMSS, as mentioned above. Several students have experienced financial problems during these periods, during which the Sida support for living costs abroad is not paid. Some students (from UMSS) are not formal employees of their home university and thus not entitled to any salary at all. Sida has in some cases paid living costs

for such graduate students. Others are employed only part time and their salary is thus low and often insufficient. But even those entitled to a full salary sometimes do not receive it, because of financial problems at the home university (e.g. near the end of the fiscal year). These problems discourage the students and make their research work and research training less efficient.

Furthermore, sandwich students with university employment are sometimes asked to perform extensive educational tasks during their time in Bolivia. This is probably considered compensation to their department for the long periods they have been away and unable to perform educational tasks. But such tasks severely limit their opportunities for doing research and are not a constructive strategy for a department that needs to upgrade staff and that want to excel in research. Although some limited educational obligations may be healthy for graduate students, it is absolutely necessary that these old-fashioned attitudes are changed, and that research activities for graduate students are given the highest priority.

Employing the new researchers. Finally, there is an ultimate threat to the upgrading of research at UMSA and UMSS, based on the Sida sponsored graduate training. There is a severe risk that these commendable efforts at the end may not fully benefit either of the two universities, and possibly not even Bolivia. The problem is already now visible and it will grow fast with the increasing number of new PhDs that starts returning to Bolivia. These well-trained young researchers, that would be able to significantly improve the research culture and productivity within Bolivian universities, will expect a regular position and a salary that, at least to some extent, reflect their new degree and their research accomplishments and competence. They will also expect benefits, such as a social security arrangement (e.g. health insurance) and a pension plan. However, it seems that the universities in many cases do not have resources for such arrangements. Nor is it clear if there is a will to do this.

This situation is particularly serious at UMSS, because of the number of graduate students without employment and the existing regulations and budget conditions. This is one of the reasons that UMSS lately changed the selection procedures for graduate students and has sent more senior staff members for graduate training instead of younger students. However, this is not a perfect solution at all; the reduction of opportunities for (recruitment of) young talents may be costly in the long run.

The contracts. The universities insist that since the graduate students have signed contracts with them before the start of their studies, by which they are committed to return to their respective university after graduation, they must do so. If they do not complete their degree or do not return, they have to reimburse their university. However, it is hard to imagine that the universities can expect the contracts to be fulfilled by the graduates, unless they can be offered suitable employment. It is not surprising that this situation already causes a great deal of uncertainty among the students approaching graduation, especially those who do not have a satisfactory university position (or any position at all) to return to.

Entering the 21st century: UMSA and UMSS. The universities feel that the graduate students who receive a Sida grant, are given a unique opportunity for improving their qualifications, for which they should be grateful (and even pay for, one way or another). However, the universities may overlook that it is an equally valuable opportunity for themselves to upgrade and modernize their standards to those required in the 21st century. When the students complete their research degrees they have basically fulfilled their commitment. It would be a terrible waste for the universities (as well as for the country) if they were unable to match the commitment of the students by providing suitable positions, especially for the new PhDs. In this connection it must be kept in mind that the age profiles at UMSA and UMSS are so that a substantial recruitment of new university teachers will be necessary within the next decade. A full solution will not only require that the universities find funding for the positions required, but also that research work and research accomplishments become recognized at the same level as educational efforts.

Project stages. Finally a word about the life of a typical Sida project. It is usually assumed that the support will last 10–15 years or so, and that the project develops considerably during this period. One may say that it is expected to go through three different stages:

- *Stage 1.* At first there is a great need for academic training, especially in the form of degree programs, and for upgrading of laboratories and equipment in based science fields (stage 1). The projects do not yet produce extensive outputs, but a great deal of research management training takes place; this often includes practice in competitive research funding, international publishing, etc.
- *Stage 2.* Later on, the projects often see a reduced need for research degree programs and the laboratories have become much more satisfactory, although progress in research may call for some additional equipment. However, the need for funding for active research, for example by newly returned PhDs, is increasing fast. Whenever possible, such funding could be given through small grants. The projects are now becoming much more productive; they have expanded the number of national and international research partners and regular publishing in international journals takes place. Based on this strength graduate programs may be established or upgraded, possibly in cooperation with other Bolivian groups in a similar field. The oldest of the Bolivian projects are entering stage 2 these years.
- *Stage 3.* Finally, the projects have become strong and independently productive. The cost of the research activities may increase slightly compared with Stage 2; repair and maintenance of equipment appear as an additional cost. Sida is gradually reducing its support for the projects. In return, the projects have started locating other kinds of research financing, for example from national or regional public sources, industry, international organizations, other bilateral donors, through MSc or PhD programs, or even through loans from development banks. With their documented productivity and experience in proposal writing, etc., the successful projects will be highly competitive in this connection.

So far, most of the Bolivian projects seem to follow this schedule.

5. Projects in the Humanities and Social Sciences⁵

There are 9 Sida-supported projects in this category, 5 at UMSA and 4 at UMSS. In general these H&SS projects are characterized by the following:

- At both institutions, the projects have been able to capitalize, on the one hand, of much talent among the undergraduate students from which good graduate students may be recruited, on the other, of well-prepared research staff among the University faculties
- the research mostly deals with issues not only relevant to the two selected geographical areas, but also to the wider Bolivian society; it is also extremely pertinent to theoretical research in the various branches of the Humanities and the Social Sciences covered by the specific projects
- the support from Sida has made it possible to perform essential fieldwork under good conditions, and has noticeably improved the quality of research outputs. It is expected that this should also have a positive trickle-down effect both in education and research, at undergraduate as well as graduate levels

⁵ Note that the present evaluation is not a detailed research evaluation and that the recommendations for the projects are of a general nature.

- the dissemination of research is generally below expectations, with only a few significant exceptions
- the overall gender balance is not satisfactory in H&SS subjects, with a 2/1 male/female ratio (see below)
- the success of the projects has been in part impeded by structural flaws at both universities that created problems in terms of lack of timely access to funds and resources, insufficient unburdened research time, and inadequate strategies for reinsertion of graduates at appropriate levels

Major benefits and deficiencies. Typically, all those involved in the Sida supported projects feel very positive about the Swedish assistance. Through this support, they were able to get equipment, hire personal, and – perhaps more importantly – obtain space and time to conduct their research:

“It was a gift from Heaven. Before Sida we were already working with international funding, but thanks to the Swedish cooperation, we now have access to funds more rapidly and efficiently”

“A 3-year financing means that researchers do not have to compete for their own position every year”

Elsewhere in this report, the problems dealing with contracts and reinsertion of the researchers and also administrative bottlenecks have been discussed. But in interviews with beneficiaries of the Sida program, other deficiencies were also brought out. One is the lack of horizontality and the limited sharing of information and resources between institutes, even when the thematic and logistic focus seem to overlap. This isolation even applies to graduate students at the same foreign university – but coming from different institutes at their home university – who do not necessarily form a relation of mutual support. Another inadequacy that was mentioned is the alleged lack of transparency and democracy in the control of resources at various levels of the system.

One of the most preoccupying flaws goes much beyond the implementation of the program or the specific projects. As mentioned above, Bolivian institutions of higher education tend to reproduce themselves. In a certain way, the Sida program may reinforce this tendency, by helping students become researchers, who may become professors and train new students in a closed environment. If indeed the universities need to renew their research and improve the quality of their researchers, it is also true that this change needs to go beyond the university. The improvement of higher education also requires societal transformation and employment options outside the university.

Research Strategies in H&SS. In these subjects, at both universities, the culture is primarily one of teaching, not research. What research there was has traditionally been very insular, disconnected not only from the private sector, but also from other research centers (in Bolivia or abroad) and even within the university, with little collaboration between research institutes. The only exceptions to this have been occasional cooperation with foreign universities, institutes and development programs. In such cases, members of both institutions have been able to benefit from the international relations to obtain a postgraduate degree in a foreign university. Systematization of this process through the Sida program may help create a critical mass of well-trained researchers who will in turn have a multiplying effect on the formation of young researchers.

In terms of theoretical production, and the significance and relevance of the research activities, Humanities and Social Sciences in Bolivia have traditionally been lagging. For example, UMSS has no Anthropology, History or Archaeology Departments. On the other hand, the research that takes place at UMSA within these important fields has often been characterized by theoretical conservatism and lack of inspiration. The exposure of Sida-supported researchers to new theories and ideas is likely to have very beneficial implications for the development of Humanities and Social Science research in Bolivia, which in recent decades has been mostly dominated by foreign researchers from institutions in Europe and the U.S.

Graduate Studies. Most PhD candidates in H&SS (19 out of 23) are doing their doctorates at universities in other Latin American countries. This might be explained by the fact that a shared language and culture may be considered to be more significant in those disciplines than in the sciences. Incidentally, the 4 remaining PhD candidates (all of them studying at Uppsala) are archaeologists, perhaps the most technical of the Social Science subjects.

All the graduate students are doing their coursework and research following the “sandwich” modality, spending periods of varying lengths both at their home institution and at the foreign university where they are conducting their doctoral studies. The rationale behind this modality makes perfect sense in terms of articulating work and research with academic activities (“the main advantage of the ‘sandwich’ is that doctoral candidates can give feedback on their research”). It also helps preserve the contact with the home institution and grounds the research in the very space where the new training will be applied. Nevertheless, the “sandwich” model has not always been successfully implemented. In some cases, the doctoral student on the Bolivian part of the sandwich did not receive the stipend the university is committed to giving him/her. In other cases, the student had to make up for time spent away from home and teach extra classes. This, of course, is extremely detrimental to the success of the candidates’ research projects and endangers the continuity and completion of their PhD programs. Additionally, some candidates have been told that if they do not complete their degree within 5 years, they must return the money spent on them by Sida.

The combination of those two pressures (extra demand on their time and financial threat) has been putting a lot of unjustified strain on some of the students.

Gender balance. Not only is the ratio between males and females involved in H&SS projects dramatically skewed in favor of men (roughly 2 to 1), this difference is conspicuous across the board, at all levels of involvement in the program, and at both universities. More preoccupying even, is the fact that the ratio of individuals involved in a graduate degree program (Master or PhD) is about 5-to-2 in favor of men.

Table 5.1. Gender Balance, 9 H&SS projects

	Females	Males
Master, completed	2	9
PhD, completed	0	6
Master, ongoing	6	12
PhD, ongoing	8	15
Technicians trained	3	5
Academic staff involved	19	28
Total	38	75

The overwhelming male-to-female ratio among those involved in the H&SS projects may be attributed to a lack of democratic and transparent selection. This issue has been much better handled in the S&T projects (see below). It seems like the H&SS area forms institutionalized systems where power and control (deanships, department chairmanships, etc.) is by and large in the hands of men, who often select other males as participants in the projects.

Research subjects. The pre-selection of geographical research areas (Chaparé for UMSS and Poopó for UMSA) is considered a very positive feature of the Sida Program. It means that the projects must not only focus on the geographical area but also are forced to (and have the opportunity to) concentrate on a complex assortment of interrelated issues. Many of the projects touch on the same issues (territoriality, ethnicity, etc.). However, there seems to be no attempt to articulate the various projects, pool human or material resources, or share results across projects.

Dissemination of research results. The dissemination of research results is probably one of the weakest points in most projects. This might be ascribed to the fact that traditionally, researchers in Latin America have seldom been pressured or even encouraged to publish like their European or U.S. counterparts. There is also little discrimination between venues of publication. Both UMSS and UMSA have in-house and sometimes institute-based publications that contribute little to the diffusion of research, although substantial resources are spent on this. The researchers in the various H&SS projects have published overwhelmingly less in international publications than in national ones, perhaps more for lack of custom than for lack of access.

In terms of overall dissemination, not only is the total output low (see below), in addition some of the projects have yet to publish a single article on their research.

Table 5.2. Dissemination of research results, 9 H&SS projects

International journals, articles	12
Bolivian, local journals, articles	52
Conference presentations	87
Conference proceedings, articles	37

Summary. In the following paragraphs, a brief summary of the relevance, soundness, feasibility, effectiveness, impact, and sustainability of this group of humanities and social science projects will be attempted:

- *Relevance.* By definition, the relevance of H&SS projects is thematically more direct than that of S&T projects, but their applicability is much more diffuse. All of the H&SS projects deal with the cultural context of development (ethnicity, language, settlement patterns, etc.). But, there again, those disciplines are less likely than the hard sciences to have an immediate relevance to the economic and social development of the region.
- *Soundness.* Most of H&SS projects have a logical construction and seem to develop and grow into new fields in a sensible way. A few of the projects, however, seem to have had as their main goal to get access to Sida support. The project definition for these is overly general and its construction appears to be more opportunistic than clearly based on a strongly expressed theoretical position or on a well-established line of research of the institutes involved. At least at first, such activities may be “projects” more by form than content, without a theoretical concern or a precise intervention field. Nevertheless, through the processes involved, it may be hoped that they will develop into real research projects.
- *Feasibility.* H&SS projects are generally quite likely to achieve their goals (general program goals as well as project-specific ones). There are a few exceptions, identified below, where the objectives are either too general (see previous paragraph) or, on the contrary, unrealistically ambitious.
- *Effectiveness.* The effectiveness of the H&SS projects has been directly affected by the administration problems that have created delays and bureaucratic bottlenecks. In many cases, progress in those projects must be almost entirely credited to the institutes and individual researchers who managed to reach their goals in spite of the lack of support from the university administration (in particular at UMSA). In addition, the overall effectiveness of the H&SS projects would be greatly improved if there were a more successful articulation between the various projects in terms of data sharing, multidisciplinary focus and better use of resources.
- *Impact.* The impact of the H&SS projects on societal problems is, for now, mostly indirect and contextual: research on cultural and social issues provides information that can (and should) be used towards building strategies that will remedy situations of poverty and economic distress in the region. Yet, as such, H&SS research is not directly affecting major development problems. On the other hand, the projects have had a tremendous impact on the development of researchers (PhD candidates, but also undergraduate students). The return of recent PhDs (if the conditions are right

for their employment in the institutes and departments) is likely to have a very positive impact on undergraduate education and the generation of new research.

- *Sustainability.* Most H&SS project managers and researchers are aware of the fact that Sida support will sooner or later end. They are aware of the necessity to find other sources of support that will guarantee the continuity of their projects. In various cases they expressed the interest in creating a self-sustainable structure (e.g. a consulting firm) that would generate project funds for the conception and execution of future projects.

Individual projects. The following section will present a brief description of the individual Sida-supported projects.

A Linguistic Vision of the Regions of the Basin of Lake Poopo and the Desaguadero River (UMSA)

The project that is being executed at the Bolivian Studies Institute (IEB) by a broad interdisciplinary team headed by a linguist, is extremely ambitious. The aim is to produce an Aymara encyclopedia. It is a multidisciplinary, integral cultural project that considers tradition, linguistic variation, myths, practices and the relation between oral literature and the physical and cultural environment. To date, they have produced and transcribed 200 hours of taped interviews in Aymara. The Sida support has been crucial in providing the project with the necessary equipment. The IEB project has received several prizes in national competitions.

In terms of the formation of human resources, there are 3 doctoral candidates (2 males one female) in this project and one (female) Master candidate, as well as 4 students working as assistants 10 hours a week.

Among the main problems identified is lack of time, when many of the principal researchers have to work in other institutions to support themselves. Another problem is the seemingly overbearing weight of the general project as opposed to individual projects: many researchers as well as the 4 assistants have been asked to work on portions of the general project instead of being allowed to develop their own project within this wider framework.

The feasibility and effectiveness of this project would be improved by setting achievable yearly goals within the overall long-term goals of the project. We also recommend a less hierarchical and more participatory coordination of the project.

Instruments of the Environmental Economy as Alternatives to Face the Relationship between Poverty and the Environment in the Area of the River Basin of the Altiplano (UMSA)

Behind the long title there is a fairly recent project that only started in 2004 and brings together, in what seems to be an ad hoc fashion, 4 different institutes: Institute of Economical Research, Institute of Sanitation Engineering, Institute of Architecture, and Institute of Agronomy, involving altogether 15 researchers. This is an odd mix that does not seem to have had time to jell yet. This project is one of those that seem to have been put together around the research project of one individual (one of the 3 doctoral candidates).

The general themes of the project are economy and environment and the broad intention is to carry out multidisciplinary applied research in the Poopó Basin, involving also the municipal governments there. They also plan to offer a diploma in Environmental Economy that could later lead to the creation of an MSc program.

The sustainability and effectiveness of this project depend on a clear definition of a truly collective project that would be thought in relation to the human capital and disciplinary focus of all the institutes involved.

Andean Territory and Rural Habitat (UMSA)

The project is located at the Research Institute of the Faculty of Architecture, Town Planning and Arts, and involves 58 faculty members doing research. Before the Sida involvement, there were only 7 academic staff members active in research. Four doctoral candidates (all of them males) and with teaching positions in the department are currently finishing their PhD. One of these researchers has been appointed professor at the University of Rio de Janeiro where he is studying. There is a deliberate attempt to focus on a collective project within the Institute rather than 4 individual research projects. Also, the 4 different PhD projects are considered to be addressing the same project at 4 different levels: the scale of the Andean territory, the scale of the Aymara region, the Andean community and the rural habitat. The 4 candidates benefit from the assistance of 10 undergraduate students.

The central theme of the project is territoriality. In terms of capacity building, besides the doctoral candidates, seven undergraduates are doing their final thesis within the project. In addition, establishment of a Master Program in Territorial Governance and Spatial Planning is being considered.

There is much cohesion between the individual projects and also a good articulation between the PhD researches and that of the undergraduates. An adequate access to human resources, and a clear structure of articulation between teaching and research, should allow for a satisfactory level of sustainability for the project.

