

programa Erasmus+ de la Unión Europea

**GOOD PRACTICES GUIDE** 

### on Research Management at Higher Education **Institutions in Bolivia and Paraguay**

**INNOVA "Promoting research Management at Higher Education Institutions** 

#### in Bolivia and Paraguay"

KA2 – Cooperación para la innovación y el intercambio de buenas prácticas – Desarrollo de capacidades en el ámbito de la Educación Superior



**T.1.1. Good Practices Guide** 

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#### Disclaimer

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#### Acronyms

**CAE-Business Administration Department** CONACYT- National Council for Science and Technology CONCITUNE- Council for Science, Technology and Innovation DICIT- Directorate for Scientific Research and Technological Innovation **DICYT-** Research Directorate for Science and Technology HE - Higher Education HEI - Higher Education Institution MEC - Ministry of Education and Sciences in Paraguay MINEDU - Ministry of Education of Bolivia OTRI- The Office for the Transfer of Research Results PIEB- Foundation Strategic Research Program PROCIENCIA - Paraguayan Programme for the Development of Science and Technology R+D – Research and Development SENAPI – The National Intellectual Property Service STI - Science, Technology, and Innovation UA - Universidad de Alicante, Spain UAGRM - Universidad Autónoma Gabriel René Moreno, Bolivia UC – Universidad Católica Nuestra Señora de la Asunción, Paraguay UCB – Universidad Católica Boliviana San Pablo, Bolivia UNA – Universidad Nacional de Asunción, Paraguay UNE - Universidad Nacional del Este, Paraguay UPSA – Fundación Universidad Privada de Santa Cruz de la Sierra, Bolivia UPT - Universidade Portucalense, Portugal USFX- Universidad Mayor, Real y Pontificia de San Francisco Xavier de Chuquisaca,

Bolivia





#### **1** Introduction

The present guide is elaborated in the frame of the project INNOVA "*Promoting research Management at Higher Education Institutions in Bolivia and Paraguay*", funded by the Erasmus + KA2 – Cooperation for innovation and the exchange of good practices – Capacity Building in the field of Higher Education.

**The OVERALL AIM** of the INNOVA project is to improve the research management of Higher Education Institutions in Bolivia and Paraguay, with a specific focus on Climate Change.

This goal is achieved by implementing the following **SPECIFIC OBJECTIVES:** 

- Firstly, development and consolidation of Research & Innovation policies in Bolivia and Paraguay, with a specific focus on Climate Change, in order to meet international standards.
- Secondly, setting-up of an innovative Forward-Looking Platform to orientate coordinated and sustainable policymaking in the field of research management in Bolivia and Paraguay, drawing upon foresight methods.

INNOVA aims to contribute to address the apparent research and innovation gap of higher education institutions in Bolivia and Paraguay.

The current situation calls urgently for effective formulation of legal and policy frameworks to articulate R&D actions at HE systemic level, which INNOVA aims to foster through fruitful interplay between HEIs, private sector and policymakers to move forward on Science, Technology, and Innovation (STI).

The concortium is composed by 7 private and public universities from Bolivia (4) and Paraguay (3), the ministries of education from the two countries, and two European partners (Portugal and Spain), presented in table 1.

Acronym	Institution	Country
UNA	Universidad Nacional de Asunción	Paraguay
UNE	Universidad Nacional del Este	Paraguay
UC	Universidad Católica Nuestra Señora de la Asunción	Paraguay
UCB	Universidad Católica Boliviana San Pablo	Bolivia
UAGRM	Universidad Autónoma Gabriel René Moreno	Bolivia
LICEV	Universidad Mayor, Real y Pontificia de San Francisco Xavier	Bolivia
USFA	de Chuquisaca	
UPSA	Fundación Universidad Privada de Santa Cruz de la Sierra	Bolivia
UA	Universidad de Alicante	Spain
UPT	Universidade Portucalense	Portugal
MEC	Ministerio de Educación y Ciencias	Paraguay
OEI	Organisation of Ibero-American States for Education, Science	Paraguay
UEI	and Culture	
MINEDU	Ministerio de Educación, Cultura y Deporte	Bolivia

Table 1. Project concortium





#### 2 Aim and objectives

Aim of this guide is to present a detailed overview of good practices in research management implemented by the universities of Bolivia and Paraguay. This action looks into successful experiences of the partners, within the field of research management, mapping out positive actions already implemented at institutional level.

#### **Objectives:**

- To select several case studies which illustrate how institutions have responded in the past to the necessities of the Bolivian and Paraguayan context with respect to research management at HE level, with a special attention to uncover the interplay between private and public institutions.
- To foster empowerment of partners resiliency, build upon previous experience and recognise local knowledge and preceding solution in the field of research management.
- To apply the benchmarking analysis for categorising constructive knowledge and good practices from partners, fostering their sense of ownership and involvement in the process.
- To derive insights contributing to the inspiration and enhancement of the conventional practices in terms of HEIs research management in the region.

This guide is a result of the T1.1. *Identification of good practices on research management and innovation in Bolivia ana Paraguay* of the **WP 1 "Needs analysis** (**Benchmarking**)", aiming at identification of endogenous knowledge and contextual responses to the specific challenges within the field of research management in both countries. Seven successful case studies in HEI research management are presented, with a with special focus on their transferability.

The publication begins with an introductory section, followed by the statement of the general and specific objectives. In addition, the methodology and implementation process are outlined, followed by the case studies presentation. Finally, the document is supported by appendices and references.

#### 3 Methodology and implementation

#### 3.1 Approach to study

Selection of the case studies is assorted according to the following criteria:

- 1. Relevance in the context of Bolivia and Paraguay;
- 2. Scalability, in terms of feasibility of transposing schemes similar to others;
- 3. Concortium institutions;
- 4. Cost-Effectiveness: Since the project operates in a private financial resource environment, case studies will encourage actions that have produced optimal results with minimal expenses.

A set of activities were realized in the process of case study selection.

- Firstly, Good Practices Selection Committee set-up with the requirement of minimum one participant from each institution. Each partner scanned their general services and structures to detect minimum 1 specific service, valuable experience, case study within its institution for further analysis, nominating it as a good practice example.
- Services consulted include researchers services support, funding and grant, strategic operation, administrative management, evaluation and results.





 Afterwards 14 case studies were preliminarily identified, being 2 cases from each partner organisation.

Qualitative analysis of the cases conducted by the Selection Committee according to criteria of relevance, scalability and cost-effectiveness. For this purpose, good practice evaluation template was used by the committee. The template can be consulted in the *Appendix A*.