The Territoriality in the Desaguadero and Poopó Region from an Integral Cultural View (UMSA)

The project is located at the Research Institute of Anthropology and Archeology, a young institute whose first objective was to open a dialogue between anthropologists and archaeologists. It is also a very small institute with few resources and without a proper budget. The Department of Anthropology pays for four part-time research positions, and the water and electricity bills. By contrast, the sociologists have 20 full-time research positions. The researchers at the institute typically also have educational obligations in the Anthropology Department. The Sida support has made it possible to train researchers in new techniques, and has increased the presence in the field. The two PhD candidates, a female and a male, study at Uppsala University in Sweden. Both of their theses deal broadly with territoriality: “Markas and Tambos in the Settlement Structure in the Quillacas Region” and “Uru-Chipaya Ethnoarchaeology: Occupation Patterns in the Poopó Region”.

The researchers expressed a concern about the sustainability of the Institute and proposed that it might function as a consulting firm to take advantage of the possibilities for contract archaeology offered by the government, highway construction projects and the gas exploitation firms. The small project staff is extremely well trained and capable of executing the project. The feasibility and effectiveness of the project (and therefore its sustainability) are limited by the small size of the staff, the lack of resources and the other demands on the researchers' time. An increase in support from Sida would have positive consequences for this project.

History: Dynamic Process of Interethnic Relationships (UMSA)

The project is located at the Bolivian Studies Institute. All four PhD candidates are females and study in other Latin American universities (1 in Mexico and 3 in Peru). The PhD research centers on mining city of Oruro and the immediate region, but focus on different time periods from colonial times to the present.

This project has been one of the most productive in terms of dissemination: Staff and students have participated in international conferences and have published books and papers on their research. Even their four assistants have been participating in conferences and developing their own research. It is a remarkably cohesive team where assistants are given space and initiative to develop their own ideas.

Also in this project the main concern has to do with time – for a PhD in History, research and writing tend to be very lengthy. All four PhD candidates are on the teaching faculty in the department of History. They haven't been given any time off for research and writing. When one of them asked for a sabbatical to work on her thesis, she was given one, but on the condition that she used it to do another research project unconnected to her thesis and write a book about it. Inexplicably, she did. This is one of the most successful and effective H&SS projects in terms of output and objectives met.

Human Settlements in Chaparé, Habitat/Architecture (UMSS)

The project is located in the Institute of Architectural Research and deals with architecture and bio-architecture, territorial organization and environment in the Chaparé. In a few years the project will have produced five MScs and four PhDs. Since the start in 2000, four (male) individuals have completed their MSc and are now doing their PhD: One in Mexico, one in Cuba and two are still shopping for a University (they are both considering either Chile or Brazil).

Initially, the project was co-administered between the Institute of Architectural Research and the Centro de Estudios Superiores Universitarios (CESO) which jointly created the project. Later, the former Institute took over the administration of the project. But this plural origin had an odd consequence: some of the doctoral candidates are not architects but sociologists or economists, and will therefore have to reintegrate their faculty of origin when they graduate, as the Institute of Architectural Research does not have any teaching positions. The Institute is also developing an MSc program in Sustainable Development.

Presently undergraduate students are in the Chaparé doing fieldwork as assistants of the Doctoral candidates. In exchange, the PhD candidates serve as tutors for the students' undergraduate theses. During periods of fieldwork the undergraduate assistants receive Sida support in the form of per diems and logistics. The project has a strong team of researchers that are well organized and effectively articulated. The prospect of long-term sustainability is good.

Sustainable Development and Conservation (UMSS)

The Institute of Social and Economic Studies (ISEE), belonging to the Faculty of Economic Sciences, is one of the oldest at UMSS, with 50 years of existence. The start of the Sida support to research has changed the way of work at the Institute: Research is now considered teamwork, rather than individual research. Today there are 13 active researchers in the ISEE, including five with Sida funding. Of the latter, four are PhD students in Mexico and one has just finished an MSc program in Chile. All are males. Two female researchers are working on their PhDs in the Netherlands with financial support from the Dutch.

Many of the subprojects, financed by Sida, seem to have a common idea of *production/distribution chains*, and several deal with the production and commercialization of indigenous products (e.g. canawa and aracacha). In some cases, rural organizations are involved in the execution of the subproject (aracacha project). In terms of dissemination, ISSE has its own journal, *Busqueda*, which was started with Dutch support, and now is being supported by Sida. The project has produced very few publications in peer-reviewed and indexed journals. The various subprojects plan to produce both academic books and didactic manuals to help rural communities improve the production and commercialization of their products.

The project demonstrates good sustainability and effectiveness, as it antedates the Sida support and as this support has been successfully integrated in the wider activities of the institute.

Pre-Columbian Cultural Dynamics: Anthropology/Archaeology (UMSS)

The Institute of Anthropology at the Anthropology/Archaeology Museum hosts the most atypical of all Sida-funded projects. The two male PhD students (both studying at Uppsala University) and the single female PhD students (studying in Mexico) are the only three professional staff of the Institute. Moreover, there is no Department of Anthropology or Archaeology at UMSS, thus the reproduction and diffusion factor of this project is not at first obvious. However, it is clear that the Sida support has provided valuable results in terms of improving research capacity and dissemination (publications). Furthermore, the future plans for the Institute include:

- continued development of new research activities
- improvement and expansion of the museum
- creation of an Anthropology/Archaeology degree program for a small number of students, perhaps linked with the Tourism and Architecture faculties.

If these three lines of activities are maintained and successfully implemented, then the Sida support will have been quite effective. The impact of this project may be considerable, given the public nature of the museum (the only museum in Cochabamba) and the multiplying effect of its activities. The sustainability of the project depends greatly on the positive and proactive initiative of the very capable project coordinator and director of the museum.

Natural Resources Management through History (UMSS)

The project is located in the Center for Population Studies (CEP). A PhD and an MSc student (both males) are studying in Mexico, but the latter is considering Uppsala for his PhD. The project follows the original design of the Sida Program, without any attempt to invent a project (or create an institute or form a consortium between institutes) in order to obtain financing for PhD candidates. Rather, the project presented to Sida, and also the two degree program projects, correspond to a research line that is central to the CEP. This deals with demographic dynamics and the agricultural frontier of the Cochabamba Tropics. The focus is the 6 municipal districts in the region, with a combined population of 150,000, creating demographic pressure on the natural reserve.

The remaining of the staff at CEP (an architect, a sociologist and three economists) also profit from the support of Sida and participate in the research of the doctoral candidates. They have elaborated several documents for Sida. Also undergraduate students working on their thesis participate in the collective project and their thesis research often derives from the research of the PhD students or other CEP researchers. Finally, they have good ties with local institutions working on development problems.

In terms of effectiveness and sustainability, this project is doing quite well, as Sida's participation has been to complement and support existing and projected activities in the institute. CEP is also planning that with an increasing number of PhDs on the staff, the Institute could offer a Master Program in Development and Population.

6. Projects in Science, Technology and Health⁶

There are 11 regular Sida-supported research projects within science, technology and health (S&T), 3 at UMSS and 8 at UMSA (the environmental economics project at UMSA is counted as an H&SS project). In addition, a single project supports a Master program in hydrology at UMSA, and a major activity will establish ICT facilities at the UMSA campuses, including a library system, and will provide extensive training for both staff and students (see below). The characteristic, general features of most of the S&T research projects are that:

- they have access to a large amount of talent among the undergraduate students
- the gender balance in the groups is very good (see below)
- the research deals with problems of fairly direct societal importance
- the support from Sida in the form of new equipment has in almost all cases improved the laboratory facilities extensively and helped attract new, talented students
- the research training supported by Sida will significantly improve the level of formal training for the staff, as long as the new MScs and PhDs are given university positions
- the projects are learning to take advantage of the competitive research funds, especially at UMSS
- many projects have built valuable equipment on their own or with the help of local, small companies or have designed elegant, low cost solutions to equipment needs
- the dissemination practices are unsatisfactory
- the bureaucratic systems at the parent universities, especially at UMSA, present severe obstacles to good and active research

Research Strategies. It is interesting to note a vanishing difference between the two universities. Most research at UMSA has from the start been purely academic; it has until recently remained within the ivory tower and contacts with industry and other users of research based knowledge have been fairly rare. In contrast, much of the research at UMSS has started out as applied research, in some cases as simple production exercises, e.g. separation and purification of local natural products. Through the Sida support the research activities at UMSA and UMSS have been able to approach a more healthy balance that includes both basic research and applications, that often may be suited for cooperation with industry or other outside users (Fig. 6.1). In particular, the modern equipment provided by Sida has made the research groups more interesting for industry (actually, the talent mass, that the equipment helps attract, might be even more interesting for industry).

It still remains a problem in many projects that cooperation with industrial partners and other users is weak, although the research subjects are all related to urgent national needs and opportunities and aim to define practical solutions in this context. This adds to the problems caused by weak contacts with relevant academic partners, including the frequent lack of participation in international networks. It is. By the way, remarkable that most of the S&T projects are concentrated within biochemistry in a broad sense.

Problem based learning and the recruitment of graduate students. Within the Sida supported S&T projects at both UMSS and UMSA it is common to involve interested and gifted undergraduate students in research projects at an early stage, long before their graduation (Problem Based Learning, PBL). Reports from different sources show that PBL works well in both industrialized and developing countries (Thulstrup

⁶ Note that the present evaluation is not a detailed research evaluation and that the recommendations to the projects are of a more general nature.

1998b, 2000). In addition to the benefits of the often quite impressive work of these students, this makes the projects able to better select the most suited students for the graduate programs, although the limitation of the field to staff members presents a problem. Nevertheless, the quality of graduate students in S&T fields is generally very good. It may be added that at UMSA some projects complained about insufficient clarity with regard to the selection of candidates for graduate studies. For example, it was not clear to several groups if the students must be part time or full time staff, or if they can be selected freely.

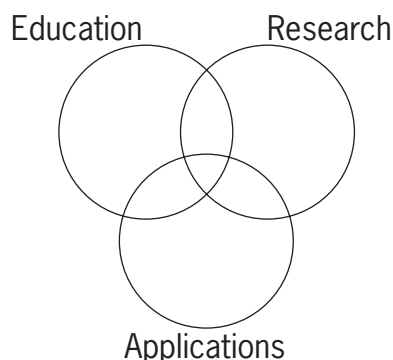


Fig. 6.1 Education, research and applications

Many of the projects aim to work in the fruitful area where education, fundamental research, and real life applications overlap (Thulstrup, 1999)

Laboratory upgrading. Essentially all projects have initiated a major upgrading of their research laboratories, based on Sida support. In all cases this seems to have been done in a sensible fashion, and the new instrumentation seems to be in good use. Often the Swedish advisers of graduate students have been helpful in connection with the laboratory upgrading, from the selection of instruments to their use and maintenance. In many cases, the instruments selected were similar to those the graduate students were using in Sweden; this way they were familiar with their use and service. The new equipment has helped change the laboratories into modern research facilities and has made possible much more undergraduate research, as well as industrial cooperation. So far, it is mainly the undergraduate students that have benefited.

In some cases, specialized equipment has been produced in cooperation with local companies; this often seems to have worked very well and has resulted in considerable savings. Many of the research groups have found ingenious low-cost solutions to common laboratory needs; unfortunately they usually do not publish such ideas. Some have even tried to hide them – low-cost still is not fashionable in Bolivia, while it would be admired in many industrialized countries.

Graduate studies. In the S&T fields most graduate programs, both at the MSc and PhD level, are sandwich programs with Swedish universities. The students spend part of their study time in Sweden, part in Bolivia, but the vast majority obtains Swedish degrees. In many research projects the time in Bolivia may be needed for performing specific tasks, e.g. to collect materials, such as natural products, or do other kinds of fieldwork. In other cases the main purpose of the periods spent in Bolivia is really to preserve the contact with the home base. In both cases, students often felt that the time they spent in Bolivia was less efficient, while all those interviewed felt that their work progressed well in Sweden, with only minor (and probably unavoidable) obstacles such as a busy advisor or waiting time at key instrumentation.

There are occasional delays in the graduate study program, partly caused by the problems during stays in Bolivia. However, delays in planned research activities are quite common and are often a result of the “unpredictable” nature of innovative research. The alternative would be to let students work on less innovative projects with guaranteed outcomes, but this would diminish both student learning and the value of the research results.

Some Bolivian students in Sweden were apparently not aware of all opportunities offered by the Sida program. Some complained that they did not know “their obligations and rights”. The obligations

should be clear: To do their best in the research training, but their rights, for example to support for conference travel, were less obvious. Some expected their Swedish adviser to pay (since this occasionally had happened), but were not aware of the opportunities to apply to the two university research funds for such expenditures.

Excellent gender balance. The gender balance in the 11 S&T projects is unusually good at all levels (considering 50% females and 50% males the ideal distribution). Among the teachers/researchers involved were 20 women and 27 men, while among the graduate students and those recently graduated with research degrees (MSc and PhD) were 29 women and 19 men. Among the technicians trained under the project were 22 women and 23 men. In total 71 women and 69 men were involved in the projects (Table 6.1). This is a much better gender balance than the international average in science based subjects (Cetto, 2001).

Table 6.1 Gender Balance, 11 S&T projects

	Females	Males
Master, completed	2	1
PhD, completed	1	3
Master, ongoing	12	8
PhD, ongoing	14	7
Technicians trained	22	23
Academic staff involved	20	27
Total	71	69

Weak dissemination of research results. The dissemination of results from the research is generally quite dependent on the work of graduate students in sandwich programs. On the average, until August, 2005, each project had produced 2.5 papers in international journals, 3.5 in Bolivian or local journals, they had made 4 conference presentations and 3 of these had been reported in conference proceedings, over a time span of 3–5 years. None have reported that patents have been obtained.

Table 6.2 Dissemination of research results, 11 S&T projects

International journals, articles	27
Bolivian, local journals, articles	37
Conference presentations	47
Conference proceedings, articles	31

The importance of international science publishing. As mentioned above, academic publishing in high quality, international journals is of high importance in several respects. It ensures constructive criticism from highly qualified peers (reviewers), spreads the message contained in the research results and methods to other researchers and to users of research based knowledge, and it provides access for the researcher to the informal global networks that exist within each research field. Therefore, the present publication rate and the overall quality of dissemination channels in the projects are in general not satisfactory. With the talent available and the present investments in equipment, training and manpower, one would expect a much higher average production of research papers. Most projects with such problems are aware of this, but in spite of the fact that today they increasingly produce research results of considerable interest, they are not comfortable with regard to the writing and the submission of papers to quality journals. It may be added that the Swedish advisers are optimistic about the development in this respect.

When asked why interesting research results had not been published, some replied that they did not have the money and manpower required for creating their own journal! Apparently they did not even consider submitting their results to existing journals. Others said that they did not personally know any

relevant editors, although they were well aware of useful journals in their field. This is a severe mistake – most good science journals have also good editors, who not only treat papers based on their quality, but who also go a long way to help inexperienced authors, even if they are completely unknown to them.

The present lack of confidence has sometimes led to the creation of local journals which tend to be expensive (in time and money) compared with their limited usefulness, and which do not provide the benefits of real academic publishing mentioned above. On the contrary, they often do not provide quality reviews, they only spread the information to a very small number of relevant readers, and they rarely help establish contacts with relevant researchers elsewhere. In addition, publication times are often long (more than 1 year must be considered unacceptable); thus, publication in only local journals may in reality help hide the research and research groups involved in the work.

Summary. In the following a brief summary of the relevance, feasibility, effectiveness, impact, and sustainability of this group of 11 science, technology, and health projects will be attempted:

- *Relevance:* In theory, the relevance of the S&T and health project themes is generally good; either in the form of a potential, direct impact on societal problems, e.g. in the health, environmental, or food projects, or in connection with economic growth opportunities. Clearly, increased economic growth is a precondition for successful solutions to most societal problems in Bolivia and to the needs of the large indigenous population
- *Feasibility:* All projects in this group have realistic opportunities for successful outcomes, both in terms of research training, academic research results, and within a wide range of real life applications, development contributions, etc. However, it is too early to say how feasible the transition from academic research outputs to real life applications and outcomes will be
- *Effectiveness:* The effectiveness is generally quite good with respect to research and research training, but low with regard to academic communication (including publishing) and practical applications of the research results and skills. It is a major concern that many S&T sandwich students experience severe problems during their stays in Bolivia, which reduces the efficiency of the otherwise efficient sandwich model considerably. This is one of the reasons for delays in the graduate programs of individual students, but most of the delays seem fairly minor. It must also be kept in mind that fixed time schedules do not go well with the unpredictable nature of research and that delays are hard to avoid completely
- *Impact:* So far, the impact is mainly of a less practical nature, for example, the formal, academic qualifications of the staff are improving considerably. It is highly important and commendable that a large number of talented, young students are exposed to (and in many cases experience real excitement over) modern research practices in several of the projects. However, societal impacts are so far quite limited, although it seems likely that several of the projects may easily increase their impact on development and poverty reduction considerably, both directly and indirectly. Furthermore, it should not be overlooked that the expected improved quality of university graduates in key fields eventually may have a significant societal importance
- *Sustainability:* Even if Sida decided to withdraw all support on a short notice, some of the benefits would survive. These include the improved laboratories, the higher academic staff qualifications, and the modernization of education and research practices that has resulted from the exposure to modern university research based education, e.g. in Lund. Also the research management procedures established at UMSA would improve sustainability. However, for most projects, it would at the moment be very difficult to establish the required, international academic ties in the individual research fields and to establish the important connections with real life applications of the academic knowledge

Individual projects. In the following section, a brief description of the individual, supported projects will be given.

Chemical Process Technologies (UMSA)

The group has concentrated on two major, related, fields:

- Hydrolysis to sugars and later fermentation of Bolivian straw and other native plants from the Altiplano (highlands) for the production of alcohol (ethanol, C₂H₅OH)
- production of biogas (mostly methane, CH₄), primarily from various kinds of waste and cattle manure (from Llamas). This work is supported by studies of anaerobic processes

The group is presently looking for new microorganisms for fermentation, such as native fungi.

The group is also currently scaling up the size of the activities to pilot plants, and is using mathematical modeling to follow the processes.

The expected Sida funding between 2000 and 2006 will be close to 5 M SEK. This is more than ten times the support received from the University, and is by far the major investment in the project.