It should be stressed that in the selection process, partners factored a specific focus on Climate Change and related research fields. As a result, out of 14 cases 7 case studies were selected for further exploratory analysis (*Appendix B*). It follows a case-study research methodology, relying on multiple sources of qualitative and quantitative sources of evidence.

#### 3.2 Case study methodology

Case study methodology is widely used by researchers in academia, as well as a popular tool for evaluation and deep exploration of a specific case among practitioners (Baskarada, 2014; Yin, 2009). Case study research is *"intensive study of a single unit for the purpose of understanding a larger class of (similar) units ... observed at a single point in time or over some delimited period of time"* (Gerring, 2004, p. 342). It is based on multiple data evidence in order to gather necessary data and information about a specific case. It is a preferred qualitative research method with the application of how and why questions (Yin, 2009).

These questions were used as the information-gathering tool and have provided a comprehensive understanding of each case, and the data obtained have supported elaboration of this guide, which aims to contribute to improving research management and performance of the universities in Bolivia and Paraguay.

#### 3.3 Data collection

As the most appropriate method semi-structured interviews are used to collect the relevant information about case studies in the most efficient and effective manner.

The semi structured interview consists of the following sections, each of them includes a set of specific open-ended questions:

I. Research Management: assessing current context of the good practice at institutional level;

II. Monitorization and evaluation of research management: assessing performance indicators;

III. Recommendations for improving research management.





#### 4 Good practices on Research Management

4.1 GOOD PRACTICE 1: Specific research management policies and strategies at institutional level. Creation of the Office for the Transfer of Research Results (OTRI), Universidad Nacional del Este (UNE), Paraguay<sup>1</sup>

### 4.1.1 Research management: assessing the current context of good practice at institutional level

Universidad Nacional del Este (UNE) has a decentralised model for research management. The Rectorate has a General Directorate of Research, and each academic unit (Faculties and Higher Schools, dependent on the Rectorate) has its own autonomous bodies for planning, execution and evaluation of research activities. However, in order to achieve cohesion between all these bodies, UNE has created the Council for Science, Technology and Innovation (CONCITUNE), where the authorities of all academic units converge and institutional policies and plans for research are established.

In this context, it is important to know the background of this initiative. Although, since 2008, UNE has seen a considerable increase in its participation in national and international research networks, the processes of institutional self-evaluation for diagnostic purposes, together with the permanent evaluation of the institution's mission actions, have revealed activities that are still incipient for the generation of new knowledge in the institution. At the time, research management was dispersed among the different academic units of the university, and lacked formal and systematised spaces for planning, managing, and evaluating inter- or multidisciplinary activities. Hence, in 2015, the University Superior Council decided to create the CONCITUNE, with the aim of improving research management at the institution. The CONCITUNE is a political and strategic space, with the participation of the institution's key players: the Vice-Rector, Deans and Heads of Schools.

The main objectives of the CONCITUNE are:

- to formulate and propose to the rector proposals on science, technology and innovation policies and strategies to be carried out by the university;
- to encourage the coordination of scientific, technological and innovation efforts by promoting the formation of research networks and their development;
- to advise the rector in the regulation and execution of the policies for the allocation of the institution's resources for research and innovation;
- to promote the dissemination of scientific, technological and innovation activities, as well as to organise and systematise them;
- to encourage the generation, use, dissemination, and application of scientific, technological and innovation knowledge that is culturally, socially and environmentally sustainable;
- to encourage relations with similar public and private, national and foreign organisations, as well as to promote the participation of representatives of the university in congresses or other types of scientific or technical activities and to support exchange, cooperation and reciprocal information in the areas of the university's competence;

<sup>&</sup>lt;sup>1</sup> Good practice authors: José Díaz, Carlos Montiel





• to promote rationalisation and transparency in the management and application of resources allocated for scientific research, technological development and innovation.

The operation of CONCITUNE has led to a number of successful impacts such an increase in the number of undergraduate and postgraduate projects and participants in research training courses, the use of ICTs by teachers in schools and colleges in the region, the creation of training spaces for business incubation, spaces for scientific dissemination and popularisation, and, last but not least, an increase in the amount of external funding through the National Council for Science and Technology (CONACYT).

CONACYT, in the framework of the Paraguayan Programme for the Development of Science and Technology (PROCIENCIA) invited interested institutions to apply to the call for the creation or strengthening of the Office for the Transfer of Research Results (OTRI). To this end, the UNE elaborated and submitted a project to the call, with all the requirements, the main one being to generate the OTRI information and prepare two transfer projects. The project was accepted.

The general objective of the OTRI is to plan, execute and evaluate, together with the academic units that make up the UNE, the activities related to the identification, protection and exploitation and/or transfer of intellectual property rights derived from the research activities carried out at the institution. Internally, the OTRI has structures that deal with the technology transfer process, including intellectual property, business plans and technology watch.



Figure 1. The Office for the Transfer of Research Results (OTRI)

The OTRI is officially part of the UNE Rector's Office and has an internal organisation chart (approved by resolution of the Rector, as an action within its attributions), which consists of a director (who reports directly to the Rector's Office), a coordinator of technological issues and a coordinator of business plans and models.

The activities performed by the OTRI are:

- Identification of the institution's intangible assets;
- Design and implementation of the strategies for the protection of intellectual property rights;
- Management of the institution's technology transfer contracts;
- Assessment the market potential of a given technological development;
- Strategically analyse research results;
- Evaluation and prioritising the technology portfolio and methods for increasing the value of research results.





The OTRI, as a body dedicated to innovation management from the rector's office, also collaborates with CONCITUNE in the elaboration of strategies for the construction of research capacities in the university and contributes to the development and updating of research management strategies and policies at institutional level.

Currently it has only a tab on the institutional website including the services it  $offers^2$ .

Today, OTRI as an emerging UNE unit is promoting the identification of the institution's intangible assets, as well as the processes for the protection of research results. Intangible results include an increased knowledge of intellectual property issues, and an effective incorporation of the transfer of research results in science and technology policies. Mention should also be made of the institutional regulation generated around tangible assets.

Among the main difficulties faced by the unit are the institution's insufficient own resources. Only participation in international projects has made it possible to access resources and form networks that strengthen human capital for research management.

A challenge in this area is to make as much progress as possible in the training of fulltime staff. Currently, the efforts of the centre are aimed at strengthening its structure, which responds to the institutional Statute, General Regulations and Strategic Plan, with a view for improving research management and innovation processes, which are key factors in the national and international positioning of the UNE. In addition, the OTRI provides a permanent space for dialogue for research management activities, where these are legitimised, and inter- and multidisciplinary work is facilitated.