The Sida support covers a wide range of expenditures: Equipment and consumable, fieldwork and allowances during fieldwork, travel, subsistence grants for PhD students abroad, literature, and travel, salaries, etc. for staff at Lund University involved in the graduate training programs as well as overhead to Lund University.

A single Master student has completed her graduate education and two PhD students and a Master student are presently pursuing their degrees. One of the PhD students is expected to graduate in 2006. Major equipment has been purchased with Sida funding, including a Biofermentor, a High Pressure Liquid Chromatograph (HPLC) and a Gas Chromatograph (GC). The group is convinced that the availability of such modern equipment will facilitate contacts with local industry, which earlier has been limited. It is clearly important that such cooperation is strengthened, and the group is in contact with the National Industrial Chamber (on a biogas project), local slaughterhouses, as well as farmers.

One opportunity for further industrial contacts would be to organize seminars and workshops for relevant users of the research results. A pilot plant may be useful in this connection. Finally, cooperative agreements with a larger number of academic research groups, both in Bolivia and internationally, should be established.

In recent years the group and its students have published more regularly, with 3 recent papers published or in print, 2 submitted and 2 in preparation. This is, in particular, an outcome of the graduate training in Sweden.

Development of new Products and Improvement of Traditional Technologies for Tropical Roots (UMSS)

The project is located in the Institute for Research on Food and Natural Products. The main activities are research on Andean and tropical roots and physicochemical, microbiological and nutritional analyses of food. Currently this group is receiving support from two donors: Sida and CIUF (Belgium). The group has five research laboratories, three physicochemical laboratories, one microbiological laboratory, and one nutritional laboratory well equipped with sophisticated instruments, received from the two main donors. Among other, the instrumentation includes gas and liquid chromatographs atomic absorption and other spectroscopic instruments as well as other basic instruments for analytical work. Recently, also a pilot plant has been built for processing work and development of new products. The purpose is to characterize and develop processing methods for underutilized tropical roots for the benefit of the local population. In this connection, the group has also assessed the nutritional status in three rural communities in the Parque National Carrasco.

The project has produced one MSc graduate, and two PhD students are approaching completion of their studies with degrees from Lund University. The cooperation with the adviser at Lund University is fully satisfactory. The total Sida support amounts to 3.6 million SEK; close to 2 million SEK of this was invested in equipment. The excellent facilities, together with an increasingly competent staff should form a suitable background for closer cooperation with local food industries. However, the group has to strengthen their academic publication practices, which at the moment are too limited and too dependent on the work of the PhD students. Other staff should get much more involved.

The group is a member of the international Lanfood network, which include relevant centers in Peru and Colombia. This might be very useful, but in Bolivia the project seems to work too much in isolation, and there is certainly no reason for this. With the talent available in the group, the good laboratories, and interesting research activities, it should be possible to increase both industrial cooperation and academic publishing and cooperation. Such contacts would be essential for a further development of the group.

Antioxidants in Andean Foods of Bolivia (UMSA)

This new project targets the study of antioxidant activity in Andean foods by a number of analytical methods; among the main goals is an identification of the active antioxidation compounds in the food. It is also planned to study the antioxidant activity as a function of plant species and of the altitude it grows in. The altitude determines the amount of UV radiation the plant receives. It is hoped that the group eventually may become a reference center for food quality. Initially the work focused on foods produced around the Titicaca-Poopó basins but has been extended to foods from other areas.

The support from Sida started in 2004, and the project has received a grant of 1.8 million SEK for the first 3 years. Part of this will be used for new equipment, but unfortunately, the delivery has been delayed due to the UMSA bureaucracy. The resulting lack of equipment has led to a delay in the intake of undergraduate students for research projects, although there is a considerable interest for the subject. However, one PhD student has started his studies in food technology in a sandwich program with Lund University; there is so far complete satisfaction with this arrangement. It is expected that another PhD student can start fairly soon.

The group is eager to pursue both cooperation with industry and authorities, and is aware that international publishing is a necessity. Another major priority is to increase the intake of talented, undergraduate students that can take advantage of the new equipment. With a larger group of undergraduate and graduate students involved in the research activities (which is expected after the planned equipment renewal and upgrading) it should be possible to proceed with these plans.

Plant Biodiversity (UMSA)

The natural product chemistry research of the group deals with highland plants, important for local, poor communities. It is the plan to help these communities use the plants in a more sustainable way. Especially the photoreceptor, antioxidant, and antimutagenetic properties are investigated. So far, 30 plants have been selected for phytochemical and biological studies, and several have shown interesting properties, e.g. *Junellia scriphiodes*, that is a natural source for oleanolic acid.

It will be a major improvement for the work opportunities, not only of this group, but of several other Sida supported projects, when an NMR (Nuclear Magnetic Resonance) instrument is installed in the near future. It has been purchased with the help of the Swedish counterpart, and financed by Sida. In addition to the Sida supported groups also many other researchers at Bolivian universities, and possibly also industry, will benefit. All users will be billed for the instrument time, and this will create funds for the maintenance of the equipment.

In connection with the NMR instrument, the UMSA administration has been exceptionally flexible and has provided a position for a person (trained through the project) to be responsible for this expensive and important instrument. Also the space needs for the new (and heavy) instrument have been satisfied.

The Sida support, totaling about SEK 5 million (including SEK 2 million for the NMR instrument) has been important in several respects:

- It is upgrading the formal qualifications of the group – one PhD has already been produced and 3 more will graduate within the coming months, through sandwich programs (60% in Bolivia 40% in Sweden) with Lund University
- the research equipment in the group's laboratories has been greatly enhanced, in particular with key analytical instruments, primarily HPLC and the NMR instrument soon to be delivered
- several new lines of research have been established, based on discussions with the Swedish counterpart
- cooperation with new partners have started, both within academic research (at UMSA, Lund, and in Uruguay), and industry (LAFAR S.A., Bolivia)
- academic publication has improved significantly, e.g. with papers in the Bolivian Chemistry journal, but especially international publishing will have to be improved
- the new equipment has improved the conditions for undergraduate research; one of many advantages is that a talent pool of young students has been created

Although the group thus far has had some success in the cooperation with the UMSA management, bureaucracy is still considered a considerable obstacle to efficient research. On the other hand, there is great satisfaction with the cooperation with Lund University.

Natural Products from the Cochabamba Flora (UMSS)

Long before the Sida involvement the project started out as a development project, partly in support of local industry. Valuable oils and other natural products were identified, extracted, and sold to local companies or used to make their own commercial products. With time, the need for more basic research activities became obvious, not only a search for useful natural products, but also identification of the active molecules including a structure determination. The access to support from Sida opened a timely opportunity for this shift, or rather expansion, since the traditional activities will not be abandoned. Laboratory equipment has been improved and funds for chemicals, etc. have become available. The group has also invested in several pilot setups for extraction and separation, and these will still be used. The future availability of an NMR instrument at UMSA in La Paz will open several new possibilities for the group. The total Sida support amounts to SEK 3.8 million. As in other Sida-supported projects, the group has in many cases been able to produce large-scale (e.g. pilot) equipment locally at considerable savings; in addition it has developed many low-cost solutions to laboratory needs. Much of this work would have wider interest, but so far it has not been published.

The group has increasingly and successfully involved talented undergraduate students in the research. Furthermore, three PhD students are working in sandwich programs with Lund University. All three are expected to complete their studies in 2006 and the group has made presentations of their research at international conferences. However, as a further illustration of a general problem in many projects, although much good and relevant research is going on, it is not properly published. Clearly, one of the major needs of the group is to improve its publishing practices. It is necessary that it starts a regular production of papers for international journals; this will not only secure high-quality, constructive criticism; it will also open the access to the important international networks in the field. It must be added that the Swedish adviser is optimistic in this regard.

Microbial Biodiversity (UMSA)

The project objective is to form a strong research group within biotechnology in the School of Pharmaceutical and Biochemical Sciences, at the Institute of Investigaciones Fármaco Bioquímicas (IIFB). The idea is, primarily through PhD students, to create a group with a specialized competence in key areas of biotechnology fields, supplemented with MScs and undergraduate students linked to this competence nucleus. This will make it possible to deal with environmental challenges and health problems of local and regional importance, and to initiate collaboration with local industry. The latter is considered important; so far, a pilot-scale water treatment plant has been started in cooperation with a tannery industry in El Alto. After the return of the first two PhDs in the near future, the group should be able to pursue increased domestic cooperation, not only with industry, but also with other Bolivian university researchers.

The two PhD students have worked on, respectively, microbial degradation of petroleum derivatives and sulfate reducing bacteria for heavy metals precipitation. They are expected to defend their theses in December, 2005, at Lund University. A third PhD student has recently started her studies in enzymatic and microbial technology. In the coming years, it is planned to expand the research training activities within the areas of biogas generation from organic materials, bioactive molecules of microbial origin, and biodegradation of chemical recalcitrant. IIFB is also expanding research activities in the health field, based on vegetal and microbial biodiversity, e.g. within traditional pharmacopoeia and medicinal plants related to diseases such as Chagas, Leishmaniasis and Malaria. The graduate training (performed in a sandwich mode) takes place in cooperation with the Biotechnology group at Lund University and there is considerable satisfaction with this arrangement. Also the Swedish advisor's regular visits to Bolivia are considered very valuable for the buildup of the group in La Paz.

The Sida support, totaling about SEK 4.5 million, has made it possible to improve equipment and research infrastructure in the group, although the funds are not sufficient for a pilot plant that is on the wish list. The graduate programs will improve the formal qualifications of the group significantly – both the two PhD students to graduate soon have university positions. However, a critical mass has not yet been reached. The academic publication rate has increased, to a large extent as a result of the work of the PhD students, but will still need to be strengthened. With continued Sida support and further support from other sources for industrial cooperation, the group sees no major obstacles to its development plan, except the unsatisfactory bureaucracy at UMSA, which is considered a huge problem.

The group has attracted an impressive amount of talent among undergraduate students and the enthusiasm in the group is high. These students have already produced excellent results and have also been well trained in English. The prospects for this group seem excellent.

Biotechnological Transformations (UMSS)

Since the start of the Sida involvement in 2000, the project has expanded to new research areas through two phases (2000–2003 and 2003–2006). Today, the activities include:

- Biodegradable plastics
- Anaerobic digestion
- Exopolysaccharides production
- Amylases production
- Bio-leaching
- Feather degradation
- Pigment production
- Antibiotic production
- Antioxidant production

Some of these activities are continuations of old projects, but several represent a growth of new branches into relevant neighboring research areas, especially those that are important in a local context. So far the main partners at Lund University have been within the Biotechnology Department, but new initiatives also include cooperation with Biochemistry and Medicine. In addition, the plans for the third phase of the project (2007–2010) include cooperation with partners in Argentina and Brazil.

The project has benefited considerably from the graduate training opportunities in Lund; one PhD has already graduated and returned from Sweden and two more will graduate by the end of 2005. Several MSc students are also completing their studies and 3 new PhD students are expected to start in the near future.

The funding from Sida has also been substantial, SEK 8.5 million until now, compared with a total of SEK 1.1 million from Bolivian sources. Of the Sida support over SEK 3 million was spent on equipment and other major investments, thus the group is today well equipped.

Partly due to the well-equipped laboratories, the project has been able to attract an impressive amount of undergraduate talent; this is a major strength of the project. It has also been able to expand its international publishing, to a large extent due to the PhD training activities in Lund. The group has formed links with other research groups, and it should also be ready for a major expansion of the amount and level of its cooperation with industry. In this connection it is satisfactory that the plans for the third phase include establishment of innovation clusters.

Water Resources Evaluation and Management of the Basin of Lakes Poopó and Uru Uru (UMSA)

The main activity in the project is a quantitative evaluation of the surface water resources in the basin of two major lakes in a very dry region. The insufficient amount of water resources is a huge problem for the population in the large (24,000 km²) basin, where the 300,000 inhabitants primarily earn their living from agriculture. The water resource database, geomorphologic map and other outputs, that are being created with the help of advanced software, are of considerable interest to local and national authorities and will form the foundation for further research projects, also at the undergraduate level.

The work is based on many sources of information, from satellite imagery to field studies based on GIS systems. The project has placed meteorological equipment or improved nonfunctional equipment at the stations in the basin that belongs to the Bolivian Meteorological Service. The equipment installed (data logger) is able to monitor rain, temperature, relative humidity, and evaporation. In addition, 18 water gauge stations have been established, which are able to monitor water levels and water flow. Acoustic Doppler equipment is also used, at first in cooperation with IRD of France, but the group recently acquired its own instrument.

The project has received around SEK 3.7 million in support from Sida and very little, except salaries, from other sources. The Sida support has made it possible to purchase needed equipment, especially powerful computers, which are very important for the project. So far, the project has produced 2 MScs and another 2 MScs and 2 PhDs are progressing with their studies, in a sandwich program with Lund University. Although there are some delays, there is considerable satisfaction with the cooperation with Lund. The project has been able to attract a great deal of talent among undergraduate students and this is seen as a promising development.

Although maps and an impressive book have been published, regular academic publishing is too limited and must be strengthened considerably. In addition, the project must do more to help poor stakeholders in the basin by providing information material that targets their needs in a language they can understand.

Water Resource Management: Hydrochemistry (UMSA)

This project also concentrates on the Basin of Lakes Poopó and Uru Uru (see above). The goal is to develop the best possible strategy for water resource management in the very dry area and to perform a hydrochemical evaluation of the basin, which contains several industrial contaminants, such as heavy metals, for which concentrations grow through the food chain. Also natural (primarily arsenic) pollution is a major problem – the lakes are special because of their low depth, high salinity, fast evaporation, and the small amount of rainwater received. The studies include analyses of airborne pollution, as well as of water and sediment samples.

The project has developed diagnostic methods for a better and safer use of the limited water resources, which may be a key ingredient for an improvement of the quality of life for the 300,000 inhabitants of the basin. Academic publishing in the group has been strengthened and now includes international dissemination as an integral part.

The project has received around SEK 1.2 million in support from Sida and around SEK 1 million from other sources. This has made it possible to purchase needed equipment and computers. So far, the project has produced 3 MScs and 1 PhD, and another PhD is in the pipeline in a sandwich program with Lund University. The project has initiated cooperation with academic partners, in Bolivia and abroad, as well as with local communities – users of the knowledge that is being created. This latter cooperation is very important and should be further emphasized. An agreement with the arsenic specialist group at the Technical University of Stockholm (KTH) has recently been signed, and a PhD student will start work there in a sandwich mode, which seems to be a sensible development.

Infectious Diseases: New Therapeutic Strategies (UMSA)

This new project is located at the SELADIS Institute at UMSA. It has four main objectives:

- to evaluate molecular tools for diagnosis, identification of species and evaluation of possible therapies for Bolivian patients suffering from Leishmaniasis
- to examine the relation between the clinical response to treatment and the cytokine profile
- to be able to distinguish between reinfection and relapse through a genetic characterization of patients and parasites, and
- to develop Leishmaniasis products based on a traditional natural product, Evanta (*Galipea Longiflora*)

Many Bolivian patients cannot afford the conventional drug against Leishmaniasis, glucantime. It is the hope of the group that it will be able to identify an alternative treatment, especially a drug that is cheaper than glucantime and is non-toxic. Cooperation with the Health Ministry and two hospitals has been initiated and field visits to a heavily affected, poor area have been made. The number of samples collected from patients in this area was so large that the group now works week-ends to complete the analyses.

The project started receiving Sida support in 2004. So far, less than SEK 2 million has been disbursed and an improvement of the laboratory equipment has started; however, the group's laboratories are already fairly well equipped, thanks to the cooperation with the university hospital, etc. Two PhD students have started their studies in Stockholm.

The project has not yet produced any publications, but has presented initial results for local, relevant users of their research results. It is important that the group get started on proper academic publishing as soon as the first results are ready. This will help expand the important dialogue with other research groups in the field, including the Microbial Biodiversity project at UMSA. The bureaucratic practices at UMSA are considered serious obstacles, e.g. for field work, but also the duties that staff members have to do services at the SELADIS Institute make it difficult to find sufficient time for research.

The group has attracted a large number of excellent undergraduate students that are making good progress within different sub-projects. After the recent field trip to an affected area, where the students met and collected samples from Leishmaniasis patients, their motivation is extremely high; they felt strongly that they had an obligation to do something for these victims.

Diarrheal Diseases: Diagnosis, Pathogenesis, and Potential Vaccine Applications (UMSA)

This project, also initiated in 2004, aims at identifying and characterizing the main bacterial (*E. coli*) and viral pathogens, isolated from small children that have been hospitalized with severe diarrhea. This disease is a severe problem in many developing countries, especially among the poor. The project has already produced several interesting results, including:

- Diagnostic methods for ADD-associated pathogens (rotavirus and others)
- systematical data on *E. coli* and rotavirus among small children hospitalized with diarrhea
- characterization of epidemiological and genetic rotavirus
- establishment of a national rotavirus surveillance network in Bolivia, in cooperation with the Ministry of Health, in order to evaluate the planned use of an anti-rotavirus vaccine

So far, the project has received SEK 1.7 million from Sida; this is by far the largest source of support for the activities. The money has been used for equipment, expensive reagents, and computers. The project has produced 2 MScs and one is in the pipeline. The selection of a student for a sandwich PhD program with Sweden has unfortunately been delayed due to the political unrest in Bolivia. The project considers the present bureaucratic practices at UMSA as a potentially destructive factor, as discussed elsewhere.

In connection with the rotavirus network, cooperation has been established both with the relevant authorities, but also with hospitals, and researchers at UMSS and University Gabriel Rene Moreno in Santa Cruz. However, the project still needs to strengthen its national contacts further, as well as its international cooperation. For this, more extensive international publishing of the excellent research results obtained will be required.

The project has been able to attract an impressive amount of talent in the form of undergraduate students, who are not only talented, but also highly dedicated. In view of the interesting and valuable research activities and the amount of talent available, there seems to be no reason for project to remain outside the highly useful informal, international networks in the field. The first PhD program should be started as soon as possible; this may be very helpful with respect to international contacts as well as international publishing.

Master Degree Program: Sustainable Resource Management (UMSA)

Emphasis on training. This project is not a regular research project, but a graduate training addition in the Institute of Hydraulics and Hydrology. Whereas other institutes planned a graduate program around their research project, this institute obtained funding for a separate MSc program on Water Resource Management. The logic of this separation is that the more specialized PhD students (who act as teachers in the program) work in Poopó only, while the Master students work on water management in general, but not necessarily in Poopó. The Master program opened in 2004 with a large number of students, now reduced to 15, mostly in-service students. The total cost per student is \$2,800 for the duration of the degree.

The Master program deals with systems of water resource management for the whole country, for instance in Cochabamba (that recently suffered a political crisis caused by access to water), or in the water basin of the Pilcomayo in Tarija. The timing of the program is excellent, as the Bolivian parliament is currently working on Water Resource legislation. An inter-institutional water council has been

created, and last year an Irrigation Law was passed. There will be much demand for graduates from the program. Most of the students already work for state institutions and some even get state financial support for their studies. It is unlikely that the market will be saturated any time soon. The Institute plans to rotate this MSc program with another on Water Resource Engineering. There is also the option of taking the courses in a single semester for a diploma instead of an MSc degree. The Institute publishes an in-house journal and the students' research will be presented to peer-reviewed and indexed international journals.

Academic staff. The institute currently has 3 PhDs on its staff. Two more are expected to graduate this year and another two in 2007; they will be added to the staff. The other teachers in the program are specialists in management from other institutions, all of them with an MSc or PhD. Contacts have been made with the UNESCO International Hydrological Program to bring in speakers and the French IRD and the University of Toulouse are sending teachers for the program. Also the National Meteorological and Hydrological Service has offered to participate. The possibility of organizing a joint graduate program with UMSS and the University of Tarija is being considered.

ICT upgrading (UMSA)

The upgrading of the information and communication technology facilities at UMSA is a project of high quality with respect to its timeliness and design. Providing UMSA with a complete information and data transfer system, using the most advanced IC technologies, will benefit both research and educational activities by both staff and students. The project intends to make the whole university community efficient ICT users through extensive training efforts, thereby gradually generating an ICT culture at UMSA.

The construction of a high-speed network using optical fibers, has made it possible to connect all university buildings, spread over large area in the city. In this connection constructive cooperation with various agencies, especially the electricity services in La Paz, may be very useful. Partly in order to satisfy the needs of indigenous groups a large amount of social and cultural content is included in the project, demonstrating the possibilities of ICT in terms of participation in the globalization process without a loss of cultural identity and values. The use of local languages (Aymara, Quechua) as well as English and Spanish is a good example of this.

Unfortunately, the implementation, and project administration has suffered some setback and the project delays are substantial. After replacement of the Swedish partner (in Lund) by another in Stockholm (at the Royal Technical University) and recruitment of a large group of young and highly committed project staff, the future looks more promising.

Since it is planned to evaluate the ICT project separately, no further details will be given here.

7. Conclusions

The higher education crisis: Only a problem or also an opportunity? The Chinese word for crisis consists of two characters: The first means *problem*, the second *opportunity*. This is also the case in the present higher education crisis in Bolivia. Fast technology change, globalization, and other international developments make it necessary for Bolivian universities to upgrade their activities from those of more or less advanced teaching institutions to modern universities. In particular, the Bolivian universities must become able to support national development through research-based solutions to development problems and, in particular, production of university graduates with a relevant research background. The Sida initia-

tive provides an opportunity for a significant upgrading of this kind in a number of development-related fields. In addition to these direct benefits, the Sida program will make it possible for both universities and the Vice-ministry to gain experience in how a wider upgrading of university research and education may best take place.

Sida-SAREC has a long experience with efficient creation of academic research capacity in the Developing World (Olsson, 1996, Thulstrup, Fekadu, and Negewo, 1996), including earlier support for two social science research institutes in Bolivia. One important reason for the high success rate of Sida is that it includes broader aspects of the capacity building. Examples in the present case are the inclusion of research council activities and support for research management at the two universities, support for the Vice-ministry, and the ICT support for UMSA. In Bolivia the Sida strategies have been further refined to emphasize real life use of the capacity, in particular through the selection of projects.

The Vice Ministry: Sand castles? In spite of the work on the formulation of policies, reformation of processes, and the definition of an S&T (research) plan for the country, little has happened in practice at the national level. In particular, the plan has not been implemented. Even with the support from Sida the Vice Ministry has little capacity for action; among other, its possibilities are limited by the continuous changes in leadership and technical personnel. As a Vice Ministry staff member said: “Processes here are like sand castles; after every tide you have to build them again”. Still, the Sida support has led to some progress on the design of the national plan, progress that may prove useful whenever the political situation is stabilized. The plan seems useful, and may, if it can be implemented, significantly improve the connection between university research and national development.

Improving research management at UMSA and UMSS. It is clear that the outcomes of the management reforms at the two universities have not yet been sufficient, in some cases they are hardly visible. The situation seems to be particularly difficult at UMSA. Clearly, managers have not yet realized that research is dynamic, not stationary like old-fashioned teaching, and the understanding of the needs of active researchers is still low among university administrators. This may to a large extent be due to the widespread lack of understanding within the universities of the role of university research and the resulting low priority given to it. The present emphasis on technical skills of the staff UMSA may have to shift to initiatives that improve the understanding among all, including students, of the benefits of active university research. The Team has noticed that the special practices used at UMSS for the management of Sida funds has reduced the dissatisfaction among researchers somewhat, but there is still room for improvement, also at UMSS.

The research funds. The research fund management at UMSS follows a clear policy; the processes are consistent and transparent and are directly administered by DICYT. There seems to be a high commitment to institution building, which will improve the sustainability. The research fund management model seems innovative, creative, effective and practical, and may be copied at other universities, including UMSA. At UMSA there is a constant, serious risk of bureaucratic and political problems. The Deans Committee that controls the research fund is more a political unit than an administrative or expert group. There is presently strong pressure from powerful groups outside the committee to “democratize research”, i.e. redistribute, or spread out, the research funding. This is a dangerous plan, since efficient research by nature is not democratic in this way. There must be rewards for good performance and relevance, and none for mediocrity and irrelevance.

The projects: Early successes. Many of the selected research projects have already been successful in several respects. They have, for example, attracted a large number of bright undergraduate students, their graduate research training, mostly done in a sandwich model, has progressed successfully, although with some delays. A large number of new PhDs and Masters are now about to return to Bolivia. In the science-based fields laboratories have been upgraded significantly and generally successfully, and these new facilities are being well used by eager, young researchers. Often low-cost and local solutions have

been cleverly used in this connection. The research funds are changing the culture through their demand for well-documented proposals, and the cooperation with foreign advisers of graduate students is in most cases both friendly and productive. Often these advisers have become involved in several aspects of the projects, far beyond the graduate training. Finally, the ICT project at UMSA will further help staff and students enter the 21st century. If successful, it will, among other, strengthen education, research, as well as inter-university and international communication, and the potential benefits seem huge compared with the costs.

Attracting talents. The main strength of many projects is the impressive amount of young talent, primarily in the form of undergraduate students, which they have been able to attract. Not only the relevance of the research projects, but also the equipment provided by Sida, has been important in this context – it has made new, interesting and more satisfying research activities possible in the improved laboratories.

The gender balance. It is highly satisfactory that the gender balance in the science based research projects is very close to 50/50. These are subjects that internationally often have problems getting hold of the female talent, but the situation in Bolivia is much better, almost ideal. Unfortunately, the H&SS fields are poorly gender balanced, usually (but not always) because of a dominant participation of males. The present share of women among H&SS graduate students that receive or have received Sida support is only 27%. It is not clear what these projects are trying to do, if anything, to improve the situation.

Spanning the gap between basic research and applications. There seems to be a healthy aim, especially among S&T and health projects, to span the gap between basic research and applied research, related to local problems and opportunities. This is highly commendable and suitable at a university; it will facilitate real life research applications and upgrade the educational activities, especially research based education. The themes of most research projects are characterized by a considerable relevance for both academic problems and for development issues and local problems. This relevance was often part of the philosophy from the start of research activities at UMSS, while it has developed much more recently at UMSA.

Indigenous groups. According to the most recent demographic information, Bolivia's indigenous groups account for more than 55% of the total population. It is also among those groups that the highest levels of poverty and extreme poverty are found. This high social, ethnic, and cultural diversity in Bolivia may be increasingly incorporated in at least some of the Sida supported projects, for example in connection with possible support for poor communities, interculturality, and traditional knowledge.

But all is not well. In some respects significant improvement is still required by the projects. With the impressive talent available and with the facilities and funding provided by Sida, many projects should be able to be more productive in terms of dissemination. These shortcomings include the modest outputs from academic research activities, where more international publishing is needed in order to establish valuable international contacts and obtain competent, constructive criticism. This is particularly frustrating, since research results of interest are being produced in many projects. Research publishing within Bolivia is not satisfactory either. In spite of progress in e.g. Physics and Chemistry, the Bolivian research journals are not sufficiently supportive of the research in the country, and a rationalization is badly needed.

It is satisfactory that many projects deal with subjects of direct development relevance. But too often have these research interests not been fully implemented in the form of extensive cooperation with research users, such as industries and authorities (Clark, 1998), as well as other parts of society, especially poor and indigenous communities. In some cases, opportunities for social, economic and cultural relevance are lost by not considering the high ethnic and cultural diversity in the country. In general there is a lot to gain in real life applications; even the applied research, which is performed in the projects, often looks fairly "theoretical". Finally, cooperation between the Bolivian universities, includ-

ing cooperation between Sida-supported projects, could also be much improved. This might improve the mobility between Bolivian universities, which is presently much too low. The low mobility limits progress in research and education, and an improvement would strengthen university research considerably.

The frequently insufficient or missing cooperation between Sida supported projects, both projects in neighboring fields and projects working in the same geographical area (or both) is sometimes hard to understand. An improvement in this respect is clearly an important opportunity for increased efficiency. The November 2005 workshop in Cochabamba brought potential partners among projects together and seemed to succeed in improving communication between projects sharing common interests.

Thus, there is reason for some optimism. Also the international publishing, for example, is expected to improve in the coming years, when a large number of PhD students graduate and return to the renewed laboratories in Bolivia. With time, the cooperation with small industry should be facilitated by the new laboratory facilities and a rich supply of talented undergraduate students, while different Sida supported projects are getting to know each other better, especially because their graduate students share laboratories abroad. However, most projects must still do more to increase the openness towards other researchers, including other Sida supported projects and towards local users of research.

Although the graduate studies generally progress well, and most delays must be considered “normal”, the problems experienced by many students during their sandwich visits in Bolivia are frustrating. Also the tendency to select older staff for graduate training, rather than young talents, is worrying.

So far, neither the projects, nor the Vice Ministry have been able to change the university priorities significantly. Even in connection with the selected projects, research is often given very low priority – PhD students on their sandwich visits in Bolivia are not given the needed time and opportunities for research; promotions, pay raises, and recruitment are not sufficiently based on research qualifications and productivity, etc. The contracts about their return, that graduate students have signed, make no sense unless the universities can provide them with satisfactory positions, in accordance with their qualifications.

Bureaucratic inefficiency. It is also a serious problem that the bureaucratic inefficiency, earlier tolerated in the old-fashioned teaching institutions, has collided violently with the needs and spirits of active researchers. The vast majority of projects consider bureaucratic delays and other inefficiencies the main problem in their work. Even though UMSS has found a way to give special treatment to procurement funded by the Sida grant, and thus have prevented many of the delays, there are still occasional complaints about excessive bureaucracy at UMSS. At UMSA, it seems that little improvement has so far been possible and the dissatisfaction among the researchers is very severe.

It seems clear that active research cannot be managed according to the old bureaucratic system and major reforms are needed. There is, for example, an obvious need to replace most of the immense administrative control, that presently takes place before a research investment is made, by a later evaluation of the outcomes of the investment (in terms of research results, research training, etc.). In general, output and outcome measurements should be key tools for the management in research universities.

Project progress. According to the project stages discussed at the end of Chapter 4, project success depends on the ability of the projects to follow a fairly strict schedule. All projects are presently in Stage 1 or have just moved into Stage 2. They are heavily involved in academic training mostly in the form of degree programs, upgrading of laboratories and equipment in based science fields has taken place. Some projects have started to produce more substantial outputs, and have gained some experience in competitive research funding, international publishing, etc.

The projects that have now moved into the second stage see a somewhat reduced need for graduate training and their laboratories are becoming quite satisfactory. On the other hand, the need for funding for active research, for example by newly returned PhDs, is increasing fast; especially support in the form of small grants may be very useful. Some projects are becoming much more productive; they have expanded the number of national and international research partners and have started publishing in international journals.

8. Recommendations

The Universities UMSA and UMSS

*Individual Research Projects*⁷. The main strength of most Sida supported projects is their access to young talented researchers among undergraduate students, together with the graduate training and the much improved (laboratory) facilities that are now available. These advantages must be exploited as much as possible. The undergraduate research activities, performed in many projects, produce excellent training and often good research results. In addition, they make a selection of talented students for graduate training possible and it is imperative that all projects give such opportunities to young talents.

However, an emphasis on talent is not simple. It must be coordinated with the positions presently available in Bolivia as well as the need for future recruitment in each field, both in the academic sector and outside. In other words, a long-term recruitment/placement plan must be established by field, in cooperation with university managements and with other Bolivian stakeholders. It is necessary to reconsider the present practices for selection of graduate students, it is important that whenever possible, outstanding talents, even without university employment, are given opportunities for further training. On the other hand, older staff should not be forgotten, but in many cases individual staff development programs may be a more suitable option for them than degree programs. When asked, several of the Swedish advisors have declared their willingness to take part in such programs.

Projects in H&SS must do much more to correct the gender imbalance. There is little doubt that the projects have many female talents among their undergraduate students, and they must do much more to motivate them for graduate training.

In order to limit waste due to insufficient cooperation between researchers and projects in neighboring fields, or in the same geographical area, the individual projects should establish fora within their research field or geographical area for cooperation on both academic and practical matters. This should include an exchange of information on how to handle not only the university bureaucracy, but also field visits, visits abroad, etc. Also mobility (exchanges, etc.) between research groups within each field should be promoted. At the November 2005 workshop in Cochabamba many projects agreed to work together and try to do much more at the project level, instead of just wait for the university managements to take action. This policy change is highly recommended.

In general, the projects must give higher priority to communication, including international publication and research cooperation. Some projects have paid expensive page charges to international journals; this is usually not necessary and they should try to avoid it in the future. Cooperation with other researchers and inter-project cooperation must be strengthened. The same is true for cooperation with authorities, communities, and small industries that may benefit from the research. The improved laboratories and the work power of many talented, undergraduate students should make the groups highly attractive for

⁷ Note that the present evaluation is not a detailed research evaluation and that the recommendations to the projects are of a more general nature.

outside partners, but the project must be much more active in their search for them. Organization of course and workshops for industries and other knowledge users may be useful in this connection.

The projects must give the highest priority to the research work of their graduate students, e.g. by giving them time for research instead of demanding excessive involvement in educational activities during sandwich visits in Bolivia (however, a moderate involvement may be useful). Finally, plans for remuneration of graduate students during their sandwich visits in Bolivia must be worked out before the need occurs. If university funds are not available Sida funds must be mobilized to cover living costs in Bolivia.

It is very important that the projects keep track of their general progress in terms of the project stages. If they fall behind their plan, action must be taken. Presently, the older projects must make sure that they are entering the second stage in all relevant respects. In general, from an early stage, the projects must keep in mind that they will have to develop alternative financing for a future without Sida support.

The graduate students. Although the graduate studies abroad generally take place without major problems, there are reports about uncertainty and worries among new students with respect to practical problems, especially in Sweden. The (former) graduate students in each relevant location abroad should together work out a manual (5 pages or less) that provides new students with advice on all relevant issues.

The universities. First of all, each of the two universities must make a major decision: Will they facilitate their entrance into the 21st century by giving research and research based education a much higher priority? If they want to do so, they must not only streamline, but radically reform their administrative procedures so that they are able to handle research activities (and researchers). They must also make a strong case to staff and students for increased emphasis on research and research based education (i.e. “popularize research”).

Especially UMSA must demonstrate that Sida funds, provided for a strengthening of research management at the universities, produce clear results. It would be useful to make an annual survey among the research projects in order to see if the satisfaction is improving continuously (from the present very low level). If progress can not be demonstrated, the strategies must change. Support for activities that need strengthening, for example courses in scientific publishing, must be intensified. Whenever possible, such course activities should include participants from projects at both UMSA and UMSS, in order to improve their interaction.

It is important that UMSA uses the research fund well, when it starts distribution of grants in 2006. It must ensure that the fund supports only good and relevant research; at the same time it should try to promote and popularize good university research. An alternative to the power given to the politicized Deans Committee would be to strengthen DIPGIS by adapting the more successful structure and practices developed at UMSS. This may require a research master plan at UMSA, in which DIPGIS is given responsibility, e.g. for the research fund management.

In general, UMSA should learn as much as possible from the experiences gained at UMSS. This includes the selection of projects for Sida support, for which the procedures at UMSA are not satisfactory. It is necessary to bring in outside (foreign) reviewers and to replace (university) policy concerns with greater concerns for quality and relevance.

The evaluation of proposals for research fund and project support offers a unique opportunity for provision of research guidance. It is important that applicants (both successful and unsuccessful) receive as much feedback as possible.

It would be a major step forward if most of the excessive control measures at the universities before the start of research activities were changed to the much more relevant and productive controls of research outputs and outcomes, with rewards for good performance, as discussed earlier. UMSA should as an urgent, first measure consider a special treatment of Sida research funds, like it is done at UMSS.

With regard to the ICT project at UMSA it is imperative that the university fully supports the project and takes advantage of the new opportunities, for example in connection with an open communication to both staff and students.