# 4.1.2 Monitoring and evaluation of research management: assessing performance indicators

The aim of this section is to understand how the unit monitors and evaluates its activities and the achievement of its initial objectives, how it develops evaluation indicators, and how it reacts to any changes (external or internal) in research management.

To evaluate its activities, the OTRI has management indicators, which include products and results per year of implementation, distributed in clearly identifiable stages: installation, consolidation, and expansion of the OTRI. The development plan includes these indicators and the respective improvement plans. In addition, CONACYT, as the funding agency of the project, carried out technical and financial evaluations (every two and six months, respectively), based on its own indicators. Once the financing of CONACYT is completed, the OTRI must necessarily adapt these indicators to their context, according to the evolution of the project.

CONCITUNE articulates all structures, policies and techniques linked to research management. In this context, researchers have an exclusive management body to support all academic management units in their activities of identification, protection and eventual exploitation of the results of the research carried out at the UNE.

The link between the OTRI and external audiences is carried out through a space on the institutional website, dissemination manuals and agreements with other institutions. For the current period, the university carries out public accountability. The

<sup>&</sup>lt;sup>2</sup> <u>http://www.une.edu.py/web/index.php/institucional/direccion-otri</u>

http://investigacion.une.edu.py/





UNE also has external control bodies, but at the stage of the development of the OTRI project, mechanisms have not yet been defined for the incorporation of actors into the performance evaluation, other than the control bodies themselves.

The dissemination of research activities at the institutional, national, and international levels are carried out through management reports and institutional communication channels. Table 2 presents the monitoring and evaluation framework.

Summary	Performance indicator	Means of verification
Insufficient development of R&D activities	Increase in the development of R&D projects	Number of applied R&D projects awarded public funding
The UNE has no technological development derived from its research activity	Technological development resulting from research activity	Number of patent applications for inventions or other industrial property derived from research activity in Paraguay managed by the institution
Lack of means of asset identification	Identification of intangible asset	Number of invention disclosures of the institution received by the OTRI
Importance of systematising legal tools for research management	Protection of research results	Number of new technology contracts managed by the beneficiary institution
Lack of knowledge about intellectual property in research	Raising awareness of intellectual property issues related to research activity	Number of consultations received on intellectual property issues provided by the OTRI

 Table 2. Monitoring and evaluation framework

#### 4.1.3 Recommendations for improving research management

The knowledge and experience that result from the OTRI project can provide valuable insight to other HEIs in Paraguay and Bolivia.

The success of the unit's operation demands resources, as well as a set of strategies to increase the activities and productivity of the university's research staff (investments in infrastructure, training, and access to international databases).

The experience acquired in the project has shown that the presence of a unit such as the OTRI in the structure of a university, constitutes an essential factor from the point of view of an effective management of R+D and can be successfully replicated in the HEIs of Bolivia and Paraguay. The procurement of national or international research funds, the establishment of demanded research lines, the transfer of research results, the promotion of research initiatives and activities, and the international mobility of staff, may be enhanced by the functioning of the OTRI. However, these options are conditioned by the need to invest in the formation of human capital linked to scientific and technological activities. The initiatives such as the OTRI also contribute to positioning the institution nationally and internationally.

An institutional dialogue is required to address the OTRI model and research policies that effectively support its functioning, sustainability, and institutional and regional impact.





Considering that the OTRI is an ongoing project, it is essential to highlight the importance of increasing the visibility (institutionally, nationally, and internationally) of this unit. This good practice can be replicated in other higher education institutions in Paraguay and Bolivia through dissemination of the importance of the unit and mutual reflection by stakeholders on its implementation in this context.

#### 4.2 GOOD PRACTICE 2: Construction of research lines with society actors with the support of the Strategic Research Program Foundation in Bolivia, Universidad Mayor, Real y Pontificia de San Francisco Xavier de Chuquisaca (USFX), Bolivia<sup>3</sup>

### 4.2.1 Research management: assessing the current context of good practices at institutional level

The research management unit at the USFX is the Research Directorate for Science and Technology (DICYT), but its capacities and management possibilities at university level are limited. The department of business administration (CAE) is an academic unit of vocational education and training and makes a part of the Faculty of Economics and Business Administration. It is not a research management unit, although on some occasions it carried out this role at the initiative of its director and a team of teachers.

In 2008, the business administration department promoted the construction research lines at the university level through a participatory methodology. Work was carried out in all areas of knowledge with a team of teaching moderators and systematisers, and with actors from society who expressed their research demands and interests in working groups. This initiative obtained a support from the Strategic Research Programme Foundation in Bolivia (PIEB). The purpose of this initiative was to determine and characterise the demand for research fields relevant to the development of Chuquisaca. It was expected that exchange of knowledge and experiences from society and the university to identify cutting edge research fields will contribute to the development of the region.

The project was realized for 8 months and was carried out in five clearly established stages:

- I. Training of teacher facilitators and systematisers with the support of the Strategic Research Programme Foundation in Bolivia (PIEB).
- II. Inventory of the research carried out in all the repositories of Chuquisaca in the areas of knowledge such as economic, social and humanistic, health, technological and agricultural.
- III. Determination and prioritisation of research needs in working groups with the participation of internal and external actors of the university from all the areas of knowledge addressed. To this end, actors from civil society, public institutions and the private sector were identified, and invitations were sent out to them, achieving a commitment to attend the working groups.
- IV. Construction and systematisation of the university's lines of research through panels of researchers from all areas of knowledge and optional research institutes.

<sup>&</sup>lt;sup>3</sup>Good practice authors: Ingrid Orlandini, Edgar Iñiguez





V. Dissemination and socialisation of the university lines of research through workshops, meetings, and a national publication (edited and distributed by PIEB).

The PIEB provided financial support for the training of teachers to determine lines of research, entire process of national publication such as editing the book, dissemination of the document and sale of several copies, as well as the necessary infrastructure and equipment for the 8-month work (an office with furniture and equipment, namely 5 computers and software necessary for the development of the activities).

The construction of research lines according to the demands of the society was based on the commitment of public institutions such as municipal and departmental governments, non-governmental institutions, NGOs and foundations, banks and private companies and all the development agents that interact at the local level.

To identify research lines several round tables were organized. There were 5 roundtables with a varying number of 4 to 6 leaders per roundtable, including moderators, systematisers and support staff. The research team's working groups were held once a week during the 8 months of the project. Roundtables organised with actors from civil society, public institutions, and the private sector.

To be highlighted the organisation of the five working groups with the participation of social actors from the following areas:

- Economic sciences;
- Social sciences;
- NRM sciences;
- Technological sciences;
- Health sciences.

The results were presented as a set of research lines by several knowledge areas, based on which further research can be carried out. The results of the roundtables were systematised and disseminated through a publication entitled "*Universidad y sociedad-Agenda universitaria para la investigación en Chuquisaca*" (University and society - University agenda for research in Chuquisaca).

As for project coordination, it was implemented under the coordination of the CAE Directorate and in coordination with DAF, DICYT and Strategic Research Programme Foundation in Bolivia (PIEB). At the time of the project there were 4 leaders and 1 coordinator.

It should be noted that the CAE has several annual planning instruments, but there is a lack of a specific plan for research management. There is a comprehensive strategic plan of the Faculty of Economics and Business administration, one of the pillars of this plan is research and integration, the CAE plan is subject to this larger plan. The commitment of the authorities and the team made it possible to cope with the emerging tasks.

The action planning, budget and timeline of the project was made public through the CAE research centre and disseminated in participatory meetings involving the DAF, DICYT and the heads of other research centres or institutes of other academic units of the university. This was important to engage the participation of researchers at the working tables.





During the project implementation the following activities were carried out and monitored by the Rectorate:

- Budget elaboration
- Elaboration of timetable
- Planning of activities
- Monitoring of activities
- Quality review of results
- Arrangements with PIEB and DICYT
- Training of research actors
- Catalogue of research conducted at the local level in all available repositories
- Identification of civil society actors for invitations to working tables
- Visit to civil society actors to disseminate the events and objectives
- Planning of the roundtables
- Design of information collection instruments
- Execution and supervision of the development of the roundtables
- Systematisation of the information
- Compilation of the reports of the results of each working group
- Drafting of the final report
- Validation events of the resulting information
- Periodic reports on the financial and physical execution of the project
- Publication of the results.

The project did not have a website, but information was disseminated through the PIEB website <sup>4</sup>. The agreement was signed with PIEB for dissemination of the results of the work. As indicted the tangible result is the published book.





The CAE through the respective bodies such as DICYT and the Administrative and Financial Directorate and the Rectorate disseminated the results of the event through a series of activities, in the same way 500 copies of the book were disseminated to stakeholders.

As for intangible results, lines of research demanded by society and implemented by the university, prioritisation of research guidelines that contribute to the development of the region should be outlined.

<sup>&</sup>lt;sup>4</sup> <u>http://www.pieb.com.bo/anterior1.php?id=2478</u>





Benefits of the project:

- Exchange of knowledge and opinions from society and the university to build the research guidelines in such a way that the work of university interaction is fulfilled, and the research project is appropriated by actors outside the university;
- Building strategic alliances that allowed the research process to be carried out and the research results to be disseminated;
- Participation of society and actors external to the institution.

The main limitation of the project was the delay in the availability of resources to develop the activities. The commitment of the members of the teaching team and their work in extra hours and responsibilities made it possible to overcome the shortcomings that arose.

# 4.2.2 Monitoring and evaluation of research management: assessing performance indicators

The project operated under the direction of a coordinator, who supervised the tasks of the managers, one for each area of knowledge, who worked for products and in close coordination with the support staff. Evaluation and follow-up were carried out jointly, in weekly working meetings, without division of functions. These meetings served to evaluate progress and provide feedback on results and possible errors. The director of the CAE was in charge of preparing the evaluation reports.

After each working table with civil society, the fulfillment of the activities and intermediate objectives was evaluated. During the working groups, information was collected on the strengths and weaknesses of the university's role within the research, so it can be indicated that this was a way to involve the actors in the evaluation of performance and examine the strengths and weaknesses of research management. The project was monitored in the worktables, through attendance records and observation of participation in the construction of the lines of research.

The project considered the results reported by each of the managers, to measure the efficiency around the established deadline and the quality of the products delivered.

In case of any contingency, especially if it was impossible to deliver the work on time, the calendar of the activity was adjusted without modifying the general schedule of the project.

During the 8 months that the project lasted there were no internal or external changes.

In addition, DAF and DICYT monitored the budgetary and physical implementation of the project. Financial and physical reports were regularly submitted to DAF and DICYT. The project coordinator managed funding for publication with the PIEB.

A relevant activity of the project was the training of university researchers in the construction of the state of the art and lines of research.

The activities of the project were disseminated by the publication's unit of the university, and through the digital media of the PIEB. This information is available at the website indicated above.





 Table 3. Monitoring and evaluation framework

Summary	Performance indicators <sup>5</sup>	Means of verification
The good practice outlined in this document is summarised in the creation of strategic alliances that allowed the development of participatory processes aimed at satisfying the research demands of society and improving the efficiency of research	A publication containing the results of the work of the roundtable discussions with civil society. Organisation of 5 working groups with the participation of social actors from different areas Research guidelines in all	Book Operationalisation of the
efficiency of research management	areas of knowledge emerging from civil society demand	degree projects of the different areas of the university
	5 working tables implemented	List of roundtable facilitators and list of representatives of institutions attending the roundtables (Annex to the book)

#### 4.2.3 Recommendations for improving research management

What is remarkable about the project is the use of participatory methodology to determine the lines of research. This means that society actors came together for the first time to determine their demands. Giving special attention and importance to the participation of society and actors outside the institution is a strength of the project.

This good practice demonstrates the importance of the university's relationship with society in order to produce demanded research.

The effective contribution of the university to the development of the private sector and institutional capacities must be shown within the framework of a strategy to generate knowledge clusters that can boost regional development.

<sup>&</sup>lt;sup>5</sup>Indicators should follow SMART criteria (specific, measurable, achievable, relevant, realistic, and time-bound).





It is crucial to strengthen research management bodies and optional operational bodies, as well as to establish strategic alliances to engage in shared cooperation projects and mutual learning. Moreover, in a rapidly changing world, university-society collaboration is the best form of relationship for socially useful and applicable research.





# **4.3 GOOD PRACTICE 3: Registration and Copyright in compliance with Bolivian regulations, Universidad Autónoma Gabriel René Moreno** (UAGRM), Bolivia <sup>6</sup>

4.3.1 Research management: evaluation of the context of good practice at institutional level

The Directorate of Scientific Research and Technological Innovation (DICIT) is a main unit of management of science, research, technology and innovation. Its objective is to strengthen the knowledge economy, and to constitute an effective mechanism for the scientific dissemination of new discoveries made by researchers and research units at the UAGRM, to contribute to the integral socio-economicenvironmental development of the region. This implies an active interaction with the regulatory and production institutions of the Department of Santa Cruz and Bolivia.