The universities must take a more active role in the planning of research upgrading and recruitment of research trained academic staff, e.g. participate in the staff planning in specific fields mentioned above, starting with the fields supported by Sida. The universities must improve the rewards in terms of salary, promotion, etc. for research degrees and research accomplishments in general. They may also consider establishing Vice Rectorates for Research.

The contracts about their return, which the Sida financed graduate students have signed with the universities, should only be strictly enforced if the universities are able to offer the graduates suitable positions. If not, a relaxed practice must be used, e.g. by allowing them to take jobs elsewhere (preferably in Bolivia). The universities must also ensure that students in graduate sandwich programs have access to research funds and are paid what they are entitled to during visits in Bolivia; it is imperative that they are able to concentrate on their research.

The universities must use the information available, e.g. from small grant applications, on project progress, and must help projects move effectively through the project stages.

The Vice Ministry

The Vice Ministry should support administrative university reforms that help upgrade research, e.g. through training activities for university administrators. Initiatives that secure improved use of research trained manpower must be supported. Promotion of increased mobility of researchers may help secure a better use of this manpower.

The Vice Ministry should clarify the present state of scientific publishing in Bolivia, including a survey of the present Bolivian research journals (costs, authorship, readership, quality control, publication times, etc.) and support improved publication habits, e.g. by mergers of journals or through course activities.

Most importantly, the Vice Ministry should proceed with the science and technology plan and protect it from bureaucratization and irrelevant political interests as a first step in the consolidation of a national science and technology system.

Finally, an attempt should be made to improve the cooperation between the producers of knowledge (at the universities) and the users (including small industry) through organization of meetings or financial incentives, e.g. for establishment of innovation clusters. Several Sida supported projects would be relevant in this connection.

Sida

Sida must set clear demands to the universities, especially UMSA, in order to ensure an efficient administration of project funds, with administrative practices that support researchers instead of infuriating them. The present situation is not sustainable.

Sida must give opportunities for older university staff to obtain research upgrading without having to enter graduate programs, which are often not practical for them and where they take up space for young talents.

Sida should give high priority to projects that, directly or indirectly, are able to improve conditions for the poor in Bolivia, including projects that are able to increase economic growth in general. Thus, Sida should encourage projects to open up for cooperation with users of research, from the fostering of intercultural relationships with indigenous groups to participation in innovation clusters. Sida may

consider financing university-industry workshops or courses. Demands for a closer cooperation between related projects should also be made.

Sida should encourage dialogues with indigenous cultures, inclusion of qualified PhD students from indigenous groups, research that benefit poor, indigenous groups or include intercultural issues in practice, and of training activities on how to recognize, protect and incorporate traditional culture and knowledge in modern research.

In order to facilitate the full participation of Bolivian researchers in proper international networks, Sida should consider directly financing courses in scientific publication for project researchers that need help in this respect. Courses like *“How to write a good paper”*, *“How to publish a paper”*, etc. have worked well elsewhere. In cooperation with the Vice Ministry, Sida may even consider supporting a rationalization and strengthening of Bolivian research journals in project-relevant fields, as it was done by the Nordic Publishing Board many years ago.

Sida should also encourage and facilitate research cooperation within and between the universities. The need for increased collaboration between researchers at UMSS and UMSA was strongly expressed by the participants at the Cochabamba workshop. Such a move should be seen not only as a step towards better efficiency and efficacy of university-based research, but also as a shift towards a much needed transformation of the public university structure in Bolivia.

In cooperation with the universities, Sida must carefully follow the project progress through the stages and give proper warnings if a project falls behind schedule. It must increasingly stress the importance that projects prepare for a future without extensive Sida support.

9. Acknowledgement

The Team was received with warm hospitality and provided with valuable assistance by managers and other staff in the Vice Ministry and the central administrations of the two universities. DIPGIS at UMSA and DICYT at UMSS organized visits to Sida-supported projects and other stakeholders with great efficiency and flexibility. Also a number of experts outside the Ministry and the universities generously gave their time and advice to the Team.

Both the Bolivian students visited in Sweden and their Swedish advisers were very helpful and provided both their time and insight to the Team. Also the Sida-SAREC staff in Stockholm was helpful in many ways.

In cooperation with the Team, DICYT organized the Cochabamba workshop and helped make it into an intellectually stimulating, educational, and pleasant experience for all. The enthusiasm and hard work of the participants were impressive.

Last, but not least, the researchers, other staff, and students in the individual projects were wonderful hosts who made the communication with the projects both pleasant and efficient. Especially the enthusiasm demonstrated by the young students for their research and its potential benefits to others was highly inspiring for the Team.

The Team is deeply grateful to all for this kindness and assistance, and we highly treasure the many new friendships that we formed during the evaluation.

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Annex 1 Terms of Reference

Evaluation of the Research Co-operation between Bolivia and Sweden – Past Experiences and Future Direction

Evaluation Purpose

The evaluation encompasses the entire research co-operation with Bolivia; the two universities UMSA and UMSS, and the outcome of the support provided to the Vice Ministry for Higher Education.

The overarching objective of the evaluation is to evaluate the past experiences, including the thematic set-up of the programme, and to give guidance on the future direction of the research co-operation with Bolivia, as well as function as a learning process to the involved stakeholders. The evaluation will thus be formative and analyse the effectiveness, impact, sustainability and relevance of the research co-operation. The evaluation shall be based on participatory methods to strengthen the local initiative and ownership of the programmes.

The design of the research co-operation with UMSA and UMSS is new and experimental among Sida's bilateral research programmes. This evaluation should analyse how the concept works, what its strengths and weaknesses are, how it can be further improved and provide lessons learned.

This evaluation should also analyse and elucidate past achievements, results and experiences, also in relation to the thematic set-up, and based on this also provide recommendations on how the co-operation can be further improved and the future direction of the research co-operation with Bolivia.

Findings from the evaluation will be used in the preparatory process of identifying the components and the direction of the future research co-operation with Bolivia. The evaluation will furthermore provide information to the stakeholders in order to further improve the programme, as well as provide lessons learned for initiating and designing new programmes in other parts of the world.

Intervention Background

Since September 2000, Swedish support has been provided to strengthen research capacity and research management at Bolivia's two largest universities, Universidad Mayor de San Andrés (UMSA) in La Paz and Universidad Mayor de San Simón (UMSS) in Cochabamba. The co-operation with the two universities comprises strong support to thematic research in natural sciences and technology and social science and the humanities on environmental and cultural issues, respectively.

The main objective of the co-operation is to assist the universities in their efforts to strengthen research capacity and research management. This is done by research training of staff members, by creating conducive research environments, promoting research on topics that are important to Bolivia and by planning and setting priorities for research. The general aim of the programme is to build up analytical capacity at the universities in these areas, enhance the quality of education and create a basis for qualified research and postgraduate training. The basis for the co-operation is research training through the "Sandwich Model".

The research programme is multidisciplinary and addresses defined geographical areas in the Bolivian High Plateau (Altiplano) and in the tropical districts and it relates to poverty reduction. At both universities, research training is conducted in similar scientific areas. The purpose is to create mutual research interests and stimulate collaboration between the scientists at the two universities UMSA and UMSS.

In addition, support is provided to the Vice Ministry for Higher Education for studies aimed at promoting a university reform at a national level.

Sida's current Agreements of co-operation with UMSS and UMSA are valid until 31 December 2006 and with the Vice Ministry for Higher Education to 31 December 2005.

Since the beginning of the programme in 2000, Sida's support to the whole research co-operation in Bolivia amounts in 2004 to MSEK 86, out of which UMSA has received MSEK 29, UMSS 23 and the Vice Ministry for Higher Education 2,6. For the remaining years of present agreements 2005 and 2006, MSEK 18 and 20 are allocated to UMSA and UMSS, respectively. In addition to the research programme, a total of MSEK 20 has been allocated for building up an ICT network at UMSA.

Further information can be found in Sida documents.

Evaluation Questions

The evaluation shall specifically analyse the following aspects of the research co-operation:

Objectives and relevance

- To what extent, at a general level, have the support to the two universities (UMSS and UMSA) reached the *general objectives* of the research co-operation between Sweden and Bolivia.
- Analyse and describe the *relevance* of current research in the programme to the development of the country in light of the aim to reduce poverty through help create conditions that will enable the poor to improve their lives.
- Analyse and describe the *relevance* in relation to other developments of research and research training at the universities, including funding from other donors, external training (stipendiates). Analyse the present situation of *resources for research* at the participating universities.

Institutional administration and management

- Describe the present *research management* at the participating universities and assess possible bottlenecks. Assess the research co-operation's impact on the research management; to what extent has the research co-operation contributed to improved research management?
- Analyse and describe existing mechanisms for setting the *priorities and strategies* for research and research training at the universities. Describe present strategies. Assess to what extent the co-operation has contributed to the process of setting the priorities and strategies at respective university.
- Assess to what extent have the support contributed to the *modernisation and reformation* process of the universities participating in the co-operation. Does the research training influence the reformation process at the participating universities?
- Assess to what extent the research coordinated by the Vice ministry has contributed to formulation of *national policies and plans* for scientific development and research at Bolivian universities and implementation of reforms at the public universities. Assess the benefit of the support to the Vice ministry.

Research capacity and research environments

- Analyse and describe the *past achievements* in the co-operation in terms of outputs; number of students enrolled, general progress and number of graduated MSc students, also in relation to those begun studies.
- To what extent has *research capacity* been built? Assess to what extent the programme has contributed to creating a "critical mass" of competent researchers in specific areas.
- Analyse the *feasibility* of implementing the programme. What have been the opportunities and bottlenecks of the co-operation (i.e. quantitative and qualitative experiences)?

- Assess to what extent the research co-operation has contributed to viable and sustainable research environments; to what extent does the programme lead to capacity to formulate research problems and proposals as well as design research projects?
- Analyse the *effectiveness* of the co-operation. Has the research training lead and contributed to the achievement of both project specific goals and general objectives, has it influenced MSc and undergraduate training? Does the means lead to the goals?

Thematic set-up of programme

- Analyse how the *thematic and multi-disciplinary set-up* or design of the programme concept works. What are its strengths and weaknesses, comparative advantage and has the co-operation benefited from the set-up? Has the multidisciplinary approach increased and improved the collaboration between faculties – in what way? Has it strengthened or weakened university or faculty priorities for research?

Academic quality

- Asses the scientific *quality* of the research conducted and results obtained, including the studies coordinated by the Vice ministry.
- Asses the scientific *value* of the projects.
- Asses the *applicability* of the results obtained from a developing country perspective.
- Asses the merits of the *methods* used.
- Asses the *capability* of the project leader and staff both in Bolivia and in Sweden.
- Asses the *adequacy* of existing research, facilities and equipment.
- Asses other considerations or viewpoints which may be of importance.

Recommendations and Lessons

The evaluation is expected to provide Sida with at least the following *recommendations*:

- How can present research co-operation with Bolivia be improved and more effective.
- How can the research co-operation's contribution to viable and sustainable research environments be further improved.
- How can the research co-operation's contribution to improved research management be further improved.
- What can be the future directions of support. Discuss. In relation to poverty reduction through help create conditions that will enable the poor to improve their lives.
- How can the thematic and multi-disciplinary set-up or design of the research co-operation be further improved.

The evaluators should draw *lessons learned* from the evaluations findings.

Methodology

The evaluation is seen as a learning process and shall be based on *participatory* evaluation methods. The methodology to be used, shall be identified and elaborated by the evaluators. Self-evaluation as a part of the evaluation should be considered.

Prior to the initiation of the evaluation, Sida shall brief the team leader at a meeting at Sida in Stockholm in May. Sida shall provide necessary information and documentation to the evaluators about the programmes. The evaluators shall develop and present an *inception report*, including plans and methods to be used, to Sida before the mission in Bolivia.

The evaluators shall make their own travel and meeting arrangements to fulfil the assignment.

Work Plan and Schedule

The evaluators shall present the detailed work plan and schedule in the *inception report*. The frames of the evaluation is that the activities shall take place under a period of time stretching from May 2005 to January 2006. A *draft report* should be submitted 15 October 2005 and two *workshops* shall be held where the draft report is presented and discussed; one at Sida in late October with participation of representatives from the Bolivian universities, the Swedish counterparts and Sida and a second in Bolivia with participation of the Bolivian stakeholders in November. A *final report* should be submitted by 31 January 2006. The total time is limited to 22 consultancy weeks.

Reporting

The evaluation report shall be in English with a Spanish summary. The outline should follow the Sida format for evaluations (Annex B of the Evaluation Manual). A completed Sida Evaluations Data Work Sheet should be presented along with the report. The final version should not exceed 50 pages excluding annexes. The report shall begin with an Executive Summary and close with a selection of Conclusions and Recommendations.

Five copies of the draft report shall be submitted to Sida no later than 15 October 2005. Two copies of the draft report shall also be distributed to UMSA, UMSS, the Vice ministry of higher education and to the Swedish embassy in La Paz no later than 15 October 2005. The draft report shall be presented for comments at the two workshops as discussed above.

The final report shall be submitted to Sida no later than 31 January 2006 in five paper copies as well as in electronic form in Microsoft Word for Windows. The evaluation report will be assessed against standard quality criteria for evaluation reporting. A presentation of the final conclusions shall be carried out at Sida in February 2006. The final report shall be translated into Spanish by Sida.

Subject to decision by Sida, the report will be published and distributed as a publication within the Sida Evaluations series.

Evaluation Team

The evaluation team shall consist of the three members Erik Thulstrup, Jean-Jacques Decoster and Manuel Ramiro Muños. Erik Thulstrup has been appointed team leader. As a group the team has broad experiences in science in respective academic discipline, research and higher education, institutional co-operation and are also familiar with development issues.

The members of the team represent different academic disciplines and have accordingly sector specific responsibilities within the team. Erik Thulstrup will have the overall responsibility to lead the evaluation and specifically evaluate the Natural science and technology at both universities, Jean-Jacques Decoster will particularly evaluate the Social science and the humanities at both universities and Manuel Ramiro Muños will particularly evaluate the Vice ministry for higher education. The evaluation of the other non academic-specific evaluation issues, such as Objectives and relevance, Institutional administration and management, shall be disposed and distributed by and among the evaluators.

The Team leader has the responsibility to lead the evaluation, develop the inception and draft report and to conclude the final document to Sida.

Annex 2 Higher Education in numbers: Statistics for Latin America and for Bolivia

Table. 1: Performance and weighted score-indicators: Bolivia's public university system

Weighting	5%	20%	10%	25%	5%	5%	5%	5%	100%	
Universities	Human resources 1 Administrative/ faculty	Financial resources 1 Effect on personnel expenditure	Financial resources 2 Financial dependence	Financial resources 3 Solvency	Financial resources 4 Indebted-ness	Proc. 1 Students/ professors	Results 1 Graduation rate	FOA-pres. Norm compliance	Final score	Performance
UMSA	P	M	G	G	M	P	M	G	65	Good
UATF	M	P	M	G	G	M	M	M	60	Good
UAP	G	M	M	M	G	P	P	P	58	Satisfactory
UMSFX	P	P	G	P	M	M	G	G	50	Satisfactory
UTO	P	P	M	M	M	G	M	P	38	Deficient
UMSS	M	M	M	P	P	M	M	G	35	Deficient
UAJMS	M	P	M	P	M	M	P	G	35	Deficient
UTB	M	P	P	G	M	P	P	G	30	Deficient
UNSXX	G	M	P	P	P	P	M	P	18	Very poor
UAGRM	P	P	P	P	M	M	P	P	15	Very poor

Performance	Score	Weight assigned to qualitative grade
Optimum	90–100	G = Good = 1
Excellent	80–89	M = Medium = 0,5
Very good	70–79	P = Poor = 0
Good	60–69	
Satisfactory	50–59	
Middling	40–49	
Deficient	30–39	
Poor	20–29	
Very poor	10–19	
Extremely poor	0–9	

UMSA:	Universidad Mayor de San Andrés
UATF:	Universidad Autónoma Tomás Frías
UAP:	Universidad Amazónica de Pando
UMSFX:	Universidad Mayor de San Francisco Xavier
UTO:	Universidad Técnica de Oruro
UMSS:	Universidad Mayor de San Simón
UAJMS:	Universidad Autónoma Juan Misael Saracho
UTB:	Universidad Técnica del Beni
UNSXX:	Universidad Nacional Siglo XX
UAGRM:	Universidad Autónoma Gabriel René Moreno

Table 2: Programs according to field

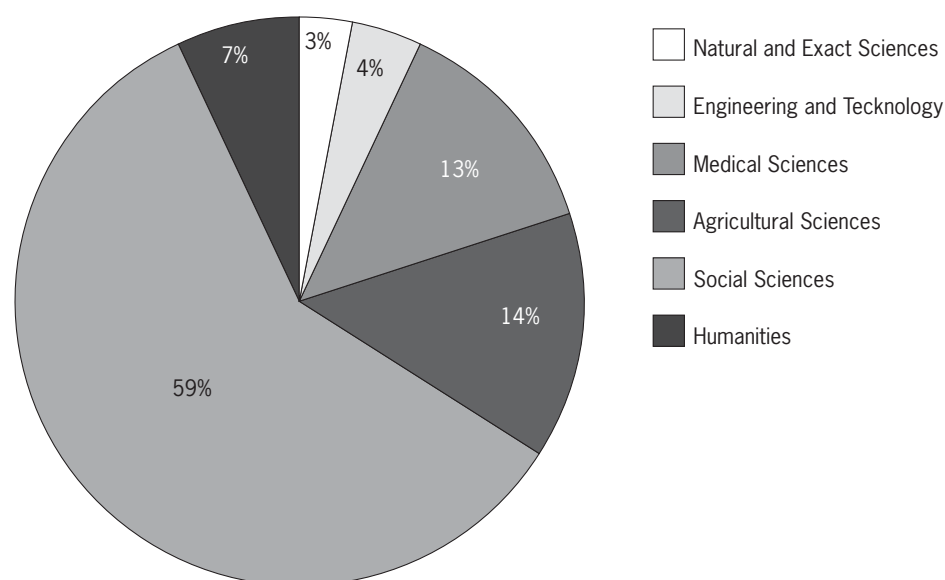
Field	Private	Public
Agricultural Sciences	1,8%	7,3%
Urban Architecture	5,4%	5,5%
Social Sciences.	9,0%	7,3%
Communic. Sciences	4,9%	3,0%
Education	8,0%	12,2%
Basic Sciences	0,4%	5,0%
Health Sciences	13,0%	12,5%
Business, Economics	34,3%	17,8%
Engineering and Technology	23,2%	29,4%
Total	100%	100%