The vision of the unit is to be the main accredited reference of the management of research, science, technology and innovation in Santa Cruz and Bolivia, to give effective responses to the demands of society.

Structurally, the DICIT depends on the Vice-Rectorate; internally, it is organised into 4 departments (and 12 units) in central areas of university management:

- Knowledge and Technology Transfer;
- Research Programs and Projects;
- Research management;
- Communication and dissemination of research.

The good practice process was carried out through the following steps:

1.Creation of the organisational structure of the DICIT, the Department of Knowledge, and Technology Transfer, as an instance in charge of managing technical, legal, and administrative procedures.

2. Carrying out training processes to achieve mastery of the subject.

3.Establishing strategic alliances with the responsible entities that grant Certifications of patent and Copyright registrations.

4. Training the university community in the topics of Intellectual Property, scientific journals, and scientific documents.

5. Developing protocol manuals to achieve objectives.

6. Preparing documents, internal forms, and other supports, which provide the university community with a critical path in this good practice.

7. Provident institutional support and information that is needed in these issues.

Within this framework, the Intellectual Property Unit (IPU) is a part of the Department of Knowledge and Technology Transfer. Two people work at the unit: the head of the unit and a support professional. The unit has a manual on the Registration of Copyright and Patents, developed for the university community.

The unit is a fundamental in the management of knowledge within the university, since by obtaining intellectual property the results of research work are disseminated, in the form of knowledge that can be used in different social sectors.

It has a strategic information plan, in compliance with national and institutional standards aimed at developing research management in the university community. The unit carries out various actions, including the management of agreements and strategic

<sup>&</sup>lt;sup>6</sup> Good practice author:

Susana Uzqueda





alliances, as recipients of research products, to carry out events that concretise the transfer of knowledge and technology.

Main activities of the IPU:

- Techno-legal assistance to the research units of the university, with the purpose of safeguarding the ownership of the innovations generated in them, in coordination with the DICIT;
- Promotion of innovation and creativity at the service of the economic and social development of the community, through an effective and balanced intellectual property system (the patent and its regulation) in the DICIT;
- Requirement of funds in advance to make the payments of copyright and intellectual property in the offices of the SENAPI (The National Intellectual Property Service);
- Application of national regulations and internal regulations of the university in legal proceedings of copyright and intellectual property patents;
- Making payments for the publication of patents in the official gazette of Bolivia.
- Making payments of fees for patents, for renewal or maintenance, to keep them in force, in the offices of the National Intellectual Property Service (SENAPI);
- Systematisation and registration of all patents and copyright that the DICIT has carried out in the UAGRM on behalf of the University;
- Training in intellectual property, in order to inform the beneficiaries, about the benefits of registration and their property rights that are obtained at the time of registration of the patent.

The unit manages the registration and copyright process, in accordance with Bolivian regulations. In 2013, the process of obtaining Patents began, on the basis of the results of research, mainly in the research lines Agricultural production, agro-industrial, forest management and forestry industry, which aim to design and apply new technologies to promote agricultural, agro-industrial, agri-food and forestry production systems, to make them locally competitive, nationally and internationally, through a rational and efficient use of natural resources, within the framework of sustainable development. The patents are framed in the Thematic Axis "Production and food safetybiotechnological processes". All these actions are established in the Resolutions of the XII Congress of Universities of the Bolivian University System, referring to the National System of Science and Technology and the General Regulations of Research.

Other contributions of the unit to highlight are:

- obtaining patents in favor of the university, and registrations of copyright and distinctive signs and trademarks;
- being a national reference, for having the largest number of intellectual property registrations in the Bolivian University System;
- to be a representative of the Intellectual Property Network.

The main difficulty of the unit was the lack of intellectual property culture, since the issue of intellectual property was unknown to the university community. Hence, among the priority actions was the increasing awareness of the university community about the importance and benefits of IP registration, and its systematisation.

This and other difficulties, as well as the challenges, the unit overcame thanks to the strategic alliance SENAPI-UAGRM, a mechanism that allowed to develop a massive training process, first informative, and then specific and formative in intellectual property, resulting in the interest of researchers.





### 4.3.2 Monitoring and evaluation of research management: evaluation of performance indicators

It is vital to understand how the Intellectual Property unit monitors and evaluates its activities, as well as the fulfillment of the initial objectives. In this order, the activities and operations are carried out in accordance with the Institutional Strategic Plan for the period 2019-2025 and the Annual Operational Plans, which are mandatory. The indicators are set out in both plans. The unit begins by characterising the fulfillment of its functions according to the unit's manual, as well as the activities indicated in the annual operational plans, and then describes the theoretical and implementation aspects of the evaluation strategies of each of the activities. There is the possibility of rescheduling according to demand, which is also established in the current planning regulations. Tasks are assigned to staff according to the areas of work, agreements, and necessary procedures inside and outside the university. Semi-annual and annual management reports are prepared, with support indicators.

The unit periodically holds an event called the transfer table (a business meeting), in which the unit asks people to fill out a form about the needs and demands they require from the university, companies, public and private institutions of society. This information is then transferred to the research unit to manage joint responses to these requests.

Summary	Performance indicators	Means of
		verification
SCIENCE AND ECONOMIC RESP	EARCH INSTITUTE-IIES	
Current economic journal accredited	Journal issues with	iies.uagrm.edu.bo
by SCIELO Bolivia	scientific articles	
OIKOS POLIS journal. It is indexed	Scientific articles on	iies.uagrm.edu.bo
scientific journal and accredited by	regional, national and	
SCIELO Bolivia	international economic	
	and institutional analysis	
<b>BOLIVIAN SOYA INSTITUTE (I.E</b>	<b>3.S</b> .)	
Preparation of an instant quinoa and	Research paper presented	Industrial practice
pineapple drink	at the UAGRM science	paper
	expo	
Instant vegetable soups	Research paper presented	Industrial Practice
	at the UAGRM science	Paper
	expo	
Development of a 20% protein corn	Research paper presented	Industrial Practice
snack	at the UAGRM science	Paper
	expo	
Development of a bread-flavoured	Research paper presented	Industrial Practice
rice snack	at the UAGRM science	Paper
	expo	
Production process of an instant rice	Patent of invention	Official Bulletin of
bread flour		Bolivia
HI UPY MITAY supplementary	Patent of invention	Official Bulletin of