Source: Vice ministry of Education Science and Technology

Table 3: Human resources working on S&T in Bolivia

Researchers	1999	2000	2001	2002
Total number	570	570	1000	1000
% State			17,5	15,0
% Enterprises			11,3	5,0
% University			67,0	70
% NGO			4,1	10,0

Source: RICYT. National Study of Research Policies in the Universities.
IESAL-UNESCO-UTEPSA (No hay datos para 1995–98)

Figure 1**Master degree research by field**

Source: RICYT. National Study of Research policies in the Universities. IESAL-UNESCO-UTEPSA

Table 4: Bolivian universities

Public universities (14)

Universidad Mayor de San Francisco Xavier

Universidad Mayor de San Andrés

Universidad Mayor de San Simón
Universidad Autónoma Tomás Frías
Universidad Técnica de Oruro
Universidad Gabriel René Moreno
Universidad Autónoma Juan Misael Saracho
Universidad Técnica del Beni Mariscal José Ballivián
Universidad Nacional de Siglo XX
Universidad Amazónica del Pando
Universidad Católica Boliviana San Pablo
Escuela Militar de Ingeniería
Universidad Pública de el Alto
Universidad Militar de las Fuerzas Armadas de la Nación

Private universities (36)

Universidad Adventista de Bolivia
Universidad Boliviana de Informática
Universidad Cer Saint Paul
Universidad Central
Universidad Cristiana De Bolivia
Universidad de Aquino Bolivia
Universidad de la Amazonía Boliviana
Universidad de la Cordillera
Universidad de los Andes
Universidad Empresarial Mateo Kuljis S.a.
Universidad Evangélica Boliviana
Universidad la Salle
Universidad Latinoamericana
Universidad Loyola
Universidad Nacional del Oriente
Universidad Nacional Ecológica de Santa Cruz
Universidad Nuestra Señora de la Paz
Universidad Nur
Universidad para la Investigación Estratégica en Bolivia
Universidad Privada Abierta Latinoamericana
Universidad Privada Boliviana
Universidad Privada Cumbre
Universidad Privada de Oruro
Universidad Privada de Santa Cruz de la Sierra
Universidad Privada del Chaco
Universidad Privada del Valle
Universidad Privada Domingo Savio S.A.
Universidad Privada Franz Tamayo
Universidad Privada San Francisco de Asís
Universidad Real
Universidad Salesiana de Bolivia
Universidad Técnica Privada Cosmos
Universidad Tecnológica Boliviana
Universidad Tecnológica Privada de Santa Cruz
Universidad Unidad
Universidad Unión Bolivariana

Table 5: Latin America – % of GDP invested in R+D between 1998–2002

Country	Argentina	Brazil	Paraguay	Uruguay	Bolivia	Chile
% R+D/GDP	0.42%	1.04%	0.10%	0.24%	0.26%	0.57%

Source: RICYT. National Study of Research Policies in the Universities. IESAL-UNESCO-UTEPSA

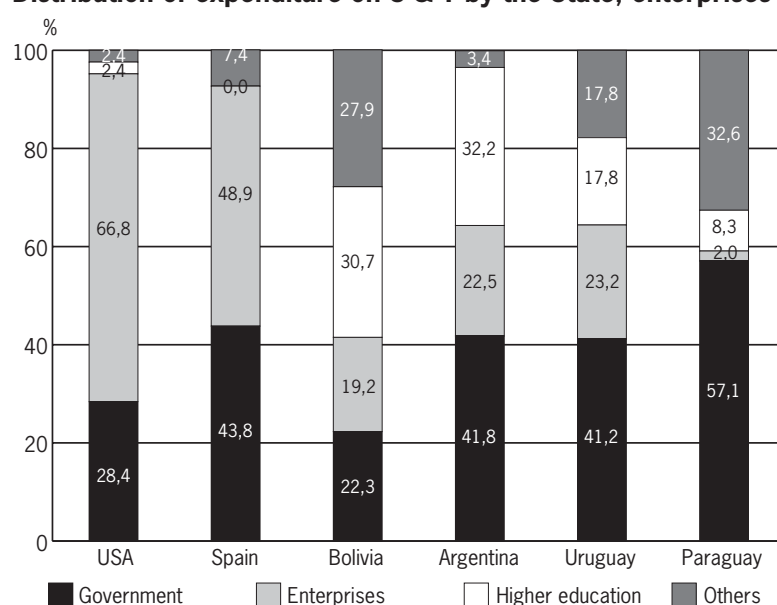
Table 6: Research expenditures by sector

Financing sector	Countries					
	USA	Spain	Bolivia	Argentina	Uruguay	Paraguay
Government	28,4%	43,8%	22,3%	41,8%	41,2%	57,1%
Enterprises	66,8%	48,9%	19,2%	22,5%	23,2%	2,0%
Education	2,4%	0,0%	30,7%	32,2%	17,8%	8,3%
Others	2,4%	7,4%	27,9%	3,4%	17,8%	32,6

Source: RICYT. National Study of Research Policies in the Universities. IESAL-UNESCO-UTEPSA

Figure 2.

Distribution of expenditure on S & T by the State, enterprises and higher education



Source: RICYT. National Study of Research Policies in the Universities. IESAL-UNESCO-UTEPSA

Annex 3 Questionnaire given to Projects

To be completed by each individual Sida supported project

Project name (e.g. “Natural products from plants in the Cochabamba flora”):

Quantitative data (please give monetary figures in SEK)

1. Project start (date):

2. Number of degrees produced within the project

Master level:

PhD level:

3. Present number of graduate students within the project

Master level:

PhD level:

4. Number of technicians trained:

5. Number of Bolivian researchers/teachers involved in the project:

6. Number of publications produced under the project in international journals:

7. Number of publications produced under the project in Bolivian or other national/local journals:

8. Number of conference presentations related to the project:

9. Number of publications in conference proceedings produced under the project:

10. Cooperative activities with outside partners, both academic and industry, etc. in the form of Courses:

Seminars, workshops:

Problem solving work:

Research:

11. Major investments under the project, amounts spent for

Equipment:

Computers:

Vehicles:

Other major investments:

12. Funding for the project from Sida, total:

13. Funding for the project from the University/Ministry, total:

14. Funding for the project from other sources, total:

Qualitative information (please answer each question in less than 30 words)

Major goals of the project:

Main achievements so far, including employment of graduates from the project and wider impact within the university and country:

Satisfaction with research partners and sponsors, including foreign graduate program advisers, SAREC and the Ministry:

Main project outcomes that have wider importance in the Bolivian society:

Evaluation procedures used within the project:

Major constraints in the project:

Main incentives for participating in the project:

Annex 4 Schedule of interviews and visits by the Evaluation Team

UMSS: External evaluators' activity schedule

Monday, August 22nd 2005

AREA I: Strengthening of research management at UMSS

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz Mr. Decoster Mr. Thulstrup	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Octavio Chávez Alba	Research Management Research Fund	Meeting with the project coordinator, Project administration and heads of the department	8:00–9:00

AREA III: Social sciences and humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz Mr. Decoster Mr. Thulstrup	Instituto de Investigaciones de Arquitectura (IIA)	Mr. Nestor Guzman CH.	Human Settlements in Chapare (Habitat/Architecture)	Meeting with the project coordinator	9:15–9:45
	Instituto de Estudios Sociales y Económicos (IESE)	Mr. Crecencio Alba I.	Sustainable development and conservation (Social Economics)	Meeting with the project coordinator	10:00–30:00
	Centro de Estudios población (CEP)	Mrs. Rose Mary Salazar Anaya	Natural Resources Management through History	Meeting with the project coordinator	10:45–11:15
	Instituto de Investigaciones Antropológicas y Museo (INIAM)	Mr. David M. Pereira Herrera	Pre-Columbian Cultural Dynamics (Anthropology/Archaeology)	Meeting with the project coordinator	11:30–12:00
	Lunch and time to rest at Hotel Portales				12:15–14:15

AREA II: Natural sciences and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
All	Centro de Tecnología Agroindustrial (CTA)	Mr. Antonio Vilaseca G	Natural Products from Plants (Natural Products Chemistry)	Meeting with the project coordinator	14:30–15:00
	Centro de Biotecnología (CBT)	Mr. José Roberto Soto Soliz	Biotechnological transformations (Biotechnology)	Meeting with the project coordinator	15:15–15:45
	Programa de Alimentos y Productos Naturales (PAPN)	Mrs. Adelina Herbas	New products from tropical roots (Food Science/Food Technology)	Meeting with the project coordinator	16:00–16:30

AREA I: Strengthening of research management at UMSS

External evaluators	Place	Coordinator	Project	Activity	Hours
All	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Octavio Chávez Alba	Strengthening of research management Research Fund	Discussion about the activities carried out during the day	16:45–18:45
	Hotel Portales				19:00

Tuesday, August 23rd 2005

AREA I: Strengthening of research management at UMSS

External evaluator	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Octavio Chávez Alba	Research Management	Visit and informal meeting with the project staff	8:15–12:00
	Almuerzo y descanso en Hotel Portales				12:15–14:15
	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Octavio Chávez Alba	Research Management	Visit and informal meeting with the project staff	14:30–18:00
	Hotel Portales				18:15

AREA II: Natural sciences and technology

External evaluator	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Centro de Tecnología Agroindustrial (CTA)	Mr. Antonio Vilaseca G	Natural Products from Plants (Natural Products Chemistry)	Installments visit and informal meetings with the project staff and students	8:15–12:00
	Lunch and time to rest at Hotel Portales				12:15–14:15
	Centro de Biotecnología (CBT)	Mr. José Roberto Soto Soliz	Biotechnological transformations (Biotechnology)	Installments visit and informal meetings with the project staff and students	14:30–18:00
	Hotel Portales				18:15

AREA III: Social sciences and humanities

External evaluator	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Instituto de Investigaciones de Arquitectura (IIA)	Mr. Nestor Guzman CH.	Human Settlements in Chapare (Habitat/Architecture)	Installments visit and informal meetings with the project staff and students	8:15–12:00
	Lunch and time to rest at Hotel Portales				12:15–14:15
	Instituto de Estudios Sociales y Económicos (IESE)	Mr. Crecencio Alba I.	Sustainable development and conservation (Social Economics)	Installments visit and informal meetings with the project staff and students	14:30–18:00
	Hotel Portales				18:15

Wednesday, 24th August 2005

AREA I: Strengthening of research management at UMSS

External evaluator	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Omar Arzabe Maure	Research Fund	Installments visit and informal meetings with the project staff and students	8:15–12:00
	Lunch and time to rest at Hotel Portales				12:15–14:15
	Dirección de Investigación Científica y Tecnológica (DICyT)	Mr. Omar Arzabe Maure	Research Fund	Installments visit and informal meetings with the project staff and students	14:30–18:00
	Hotel Portales				18:15

AREA II: Natural sciences and technology

External evaluator	Place	Coordinator	Project	Activity	Hours	
Mr. Thulstrup	Programa de Alimentos y Productos Naturales (PAPN)	Mrs. Adelina Herbas	New products from tropical roots (Food Science/Food Technology)	Installments visit and informal meetings with the project staff and students	8:15–12:00	
	Lunch and time to rest at Hotel Portales				12:15–14:15	
	Available time subject to external evaluator proposal			14:30–18:00		
	Hotel Portales			18:15		

AREA III: Social sciences and humanities

External evaluator	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Centro de Estudios población (CEP)	Mrs. Rose Mary Salazar Anaya	Natural Resources Management through History	Installments visit and informal meetings with the project staff and students	8:15–12:00
	Lunch and time to rest at Hotel Portales				12:15–14:15
	Instituto de Investigaciones Antropológicas y Museo (INIAM)	Mr. David M. Pereira Herrera	Pre-Columbian Cultural Dynamics (Anthropology/ Archaeology)	Installments visit and informal meetings with the project staff and students	14:30–18:00
	Hotel Portales				18:15

Thursday, 25th August 2005

AREA I: Strengthening of research management at UMSS

External evaluator	Place	Coordinator	Project	Activity	Hours
All	Dirección de Investigación Científica y Tecnológica (DICyT)				8:00–10:30
	Hotel Portales				10:45
	Airport (Departure to La Paz)				11:30

UMSA: EXTERNAL EVALUATORS' ACTIVITY SCHEDULE

Monday, August 29th 2005

Vice ministry of higher education, science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
All	Viceministry of Higher Education, Science and Technology	Mrs. Carmen Hada Shima	Higher education policies Science and Technology National System	Meeting with the project coordinator, Project administration and heads of the department	9:00–9:30 Muñoz stay until 12:00

Project AREA I: strengthening of research management at UMSA

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Chemical Process Development Research Institute (IIDEPROQ)	Mr. Alfonso Guarachi Ayaviri	Development of Chemical Process Technology	Installations visit and informal meetings with the project staff and students	9:45–12:00

Project AREA IV: Social sciences and the humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Bolivian Studies Institute	Mr. Zacarias Alavi Madani	A Linguistic Vision of the Regions of the Basin of Lake Poopo and the Desaguadero River	Installations visit and informal meetings with the project staff and students	9:4 –12:00
	Lunch and time to rest				12:15–14:15

Project AREA III: health sciences

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	SELADIS Research Institute	Mrs. Wilma Strauss and Mrs. Susana Revollo Zepita	Infectious Diseases: New Therapeutic Strategirs	Installations visit and informal meetings with the project staff and students	14:30–17:00

Project AREA IV: Social sciences and the humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz	Viceministry of Higher Education, Science and Technology	Fabricio Crespo, Tito Gallinate, Vania Diaz Romero	Proyectos ASDI SAREC for the Implentation of Policies in Higher Education	Meeting with consultants	
Mr. Decoster	Economical Research Institute	Mr. Abraham Pérez Alandia	Instruments of the Environmental Economy as Alternatives to face the Relationship Between Poverty – Environment in the Area of the River Basin of the Altiplano	Installations visit and informal meetings with the project staff and students	14:30–17:00
All	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mrs. Margarita Toro de Vargas	Research Management	Discussion about the activities carried out during the day	17:3 18:00
	Return to Hotel				18:00

Tuesday, August 30th 2005

Project AREA II: Natural science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Pharmacological Biochemistry Research Institute (IIFB)	Mr. Alberto Giménez Turba	Research on Microbial Biodiversity (Biotechnology)	Installations visit and informal meetings with the project staff and students	9:00–11:50

Project AREA IV: Social sciences and the humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Research Institute of the Faculty of Architecture, Town Planning and Arts	Mr. Freddy Sandoval Miranda	Andean Territory and Rural Habitat (Habitat/Architecture)	Installations visit and informal meetings with the project staff and students	9:00–11:50

Vice ministry of higher education, science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz	Viceministry of Higher Education, Science and Technology	Fabricio Crespo, Tito Gallinate, Vania Diaz Romero	Proyectos ASDI SAREC for the Implementation of Policies in Higher Education	Meeting with consultants	8:30–12:00
	Lunch and time to rest				12:00–14:15

Project AREA I: Strengthening of research management at UMSA

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup Mr. Muñoz	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mrs. Margarita Toro de Vargas Mr. Roberto Zambrana Flores	Implementation of Technologies of Information and Communication Universidad Mayor de San Andrés	Installations visit and informal meetings with the project staff and students	14:30–17:30

Project AREA IV: Social sciences and the humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Research Institute of Anthropology and Archeology	Mr. Marcos Michel Lopez	The Territoriality in the Desaguadero and Poopo Region from and Integral Cultural View	Installations visit and informal meetings with the project staff and students	14:30–17:30
	Hotel				

Wednesday, August 31th 2005

Project AREA II: Natural science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Chemistry Research Institute (IIQ)	Mr. Luis Morales Escobar	Research on Plant Biodiversity (Natural Products Chemistry)	Installations visit and informal meetings with the project staff and students	8:30–10:30
	Chemistry Research Institute (IIQ)	Mr. Jorge Quintanilla Aguirre	Water Resources Management: Hydrochemistry	Installations visit and informal meetings with the project staff and students	10:30–12:30
	Lunch				12:45–14:15

Project AREA IV: Social sciences and the humanities

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Decoster	Bolivian Studies Institute	Mrs. María Luisa Soux	History: Dynamic Process of Interethnic Relationships	Installations visit and informal meetings with the project staff and students	9:00–11:50
Mr. Muñoz	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mrs. Margarita Toro de Vargas	Research Management		9:00–11:50
	Lunch				12:00–14:15

Project AREA II: Natural science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Chemistry Research Institute (IIQ)	Mr. Juan Antonio Alvarado Kirigin	Food Science & Food Technology	Installations visit and informal meetings with the project staff and students	14:30–17:00
Mr. Muñoz	Comite Ejecutivo de la Universidad Boliviana	Ruben Medina Cellu	Science and Technology within CEUB	Meeting	15:00 -17:00
	Hotel				

Thursday, September 1th 2005

Project AREA II: Natural science and technology and project AREA III: Health sciences

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Thulstrup	Molecular Biology and Biotechnology Research Institute	Mrs. Volga Iñiguez Rojas	Diarrhoea Diseases: Aetiology, Pathogenesis and Potential Vaccine Applications (*)	Installations visit and informal meetings with the project staff and students	8:30–10:30
Mr. Muñoz	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mrs. Margarita Toro de Vargas Vice-Rector	Research Management	Meeting with the program coordinator	8:30–12:30
Mr. Thulstrup	Hydraulics and Hydrology Research Institute	Mr. Andrés Calizaya Terceros	Water Resources Management: Hydraulics and Hydrology from the Poopo and Uru Uru Lakes Basin	Installations visit and informal meetings with the project staff and students	10:45–13:00
Mr. Decoster	Hydraulics and Hydrology Research Institute	Mr. Angel Aliaga Rivera	Masters Degree Program: Sustainable Resource Management	Installations visit and informal meetings with the project staff and students	10:45–12:15
	Lunch				13:15–14:30
All	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mrs. Margarita Toro de Vargas	Research Management	Meeting with the program coordinator	15:00–15:30
	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Mr. Jorge Ocampo Castelú Mrs. Margarita Toro de Vargas	Research Management	Discussion and conclusion	15:45–17:00
	Hotel				17:00

Friday, September 3rd 2005

Vice ministry of higher education, science and technology

External evaluators	Place	Coordinator	Project	Activity	Hours
Mr. Muñoz	Department of Investigation, Postgraduate and Social Interaction (DIPGIS)	Deans			8:00–9:45
Mr. Muñoz	Viceministry of Higher Education, Science and Technology	Mrs. Carmen Hada Shima	Higher education policies Science and Technology National System	Meeting with the project coordinator, Project administration and heads of the department	10:00 -12:00

Interviews conducted by Mr. Muñoz

Persons interviewed at UMSA

Jorge Ocampo Castelú. Vicerrector

Margarita Toro. Directora DIPGIS

Ignacio Chirico Moreno. Analista de Investigación. Departamento de Investigación, Postgrado e Interacción Social. Luis V. Morales Escobar. Vice dean. Facultad de Ciencias Puras y Naturales.