Table 4. Monitoring and evaluation framework





food for children		Bolivia
Study of the physico-chemical	Research paper presented	Industrial Practice
properties of extruded pre-cooked	at the UAGRM science	Paper
beans	expo	_
Study of the effect of soy lecithin on	Research paper presented	Industrial Practice
the physical characteristics of pre-	at the UAGRM science	Paper
cooked rice (via extrusion)	expo	_
Determination of anthocyanins in	Research paper presented	Directed Working
purple corn "kully"	at the UAGRM science	Paper
	expo	-
Hamburger formulation with	Research paper presented	Industrial Practice
extruded pre-cooked lentil flour	at the UAGRM science	Paper
-	expo	1
Study of the influence of extrusion	Research paper presented	Industrial Practice
temperature on the sensory quality of	at the UAGRM science	Paper
a pineapple and oat fibre instant	expo	-
drink	-	
Formulation of an instant chickpea	Research paper presented	Industrial Practice
drink via extrusion	at the UAGRM science	Paper
	expo	_
Instant flour for making nachos	Patent of invention	Official Bulletin of
		Bolivia
Instant flour for chia drink and oat	Patent of invention	Official Bulletin of
drink		Bolivia
"Study of the effect of moisture and	Research paper presented	Industrial Practice
oil on the physico-chemical	at the UAGRM science	Paper
characteristics of extruded pre-	expo	
cooked beans and formulation of the		
flour as a meat extender"		
Obtaining instant chickpea flour for	Research paper presented	Industrial Practice
falafel production	at the UAGRM science	Paper
	expo	
Study of the influence of oil on the	Research paper presented	Industrial Practice
acceptability of an extruded white	at the UAGRM science	Paper
bean meal as a meat extender	expo	
Study of the effect of oil on the	Research paper presented	Industrial Practice
production of extruded pea flour as a	at the UAGRM science	Paper
meat extender for hamburger	expo	
production		
Development of a new process for	Research paper presented	Industrial Practice
the production of frozen potatoes	at the UAGRM science	Paper
(without pre-frying)	expo	
Study of the influence of cacl2 and	Research paper presented	Industrial Practice
mgcl2 salts on the production of	at the UAGRM science	Paper
extra firm tofu	expo	
Quantification of anthocyanins in	Research paper presented	Industrial Practice
extrusion pre-cooked purple maize	at the UAGRM science	Paper
(zea mays l.)	expo	
Development and formulation of	Technology transfer to	Technology





gummies based on honey, eucalyptus	beekeepers' association	transfer document
and mint		
Development of an instant chocolate	Research paper presented	Industrial Practice
drink from cocoa paste	at the UAGRM science	Paper
	expo	
Procedure for making a crispy green	Patent application	Official Bulletin of
banana appetizer		Bolivia
Study of the formulation and semi-	Research paper presented	Industrial Practice
industrial production of a panettone	at the UAGRM science	Paper
	expo	
To develop a frozen banana (musa	Technology transfer to	Technology
sapietum 1.) Pulp for smoothies	beekeepers' association	transfer document
Development of an energy bar based	Technology transfer to the	Technology
on cereals and dehydrated banana	company Bolibanana	transfer document
(musa sapientum l.) Cavendish		
variety as an alternative new		
commercial product for the company		
bolibanana s.r.l.		
Development and formulation of	Technology transfer to	Technology
Development and formulation of chocolate milk drinks	Technology transfer to EBBA	Technology transfer document
Development and formulation of chocolate milk drinks Development and formulation of	Technology transfer to EBBA Technology transfer to	Technology transfer document Technology
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages	Technology transfer to EBBA Technology transfer to EBBA	Technology transfer document Technology transfer document
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of	Technology transfer to EBBA Technology transfer to EBBA Patent application	Technology transfer document Technology transfer document Official Bulletin of
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya	Technology transfer to EBBA Technology transfer to EBBA Patent application	Technology transfer document Technology transfer document Official Bulletin of Bolivia
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for firefighters	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to S.C. governorate	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology transfer document
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for firefighters Development of an isotonic drink for	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to S.C. governorate Technology transfer to	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology transfer document Technology
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for firefighters Development of an isotonic drink for s.c. Firefighters.	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to S.C. governorate Technology transfer to S.C. governorate	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology transfer document Technology transfer document
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for firefighters Development of an isotonic drink for s.c. Firefighters. Formulation and elaboration of a soft	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to S.C. governorate Technology transfer to S.C. governorate Research paper presented	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology transfer document Technology transfer document Industrial Practice
Development and formulation of chocolate milk drinks Development and formulation of fermented milk beverages Process and development of texturised soya Procedure for making a crispy green banana appetizer Optimisation of the yacon drying process Energy bar optimisation for firefighters Development of an isotonic drink for s.c. Firefighters. Formulation and elaboration of a soft caramel of yacon and chocolate	Technology transfer to EBBA Technology transfer to EBBA Patent application Patent application Research paper presented at the UAGRM science expo Technology transfer to S.C. governorate Technology transfer to S.C. governorate Research paper presented at the UAGRM science	Technology transfer document Technology transfer document Official Bulletin of Bolivia Official Bulletin of Bolivia Industrial Practice Paper Technology transfer document Technology transfer document Industrial Practice Paper





#### 4.3.3 Recommendations for improving research management

Historically, universities represent the highest educational institution responsible for research, knowledge generation, and dissemination. In this context, and with a view to stimulating and facilitating these processes, the creation of a technology transfer and intellectual property office, responsible for mediating the interaction between universities, industry and intellectual property, acquires considerable value. As in the case of this good practice, this office contributes to the implementation of the regulations, both national and internal to the university, on the legal procedures of copyright and intellectual property patents.

It is recommended that an intellectual property strategy be developed, which should be reviewed periodically, in line with any changes in official guidance at the national level. All countries have national bodies to manage the registration of copyright. The main task is to establish formal agreements between this body and the university, and to proceed in line with the established regulations.

Particular attention should be paid to the contribution of this office at various levels:

- producing high-quality research;
- support academic units in conducting cutting-edge research;
- safeguard ownership of the innovations made by these research centres;
- intellectual property training aimed at informing about the benefits of registration and its property rights obtained at the time of patent registration;
- implement communication strategies through traditional and virtual media, and scientific events.





#### 4.4 GOOD PRACTICE 4: Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES), Universidad Católica Boliviana San Pablo (UCB), Bolivia<sup>7</sup>

4.4.1 Research management: evaluation of the context of good practice at institutional level

The Regional Rectorate initiated the strategy the Research Initiation Programme in 2016, aiming to promote the development of research and the generation of knowledge at UCB, in compliance with its mandate. In 2017 the Research coordination unit was opened, and a coordinator of the unit was hired. Following this initiative, in 2018 the university provided facilities and opportunities to the teachers to conduct doctoral studies.

The research management at the university is carried out by the Research Coordination unit, which is in charge for promoting research among teachers and students, with the following tasks:

- Support and administrative execution, budget allocation of resources at the level of the institution and basic administrative procedures (from the request for desk material) and complex (generation of academic programs, budgets, approval of collaboration initiatives at national and international level);
- Promotion of participation of the teacher-researcher, doctoral candidate professors and students-future interns in research actions within the research lines.
- Coordination of the activities with the SCE (Students Scientific Society), in the process of training new generations of researchers;
- Participation in collaborative projects, assuming different responsibilities according to interest and needs;
- Promotion of collaboration with entities at the South American level, to generate new future opportunities for collaboration and the generation and strengthening of the long-awaited network of collaborators, for the benefit of the Centre, the Career, the Faculty, and the institution in general;
- Writing, revision, and creation, as well as submission to review of publications generated through the staff of the centre (teachers-researchers and students).
- Promotion of collaboration with other disciplines within the institution, with a multidisciplinary vision, fundamental in modern science.

Regarding the student's involvement into the research, the creation of the Student Scientific Society (SCE) in 2015 can be referred, which became operational between 2018-2019. Initially, its role was to generate activities, essentially experimental, that allowed to promote the interest of students in their discipline. In the early stages of the SCE, last year students were incorporated to the society. However, in order to expand its impact, and considering that during the last year the students have a limited time, and that knowledge is not generated with only a few weeks, it was decided to promote the activities among the students from the first semester, with the aim of gradually promoting a research mind and a greater dedication of time. At present this generation is in its sixth semester of training and shows an interesting vision.

<sup>&</sup>lt;sup>7</sup> Good practice author: Georgina Chávez





The management of the Student Scientific Society is developed by a teacher guide who was appointed from the Directorate of Environmental Engineering. Further one doctoral candidate was invited to the society to support the fulfillment of its objectives.

To promote research activities in a specific area, the centre students were invited to work in the Centre for Research in Water, Energy and Sustainability (CINAES). The centre has a horizontal hierarchical structure with a coordinator, with administrative and operational functions. It has three researchers (one teacher-researcher and two doctoral candidates). Administratively and hierarchically, the centre is part of the Environmental Engineering Department where all the indicated people are hired. In turn, the referred department is part of the La Paz Regional Engineering Faculty.

The research centre does have an own strategic plan. The university has an institutional strategic plan, which should be followed and implemented by each research centre, including CINAES.

Given that the university has several research lines, should be noted that the CINAES corresponds to the line Science, Technology, and Innovation, with a following specific lines:

- Environment: main line of research.
- Water, sanitation and hygiene and low-cost technologies: derived line.
- Industrial wastewater treatment: derived line.
- Social water management: derived line.
- Sustainable energies: the line that will be developed in the future.
- Solid waste management and circular economy: the line that is expected to be developed in the future.

The identification of the students from the society is coordinated by the teacher guide, aiming to identify the students with the greatest potential to maintain the research stay at the CINAES. It is also important the interest of the student to pursue postgraduate studies outside the country. Moreover, the students are requested to follow the laboratory and field protocols, and that their research proposals have the goal to generate knowledge through publication in prestigious peer reviewed journals. If the student only wishes to collaborate in an operational action, during his involvement he is motivated in discovering and posing questions for future research.

As far as incentives for student participation are concerned, the CINAES does not have the possibility to capture resources and manage them independently, since they depend on the budget of the departments.

Regarding the results of the initiative, the intangible results can be outlined such as the student connection with collaborators from universities abroad, leading to promote their future training at the postgraduate level. For example, the first generation of researchers has achieved master's scholarships in Europe (3 students), partly thanks to the excellent work done at the centre and the publication of their research, as main authors, in international journals of high prestige in English.

The Environmental Engineering Degree also grants an internship certificate, which helps to improve the student's curriculum at the time of looking for a job, at the beginning of their professional career. To improve the plan and expand support to students who conduct research at the centre, the immediate plan is that the projects where those are involved and where it is intended to involve the centre, consider a budget to financially recognise the student-research interns. However, the obstacle to fulfilling the plan is purely administrative because the university does not aim to establish labor relations with interns, to avoid heavy social burdens.





The plan for monitoring the activities of the students has a schedule of meetings, promoted by the SCE board, and eventually generated by the teacher guides. The meetings with the interns-student researchers of the centre, are carried out independently between the teacher in charge of them, and the students.

It should be noted that CINAES has already achieved some publications indexed in important databases such as SCOPUS. However, the website of the CINAES does not have attractive and accessible information for students who want to participate in research. 90% of the students who actively participate in the research have a motivation driven by the desire to train outside the country. In a society where the incentive to publish is non-existent, the motivation must be born from the professional himself, from a spirit that commits him to contribute to civilisation and, therefore, to the development of his own country.

The possibility of generating research, participating in international congresses is an incentive that the student- intern receives as a sufficient reason to conduct research.

The dissemination of campaigns to insert new researchers does not exist. The insertion of new researchers, at the level of the student-interns mentioned, is carried out through the social networks of the department. As for external professionals who wish to develop research tasks, no action has yet been taken, due to resource limitations.

As for the university-civil society cooperation, the institution promotes it under the mandate of the institution's policy. The main link is through social programs promoted by the respective department, which demands the participation of the careers and the teachers associated there. Outside of this link, the university-society nexus is defined by the products of the research proposals.

All research seeks to benefit society, from the generation of knowledge. However, there is no policy at the national level that promotes the implementation of the products generated. The state simply demands that the university fulfill the role, but it does not generate the space to adopt everything that the university produces. The university seeks its own means and ways to reach people, either through the Church, as is the case, or through civil society initiatives.

# 4.4.2 Monitoring and evaluation of research management: evaluation of performance indicators

Regarding the monitoring and evaluation of research management activities the following tables presents the detailed information.

INDICATOR	MONITORING AND EVALUATION
Monitoring and evaluation of research initiation unit activities	There is no concept of a research initiation unit at institutional level. Possibly the closest is the Regional Research Coordination (RRC) and the National Research Coordination (NRC), which periodically supervises the activities, holds meetings, surveys the research and the products generated, collaborates in projects when their contribution is considered important, and promotes norms, guidelines and regulations.