Roberto Zambrano Flores. Director Programa de Implementación de Tecnologías de Información y Comunicación.

Persons interviewed at UMSS

Octavio Chávez Alba. Director DICyT.

Hans Muller Santa Cruz. Jefe Dpto. de Información Científica y Tecnológica. Dirección de Investigación Científica y Tecnológica.

José Omar Arzabe Maure. Jefe Dpto. de Formación y Promoción. Dirección de Investigación Científica y Tecnológica.

Persons interviewed in the Vice Ministry

Carmen Hada Shima. Viceministra de Educación Superior, Ciencia y Tecnología. Ministerio de Educación. República de Bolivia.

Fabrizio Lopez. Asistente de la Viceministra.

Marcelo Andrés Saravia Gallardo. Consultor del Viceministerio. Doctor en Investigación y Evaluación de la Calidad Educativa.

Others Persons interviewed

Rubén Medinaceli Ortiz. Secretario Nacional de Investigación Ciencia y Tecnología. Comité Ejecutivo de la Universidad Boliviana.

Crista Weis. Professor at UMSS, specialist in Higher Education in Bolivia

Gustavo Rodríguez Ostría. Ex Viceministro de Educación Superior, Ciencia y Tecnología. Ministerio de Educación. República de Bolivia.

Patricia Escobar. Directora de Ciencia y Tecnología del Viceministerio de Educación Superior, Ciencia y Tecnología. Ministerio de Educación. República de Bolivia.

Annex 5 Cochabamba Workshop Schedule and Agenda

Building Research Capacity in Bolivia

Cochabamba Nov. 17–19, 2005

Thursday, 17.11.

9:00 a.m.	Welcome from • Evaluation Team • Rector UMSS • Rector UMSA • Vice Ministry
10:30	Coffee Break
11:00	Presentation of the Vice Ministry Plan
11:45	Discussion
12:00 p.m.	Lunch
2:00	“Integrating Higher Education, Research, and Services: New Trends in University Strategies” (Erik W. Thulstrup), Discussion
2:45	“La Educacion Superior en America Latina” (Manuel R. Munoz), Discussion
3:30	Coffee Break
4:00	“La Educacion Superior en Bolivia” (Crista Weiss), Discussion
4:45	Presentation of the Draft Evaluation Report (Evaluation Team)
5:30	Introduction to Friday’s activities (Evaluation Team)
	Close
6:30	Cocktails and Dinner

Friday, 18.11.

9:00 a.m.	Group activities: 4 groups will elaborate recommendations directed to research groups, universities, Ministry, and SAREC to be included in the final evaluation report, and give their thoughts on new visions for the future of research cooperation and potential improvements of the SAREC Program. The starting points for the 4 groups are: • Group A: University Policy and Management and the roles of SAREC and the Ministry • Group B: Dissemination of new knowledge to other researchers and to users, publications, etc. • Group C: The future of research at Bolivian universities. Needs for research training, recruitment, and strengthening of research and services • Group D: How can research activities at Bolivian universities improve higher education and provide further support to development?
12:00 p.m.	Lunch
2:00	Elaboration of final reports by rapporteurs
3:00	Break
4:00	Presentation of 4 group reports (15 min. each).
5:00	Discussion and systematization (Jean-Jacques Decoster)
6:00	Final conclusions (Erik W. Thulstrup)
7:30	Dinner

Saturday, 19.11. (at Hotel Portales)

9:00 a.m.	Elaboration of the Final general report (Special group: UMSS, UMSA, Vice-Ministry, Evaluation Team)
10:40	Break
11:10	General discussion
12:30 p.m.	Agreements and closing
1:00	Lunch
2.30	Departure

Annex 6 Participants in the Cochabamba Workshop

Workshop “Building Research Capacity in Bolivian Universities”

Hotel Casa Campestre 17 November 2005 Cochabamba (Bolivia)

Nº	Nombre	Procedencia	E-mail
1	Dr. Marcelo Saravia	VESCyT	maravia@minedu.gov.bo
2	Lic. Tito Gallinate	VESCyT	titogallinate@hotmail.com jgallinate@minedu.gov.bo
3	Lic. Crista Weise	Desarrollo Curricular – UMSS	c.weise@umss.edu.bo
4	Lic. Claudia Delgadillo	UMSS	Claudia_delgadillo@hotmail.com
5	Ing. Eduardo Zambrana	FCyT – UMSS	eduzam@supernet.com.bo
6	Ing. Franz Vargas	Rector – UMSS	rector@umss.edu.bo franzvargas@umss.edu.bo
7	Dr. Octavio Chávez	Director – DICYT – UMSS	octavio@dicyt.umss.edu.bo
8	Lic. Hans Muller	UMSS	hans@dicyt.umss.edu.bo
9	Dr. Omar Arzabe	UMSS	o.arzabe@dicyt.umss.edu.bo
10	Dra. Teresa Cardozo	UMSS	teresa@dicyt.umss.edu.bo
11	Dr. Antonio Vilaseca	UMSS	vilaseca@supernet.com.bo
12	Lic. Bernardo López	UMSS	javierbla@yahoo.com
13	Ing. Roberto Soto	UMSS	robso@mixmail.com biotec@fcyt.umss.edu.bo
14	Dr. Jorge Quillaguaman	UMSS	Jorge.Quillaguaman@biotek.lu.se
15	Dra. Adelina Herbas	UMSS	aherbas@fcyt.umss.edu.bo
16	Ing. Sergio Carballo	UMSS	plantapapn@fcyt.umss.edu.bo
17	Lic. Crecencio Alba	UMSS	calba@iese.umss.edu.bo
18	Lic. David Pereira	UMSS	Museumss@supernet.com.bo
19	Lic. Marco Bustamante	UMSS	roxochelys@yahoo.es
20	Lic. Rose Mary Salazar	UMSS	rsalazar@yahoo.com.ar
21	Lic. Jorge M. Veizaga	UMSS	jmveizaga@yahoo.com.ar
22	Arq. Nestor Guzmán	UMSS	m.guzman@umss.edu.bo
23	Arq. Javier López	UMSS	Jlopez@puc.cl
24	Arq. Jose Luis Reque	UMSS	Tc_reque@hotmail.com
25	Dr. Jorge Ocampo C.	Vicerrector – UMSA	Jorgeocampocas@hotmail.com
26	Arq. Jesus Rodriguez	COMITÉ DE DECANOS	jesurz@hotmail.com

27	Lic. Ninosca Morales C.	DAF – UMSA	Ninosca42@hotmail.com
28	Lic. Margarita Toro De V.	DIPGIS – UMSA	margatoro@yahoo.com
29	Lic. Ignacio Chirico M.	UMSA	lchirico@umsa.bo
30	Lic. Sergio Alvarez	UMSA	seval@umsa.bo
31	Ing. Mario Eguivar	UMSA	meguivar@umsa.bo
32	Ing. Andrés Calizaya T.	UMSA	andrecaly@hotmail.com
33	Ing. Angel Aliaga R.	UMSA	ihh@accelerate.com
34	Ing. Alfonso Guarachi A.	UMSA	alfguarachi@yahoo.com
35	Ing. Daysy T.	UMSA	daysytor@latinmail.com
36	Lic. Jorge Quintanilla A.	UMSA	hidroqui@entelnet.bo
37	Lic. María E. García M.	UMSA	Maugegarcia@hotmail.com
38	Dra. Giovanna Almanza V.	UMSA	Giovyalmanza@yahoo.com.ar
39	Lic. Luís Morales E.	UMSA	luis.andinux@gmail.com
40	Lic. Juan A. Alvarado	UMSA	jaalvki@entelnet.bo
41	Carlos Díaz Mercado	UMSA	Carty2004_1@hotmail.com
42	Dra. Volga Iñiguez R.	UMSA	volgavin@yahoo.com
43	Lic. Carla Calderón	UMSA	Carlavanessa_calderontoledo@yahoo.es
44	Dr. Alberto Giménez T.	UMSA	agimenez@megalink.com
45	Lic. Georgina Chávez	UMSA	geroginacha@hotmail.com
46	Dra. Susana Revollo Z.	UMSA	Susanarevollo@hotmail.com
47	Dr. Fernando Sosa T.	UMSA	fersosat@yahoo.es
48	Lic. Huber Catacora	UMSA	hcatacora@hormail.com
49	Lic. Marcos M. López	UMSA	arqueomul@hotmail.com
50	Lic. Abraham Pérez A.	UMSA	Abraham_perez100@yahoo.es
51	Eloy Arandia	UMSA	Eloy_arandiaa@hotmail.com
52	Lic. María L. Soux	UMSA	mlsoux@yahoo.es
53	Lic. Pilar Mendieta	UMSA	pilarmendieta@yahoo.es
54	Lic. Zacarías Alavi M.	UMSA	zacariasalavi@hotmail.com
55	Jorge Sainz	UMSA	jae_sainz@yahoo.es

Annex 7 Workshop – Reports from Group Discussions

GROUP A: University Policy and Management and the roles of SAREC and the Ministry

Participants: Margarita Toro, Volga Iñiguez, Hans Muller, Alberto Giménez, Ninosca Morales, Jesús Rodríguez, Bernardo López, Crista Weise, Octavio Chavez, Jorge Ocampo, Luis Morales.

Problemas	Sistema	Descripción	Soluciones	Responsables
1. Políticas no institucionales	Políticas	Políticas centradas en las personas. Tanto a nivel de las universidades como del VESCyT. Falta de políticas y metas claras, claras asumidas institucional y orgánicamente. Ausencia de proyecto académico común en las universidades. No hay seguimiento de las políticas.	Definir opciones de política institucional donde se de una prioridad efectiva a la investigación. Metas centradas en las políticas institucionales. Conformación de equipos estables en las estructuras responsables de la gestión.	Gobiernos universitarios, CEUB, VESCyT (Autoridades y directivos)

Problemas	Sistema	Descripción	Soluciones	Responsables
2. Subalternización de lo académico a lo administrativo y político	Organizacional	Primacía de una visión administrativa y política (interés político) en la toma de decisiones. Modelo de gestión basado en procedimientos. Modelo normativo. Dificultades de comunicación y consensuación de procedimientos administrativos para facilitar la ejecución de proyectos y actividad académica. Ausencia de procedimientos que atiendan a las particularidades de cada proyecto. Tiempos de ejecución de los proyectos son diferentes a los tiempos administrativos. Dificultades para la movilidad de investigadores y doctorantes.	Valorización de lo académico como eje para la toma de decisiones. Coordinación entre las instancias operativas institucionales. (direcciones de vicerectorados) Revisión de las normas y procedimientos para responder de manera más ágil a las necesidades de los proyectos.	Gobiernos universitarios, (Autoridades y directivos)
3. Desarticulación de los procesos y funciones universitarias	Organizacional Estrategia	Prevalencia de una cultura de feudos y de compartimentos estancos. Escasa vinculación con la estructura del posgrado Escaso impacto sobre el pregrado. Encapsulamiento de los proyectos. Los proyectos son parte de la estructura institucional pero sus resultados no se traducen en beneficios para el pregrado, posgrado o para la gestión institucional.	Definir de estrategias de articulación de las tres funciones. Los estudiantes deben ser incorporados a la investigación estableciendo criterios académicos. Incorporar la formación de investigación en el pregrado. La integración de funciones debe concretarse en el currículo. Cada docente debe realizar actividades investigativas y la institución garantizar estos espacios. Extender las experiencias que existen para una institucionalización de la formación de estudiantes como investigadores.	Autoridades, Direcciones Centros. Responsables de áreas académicas y curriculares.
4. Estructuras académicas débiles	Organizacional	Insuficiente carga horaria para la investigación. Sobrecarga de horas en la docencia. Falta de espacios y condiciones institucionales que permitan el desarrollo académico.	Incremento de personal a tiempo completo para actividades de investigación. Redistribución de cargas horarias.	
5. Falta de cumplimiento de acuerdos y compromisos.	Organizacional	Los compromisos asumidos por una gestión no son cumplidos por las siguientes.	Establecer mecanismos de seguimiento.	Gobiernos universitarios, CEUB, VESCyT (Autoridades y directivos)
6. Estructura ministerial débil e inestable. Falta de continuidad en las políticas	Estratégico	No tiene claridad en las políticas. No tiene capacidad operativa. El ministerio no favorece la participación de las universidades.	Políticas de desarrollo.	VEsCyT

Problemas	Sistema	Descripción	Soluciones	Responsables
7. Ausencia de política institucional de formación de investigadores	Estrategia	No hay mecanismos para incorporar investigadores jóvenes La cultura de investigación no está bien establecida en las universidades. No hay un reconocimiento institucional al trabajo del investigador. Se concibe al investigador como un privilegiado. No se ven resultados de la investigación. Estructuras de investigación muy heterogéneas. Indefinición de la figura del investigador en la estructura institucional.	Plan maestro de desarrollo institucional que definan un proyecto académico institucional. Establecimiento de la carrera de investigador. (Mecanismos institucionales para garantizar la permanencia, desarrollo y evaluación de la actividad del investigador.) Definir status y condición del docente investigador en la estructura institucional y mecanismos para su promoción.	Gobiernos universitarios, (Autoridades y directivos)
8. Falta de articulación de las políticas nacionales con las políticas universitarias.	Estratégico	No hay estructuras estatales de apoyo a la investigación. No hay definición de políticas nacionales de investigación. Mecanismos de articulación e interlocución con el Estado e débil. Inestabilidad en el personal del ministerio. CONACYT no cumple su función. CEUB no cumple su función articuladora con las instancias correspondientes.	Mayor interacción del VESCyT y las universidades. Las universidades deben ser más proactivas, ser un eje que permita esa articulación. Las direcciones de investigación deben reunir a los investigadores e interactuar con el ministerio. Mayor autonomía del CONACYT. Exigir al CEUB que cumpla su función intermediadora.	Gobiernos universitarios, CEUB, VESCyT (Autoridades y directivos)
9. Falta de explicitación de políticas de investigación en las universidades.	Estrategia	Falta de decisión política de las autoridades para llevar a delante los planes d desarrollo de la investigación.	Explicitar y ejecutar políticas de desarrollo dela investigación. Involucrar a las autoridades.	VESCyT
10. Políticas de difusión y aplicación del conocimiento débiles y poco efectivas.	Estrategia	Poca visibilización de resultados de la investigación y del trabajo de los investigadores. Ausencia de mecanismos de difusión.	Estableer y exigir estrategias de difusión del onocimiento.	Dicyt, Dipgis
11. Poca articulación entre universidades del sistema en las actividades de investigación que se traduce en debilidad de áreas de conocimiento.	Estrategia	No hay convenios entre las universidades para trabajar en e l desarrollo de la investigación. Los mecanismos de vinculación interinstitucional no han funcionado adecuadamente. Cada proyecto actúa aisladamente.	Desarrollo de acciones conjuntas sobre todo en iniciativas de gran alcance. Ampliar convenios interuniversitarios. ASDI debe poner más énfasis en la promoción de acciones de carácter interinstitucional. Seminarios de avance de investigación por áreas. (Uno a dos foros por año.) Que las unidades involucradas prevean fondos para intercambios entre centros de investigación. Elaboración de proyectos conjuntos. Generar espacios de interacción para los investigadores.	Centros, direcciones de investigación universitarios.

Problemas	Sistema	Descripción	Soluciones	Responsables
12. Debilidad institucional para administrar los proyectos de operación internacional. (UMSA)	Organizacional	Necesidad de institucionalizar las relaciones ASDI SAREC y los equipos investigadores. Ausencia de una adecuada repuesta institucional para interactuar con la cooperación. No hay continuidad en la interlocución y coordinación con la cooperación. Problemas en la estructura institucional y las relaciones de dependencia para poder gestionar adecuadamente los componentes del proyecto.	Apoyar la constitución de un sistema de administración de la investigación, donde es importante que participen los investigadores. Institucionalizar los equipos que se hacen responsables de la gestión. Garantizar continuidad del personal técnico y de investigación para garantizar la sostenibilidad.	ASDI – Direcciones UMSA

GROUP B: Dissemination of new knowledge to other researchers and to users, publications, etc.

Participants: Maria Luisa Soux, Giovanna Almanza, Maria Eugenia Garcia, Luis Fernando Sosa, Rosse Mary Salazar, José Luis Reque, Teresa Cardozo, Crecencio Alba, Alfonso Guarachi, Georgina Chávez, Carla Calderón, Andrés Callisaya

Problema	Sistema	Descripción	Soluciones	Responsables
Lack of publishing culture	Estrategias, organizacionales	Mas publicaciones en S&T que en CS&H Hay problemas desde la malla curricular de pregrado No se prioriza este tema, no se explica su importancia y utilidad. Hay un divorcio entre investigación y difusión.	Se deben plantear estrategias Incentivar mediante revistas estudiantiles y participación de estudiantes en Congresos Materias y cursos de redacción desde nivel de pregrado (aprovechar cursos que ya se desarrollan) talvez al finalizar las carreras.	El instituto, la dirección, el investigador, los docentes y autoridades.
Pocas publicaciones en revistas internacionales e indexadas	Estrategias	Ha habido pocas publicaciones en revistas internacionales e indexadas aunque creemos que esto puede mejorar por la culminación reciente de muchos trabajos. Ha faltado la colaboración necesaria de los supervisores en este sentido.	Incentivo y apoyo al aprendizaje del idioma inglés. Ayuda en la edición. Establecer contactos con investigadores e instituciones de reconocimiento internacional. Se requiere una persona técnica que revise el trabajo final Evaluación de trabajos para publicar en revistas internacionales	Coordinadores de proyecto y universitarios. Investigadores
Falta de incentivo para la publicación	Políticas Universitarias	No se prioriza las publicaciones, se evalúa pero se exige lo mínimo y si se publica no hay ningún reconocimiento. No existe apoyo técnico para la edición (traductores, correctores de estilo, envío de documentos) Escaso apoyo para la participación de congresos internacionales y organización de talleres.	Apoyo de la coordinación a la edición (corrección de estilo, traducciones, etc.) Incentivos para la gente que publica (concursos internos). A nivel UMSA se debe apoyar con el plan horizontal de apoyo a la investigación de la UMSS, que apoya publicaciones, difusión en general.	Autoridades universitarias
Falta de evaluación de la calidad de revistas nacionales	Estrategias	Existe una escasa evaluación interna y externa de la calidad de las publicaciones Dispersión de esfuerzos en muchas revistas pero con poca calidad	Establecimiento de comités científicos de evaluación internos y externos.	Direcciones de Institutos y autoridades

Problema	Sistema	Descripción	Soluciones	Responsables
Escasa difusión de las investigaciones en la comunidad universitaria	Falta de organización	Falta de reuniones de coordinación del programa, por áreas. Falta de difusión hacia otros investigadores e institutos y a la comunidad universitaria en general.	Hace falta proyectos transversales. Talleres informativos y operativos. Folletos que muestren lo que estamos haciendo. Fortalecer los que ya existen. Se debería aprovechar el UMSATIC una pag. web para el programa (UMSA) Implementar un boletín informativo en la DICYT	DIPGIS, DICYT
Escasa devolución de resultados a la comunidad	Estrategias	No se ha podido transmitir los resultados obtenidos a los actores locales No se ha sabido transformar un lenguaje científico a un lenguaje sencillo de divulgación.	Se necesita intermediarios que transformen la información científica en lenguaje común para su divulgación mediante diferentes mecanismos: textos de lectura ágil, medios audiovisuales, etc. Apoyo de Ciencias de la Comunicación y Ciencias de la Educación.	Coordinadores Autoridades Universitarias Investigadores
Escasa devolución en productos a la comunidad	Meta Organización	Solo se ha dado en algunos proyectos (caso Bambú y ordenamiento de archivos). Se debería fomentar en los casos posibles.	Se debe fortalecer en los proyectos, la devolución en productos a las comunidades y a los usuarios. Incorporar en las metas de los proyectos 2007–2010	Responsables: Coordinación DIPGIS DICYT y coordinadores de proyectos

GROUP C: The future of research at Bolivian universities. Needs for research training, recruitment, and strengthening of research and services.

Participants: Huber Catacora (UMSA), Marcos Michel (UMSA), Ignacio Chirico (UMSA), Mario Eguivar (UMSA), Sergio Alvarez (UMSA), Pilar Mendieta (UMSA), David Pereira (UMSS), Marco Bustamante (UMSS), Jorge Quintanilla (UMSA), Carlos Díaz (UMSA), Angel Aliaga (UMSA), Antonio Vilaseca (UMSS), Jorge Miguel Veizaga (UMSS), Roberto Soto (UMSS), Abraham Pérez (UMSA).

Problema(s)	Sistema (nivel)	Descripción	Solución(es)	Responsable(s)
1.1. Ausencia de capacitación en gestión de la investigación. 1.2. Falta de conocimiento y aplicación de las propuestas de políticas elaboradas para el proyecto Asdi/SAREC, elaborado el año 2001. 1.3. Planes universitarios elaborados sin la participación de los actores de investigación.	Metas:	– La labor del coordinador se ve limitada a gestionar actividades de la investigación y no a gestionar la investigación. – Existe un documento ignorado y no difundido que fue presentado en el primer encuentro científico y tecnológico realizado en Cochabamba (Diciembre 2001). – Cada universidad elabora planes de investigación en grupos de trabajo reducidos	a) Entrenamiento (Diplomado u otros) en gestión de la investigación b) Institucionalizar el cargo de coordinadores. a) Difundir, reactualizar y aplicar. a) Reformular los planes con la participación de los actores en investigación, acorde con una visión de cambio actual del país. b) Reforzar las interrelaciones con los actores sociales locales.	– Coordinadores y directores de institutos – DICYT, DIPGIS – – DIPGIS, DICYT, en coordinación con entidades locales.

Problema(s)	Sistema (nivel)	Descripción	Solución(es)	Responsable(s)
2.1. Inseguridad laboral para los PhD. 2.2. Falta de una estructura adecuada de investigación. 2.3. Ausencia de posibilidades de actualización de los investigadores.	Políticas:	– Falta de homogeneidad en los compromisos entre los estudiantes de doctorado y la universidad. – Ausencia de un reglamento de investigación, ausencia de una autoridad de investigación con atribuciones de decisión. – Ausencia de políticas de apoyo a la actualización de los investigadores.	a) Asegurar un puesto de trabajo adecuado para todo los PhD. a) Elaborar (UMSA) y aplicar un reglamento de investigación b) Crear un vicerrectorado de investigación, de acuerdo a reglamento que valore los meritos. a) Permitir la movilización de los investigadores. b) Motivar a una actualización permanente.	– Universidad en sus instancias competentes. – DICyT (UMSS), DIPGIS (UMSA). – Autoridad de las unidades de investigación y universitarias.
3.1. Falta de incorporación de los estudiantes de pregrado en los procesos de investigación. 3.2. Desarticulación de la investigación en el sistema universitario nacional	Estrategias:	– Los estudiantes de pregrado tienen poca oportunidad de participar en proyectos de investigación. – En el pasado se delinea el sistema universitario nacional de CyT.	a) Diseñar planes de estudio y otros mecanismos de inserción, en el pregrado, que involucren a los estudiantes en la investigación. a) Revisión de los documentos constitutivos b) Puesta en marcha del sistema universitario de investigación en CyT.	– Carreras y unidades de investigación. – Las universidades en coordinación con el CEUB.
4.1. Gestión Administrativa: Financiera.	Organización:	– En el caso de la UMSA administración lenta, con un desconocimiento en los niveles medios que retrasan el avance de la investigación.	a) Eliminar los niveles medios de administración b) Aplicar el modelo de la UMSS	– Vicerrector, DIPGIS, DAF (UMSA)

GROUP D: How can research activities at Bolivian universities improve higher education and provide further support to development?

Problema	Sistema	Descripción	Soluciones	Responsables
Investigación para mejorar la Educación Superior – Modelo académico – Estructura de gestión de la investigación	Comprende aspectos de la: Política nacional e institucional – Organización de las estructuras universitarias	Múltiple -> multiescala y multinivel. El actual sistema académico es un problema La educación no esta estructurada. Pasar del discurso a los hechos. No construir torres de marfil (los centros). Dar sentido a la Educación Superior	– Establecer un nuevo modelo académico centrado en la investigación. – Currículum integrador de la investigación a la docencia para la solución de los problemas de la sociedad. – Integración de los doctorantes con la docencia, por ejemplo en la formación de pre-grado. – Recuperar la estructura departamentalizada y estructura matricial. – Preponderancia al mérito científico dirigido a la institucionalización. – Integración de los doctorantes coadyuva a la formación de pre-grado.	Instancias de Gobierno universitario. Investigadores.

Problema	Sistema	Descripción	Soluciones	Responsables
Investigación para el desarrollo del país	Política Políticas de concen- tración de prioridades	Investigación como estrategia de desarrollo del país. Dar sentido a la investigación para orientar el desarrollo del país.	– Recuperar el sentido contestatario, crítico y pro positivo. – Aprovechar las situaciones de crisis para propiciar la ruptura epistemológica – Modificación de la estructura del gobierno universitario. – Proyectos integradores. – Proyectos interuniversitarios, insertos en la sociedad, con perspectiva transcalar. – Proyectos Inter-multi-trans-disciplinarios. – Establecimiento de Ejes temáticos y transversalidad.	Vice ministerio Proyecto Asdi Proyectos universitarios
Ciencia Tecnología e Innovación	Un meta que se debe alcanzar al interior de la universidad como aplicación final de la investigación.	Integrar estado, universidad y sociedad. Direccionar la investigación a la valorización de la investigación y la transformación de materia prima en productos de mayor valor agregado.	Universidad en alianzas estratégicas con las empresas, municipios, instituciones de desarrollo Establecimiento de Fundaciones institucionales para el desarrollo regional.	Autoridades universitarias Proyectos ASDI Investigadores

Annex 8 Workshop agreements and conclusions

Minutes of the final meeting

Articulación con ayuda de otras instituciones

Hay dos líneas, una es el CEUB, otra es el VMES

El CEUB debería, pero no lo hace, no tiene estructura ni capacidad. No hace nada para mejorar el CONACYT a través de ellos. Quienes son los del CEUB: son ex rectores y no van a ir al CONACYT que no tiene jerarquía.

Para las universidades públicas debería ser el CEUB o una institución muy próxima a la U pública.

Mientras, hay que salvar la posibilidad de interactuar entre la UMSS y la UMSA. Hay que seguir insistiendo en esta interacción: proyectos conjuntos, actividades conjuntas, postgrados, pequeños esfuerzos entre investigadores, etc. Ver de mantener estos caminos abiertos. Trabajar con experiencias cruzadas.

La investigación debe ser más imparcial, no se ha hablado de temas y áreas que son importantes: derecho, turismo, etc. El Ministerio de desarrollo sostenible ha hecho una reunión, estaban todas las U privadas menos las públicas (salvo la UMSS y la UMSA). Esto es permanente, entonces tal vez debe ser el ministerio de educación superior que entre en relación con las universidades en investigación e innovación.

El Ministerio debe rejearquizar su función para interactuar mejor con las universidades.

El VMES tiene como responsabilidad sacar adelante el Plan de Inv. Cs y Tec con apoyo de ASDI.

Se está cumpliendo. El otro tema es el de estrategias: personas, ayuda mutua, proyectos conjuntos.

Crista habló sobre Univ. Ha planteado buenas ideas, la U pública estaba en estas controversias con lo privado, no pueden ensamblarse. Nuestras visiones son totalmente distintas. Habría que ver como la república tiene tuición sobre la U, tanto pública como privada.

Realmente no hay políticas de investigación ni de universidades en Bolivia. Si los investigadores no encuentran este ámbito frustrarán sus esfuerzos. En el diseño del programa se pensó en todo, se había pensado en la creación de políticas.

Por que no contactar también a las Universidades privadas para hacer algunas cosas juntos, donde ambas instituciones puedan aportar y crear, sólo porque hay calidad.

Otra manera es a través de los cursos que se dan, por ej a las industrias. Si nosotros demostramos éxitos, esa es una manera de crear políticas, eso es empezar desde abajo, no desde arriba.

Temas avanzados importantes:

La articulación entre las dos Universidades

Hay que avanzar en las publicaciones

Hacer cursos conjuntos: herramientas de difusión del conocimiento, relación con la industria, grupos sociales, etc.

Todas deben tener el horizonte de construir políticas de abajo hacia arriba

Tema en el tintero: estrategias en relación a la lucha contra la pobreza. Lo del Chapare y del Lago Poopó habría que rescatarlo en el informe. Veamos cómo.

Al respecto, tener el Programa en marcha ya es un avance. No intentemos reemplazar a los responsables. Ej. Gobierno, min de des, min de agrop, alcaldías.

Sin embargo se quiere ir midiendo ese impacto.

Lo que hacen las U es graduar p trabajar en las industrias. Lo que se debe hacer es trabajar más con ellos en temas de la vida real, para mejorar condiciones de trabajo. Hans habla de un rol educador de la U; no estamos de acuerdo.

Como trabajar con U menos avanzadas: desde los problemas:

medioambiente, agua potable, agricultura. Los investigadores y estudiantes trabajen en estos problemas. En Vietnam se trabaja mucho con las industrias, requieren cursos de capacitación de técnicos en las industrias, la U debe cubrir esta demanda. Se trabaja en alimentos, en problemas ambientales y se quiere que la U trabaje en esos problemas. Más que pensar en dinero hay que buscar los espacios pertinentes de trabajo donde el investigador este metido: en la vida real.

Eso es importante. Hay que poner sobre la mesa elementos de esa realidad: las U forman profesionales para el mercado, sin conexión con el estado ni con las empresas. Hay una distancia. Sin embargo hay una demanda del medio. En la UMSA se piensa que hay que dar a los nuevos profesionales elementos para que se transformen en productores, desarrollar sus actividades productivas, generar empleo más que demandarlo. Formar microempresas y constituirse en gestores de microempresas.

Se está haciendo un estudio del mercado laboral desde el Min de Edn. Enfoca la oferta y demanda de profesionales en Bolivia. El mercado necesita profesionales más técnicos y la U no está respondiendo adecuadamente a esta demanda. Las Univ. Deben acercarse más al estado para coordinar políticas y estrategias de empleo. FUNDAPRO con Univs privadas (UPB), Banco Mundial y el Min de la coopn (Sida).

Como hacer que la oferta de ingreso de la U sea mas adecuada a la demanda. Buscar dónde poner a los titulados no debería ser un objetivo, la lucha contra la pobreza no puede pensar solo en la ocupación. Mantener los espacios de trabajo investigativo en las dos zonas es bueno, se puede involucrar a otros actores en esta intención.

En Cba el medio requiere técnicos, pero los padres quieren tener hijos Universitarios, no técnicos. Como compatibilizar esto. Si la U forma muchos abogados este es un problema del estado y la sociedad en su conjunto. Cuando se valore la profesion técnica habra solución. Si la U debe hacer bien sus cosas me refiero a que si hay que actuar con la industria ésta demanda buenos profesionales. Ciertamente, hay que formar en concepto y en solución a problemas.

Seria maravilloso si los proyectos van a resolver problemas de la gente pobre. Pero la gran solución es hacer de un país pobre un país más rico. Si Evo es presidente, la redistribución no es una solución, creará más problemas políticos. Si la economía mejora, eso sí ayuda más a los pobres. Los investigadores deben ayudar a la generación de más riqueza.

El rol moral y social de la U es tan fuerte que desde ahí puede crear influencias. No es que no se puede, con nuestro peso moral debemos liderar estas iniciativas.

Generación de riqueza: desde dos perspectivas. Una (Klisberg), muestra que los países considerados pobres no lo son, según los índices de los últimos 20 años, lo que necesitan es aumentar índices de productividad y competitividad, no hay que repartir pobreza. Otro problema es la inequidad y la desigualdad: sociedades como Dinamarca son muy productivas, su coeficiente de desigualdad bajos. Se trata de aumentar la productividad y redistribuir la riqueza; ambas. Para el crecimiento económico, la relación con la empresa es absolutamente necesaria, cuidando lo que es ecología y medio ambiente. Plantear el tema de equidad es también fundamental en el programa.

En lo que es crear riqueza la UMSS ha optado por las microempresas.

La empresa debe ser eficiente y productiva, pero también impactar en la población en términos de ingreso y mayor bienestar.

Esta claro que el capital no es el dinero, es el conocimiento, en todos los niveles, los altos y los bajos de la sociedad. Si se implementa el conocimiento en las industrias o con las madres pobres (Diarreas, por ej), se rescata el conocimiento para ayudar a los pobres, no el dinero. Los estudiantes que hacen esto aprenden más haciendo esto. En Bolivia se puede hacer bien esto, pero hay que saber difundirlo. La difusión del conocimiento es vital, en todos los niveles. La capacitación en la investigación y la investigación misma es lo que ayudara directa e indirectamente.

Resumiendo, sugerencias

Crear un fondo para la interacción de las universidades

Asdi debe priorizar algunas temáticas nacionales importantes: e.g. ENERGIA, GAS, SU INDUSTRIALIZACIÓN, que más que una demanda de las dos Universidades es una demanda del país. No sólo un espacio geográfico que puede ser restrictivo. Sugerir la creación de un instituto del gas.

Estudiantes: Darles mas importancia, son lo fundamental para la investigación, son los que realmente la hacen, orientados por el experto.

Construir capacidades, el recurso humano, bien, pero que se entienda que el esfuerzo y sus posteriores resultados no solo será para la U, sino para todo el país, entonces no necesariamente debe estar y quedarse en la Universidad.

Programas de formación doctoral donde haya vacíos de conocimiento y no insistir más en aquellas que están saturadas.

Incentivos económicos para la incorporación de investigadores no vinculados a tiempo completo en las Universidades en los proyectos de los fondos concursables.

Fomentar cambios de didáctica de las ciencias en las Universidades

Apoyar en la concepción del Proyecto de la Didáctica durante la gestión 2006.

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SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
SE-105 25 Stockholm, Sweden
Tel: +46 (0)8-698 50 00. Fax: +46 (0)8-20 88 64
E-mail: sida@sida.se. Homepage: <http://www.sida.se>