Table 5. Monitoring and evaluation of research management activities





	The actions of CINAES could be considered analogous to
	those of a research initiation unit. Supervision is provided only
	to the student trainees, through constant monitoring of the
	products, guidance in the development, generation of results,
	analysis of these and generation of the final product.
	Supervision includes the motivational mechanisms described
	above.
	Evaluation is carried out by submitting the products for
	consideration by collaborating researchers from institutions,
	generally external, and by submitting articles to journals,
	conferences and symposia.
Monitoring and	Considering the RRC and the NRC as a characteristic unit that
evaluation of the	resembles a research initiation unit, it monitors performance
performance of the	through the survey of outputs that each unit in the university
research initiation	produces.
unit's objectives and	If the actions of CINAES are considered analogous to that of a
pre-determined	research initiation unit, the objectives are measured through
targets	the outputs. Peer validation is the most relevant element.
	RRC and the NRC are evaluated by the regional rectorate and
Evaluation of the	the national rectorate, respectively. With respect to the
unit's results in	CINAES, under the same perspective mentioned above, the
accordance with the	evaluation of the unit is carried out according to the goals
initial objectives	established by the degree programme, in the first instance and
initial objectives.	with a mainly academic focus, and by the self-imposed goals
	of each researcher within the CINAES from a research focus.
Performance	
indicators and	There is an institutional strategic plan in which activities are
updating according	programmed by the RRC, the NRC and the CINAES. Once an
to any changes in	activity is programmed, it is difficult to change it.
the unit	
	In the CINAES, the division of tasks is mainly between the
	coordinator and the researcher-teacher, when the Directorate
How to establish	allows it. In relation to the teacher-doctors, the division of
and monitor the	tasks is of their own free will, because within CINAES there is
tasks distribution	no hierarchy that allows for the compulsory assignment of
	tasks. They all have the same hierarchical rank. As for the
	student-trainees, the division of tasks is equitable and fair.
Financial	At CINAES, financial management is directly associated with
management - Type	the Career Directorate, as CINAES is not authorised to
of monitoring of the	manage resources independently. This is the main structural
unit's budget and	weakness at the level of the institution.
costs	
Forms of	
dissemination of	The activities of CINAES are known to the CRI and are
research and	disseminated through the means described above.
research activities at	
institutional level	
National and	The RRC has a space on the institutional website and issues a
international	monthly newsletter.
dissemination of	-





research and	
Development strategies for building research capacity in universities	RRC and NRC have little institutional ownership. Important decisions are generally taken at the level of the Board of Trustees. CINAES promotes, through its own strategies and means, the building of research capacity in the university. There is no articulated form of involvement with other units.
Ways of organising meetings between multidisciplinary research groups to share ongoing research work and define future opportunities for collaboration	The RRC promotes regular meetings of researchers or between scientific societies. The meeting between research groups arises from the identification of common interests, outside of an institutional structure or requirement.
Ways of disseminating and promoting, at institutional level, the joint work of multidisciplinary research groups.	Apart from the meetings promoted by the RRC, there is no other promotion strategy at the institutional level. On the contrary, goal control promotes individual production by not allowing benefit sharing for joint goals.
Ways of national and international dissemination and promotion of the joint work of the multidisciplinary research groups.	No promotional activities other than those carried out by RRC are undertaken.
Community benefits	The institution brings together individual products and associates them with institutional goals. The student community benefits through their insertion in the labour market, but mainly through contact with professional networks that allow them to broaden their possibilities of finding a job upon graduation or improve their prospects when competing for specialisation scholarships abroad. The research topics are in line with the institution's lines of research. The contribution to the needs of the community is direct.





Table 6. Monitoring and evaluation framework

Summary	Performance Indicator <sup>8</sup>	Means of verification
Funding for research projects is achieved as a means of generating knowledge and the growth of the research unit through the involvement of researchers in various areas	% of output results of internally and externally funded projects	Calculation formula: (Number of output results of funded projects that are delivered on time in year t / Total number of output results of funded projects committed to for the year)
The dissemination, contrast, discussion and creation of professional networks is an important element for the advancement and development of the R&D Unit	% of project results presented at scientific- professional events per year	Calculation formula: (Number of presentations at scientific events in year t / Total number of results produced by the projects/research committed for the year)
It is an important objective to promote the labour insertion of the new professional or to contribute to the opportunity to obtain a specialisation scholarship abroad	% of student trainees who enter the labour market or obtain a specialisation grant in a timely manner	Calculation formula: (Number of student trainees who obtain a job or scholarship to specialise in a timely manner / Total number of student trainees who have concluded their relationship with CINAES)
Participation in inter- institutional projects to increase networking opportunities	% of research projects or initiatives leading to the creation or extension of professional research networks	Calculation formula: (Number of projects that led to the creation or extension of networks in year t / Total number of research projects or initiatives for the year t)
The improvement of the professional's skills positions the institution at a higher level than its competence	Improvement/decline in the university's position in international rankings	Position of UCB in international rankings (e.g. QS Ranking) compared to the previous year

<sup>&</sup>lt;sup>8</sup>Indicators should follow smart criteria (specific, measurable, achievable, relevant, realistic and time-bound).





#### 4.4.3 Recommendations for the improvement of research management

Regarding the approaches to increase research initiation activities and productivity the following actions are recommended:

- Greater prioritisation of the area in terms of economic resources and training of human resources;
- Increase in the number of staff in the Regional Research Coordination;
- Decentralisation in the administration of the institution, would allow the effective and timely management of procedures, resources, in the various area of research and projects;
- Greater access to international databases;
- Promote access to networks not only in academic matters, but also in research.

Regarding the promotion of the initiation of research at university level the following actions are recommended:

- Invitations to interested teachers and students;
- Networking, allowing the researcher to broaden professional, analytical, creative and mobility perspectives.

As for ways to increase the visibility of early-stage research and new researchers at the national level the actions recommended are:

- Participation in internal meetings;
- Strong, broad, continuously updated networks;
- External output, such as published articles, has high value, reputation and credibility at national level.

Resources for a successful implementation of the initial research programme are:

- Financial resources;
- Human resources dedicated exclusively to research;
- Research, professional and knowledge networks to position the country in the global arena.

Finally, to replicate this good practice in other higher education institutions in Bolivia and Paraguay, the reality of the situation in each institution needs to be studied in depth and then the best way to implement it needs to be determined.





#### **4.5 GOOD PRACTICE 5: Programme for the incorporation of new Researchers,** Universidad Católica "Nuestra Señora de la Asunción" (UC), Paraguay<sup>9</sup>

### 4.5.1 Research management: evaluation of the context of good practice at institutional level

The Program of Incorporation of Researchers of the Catholic University "Nuestra Señora de la Asunción" of Paraguay (UC), is a program that is part of the strategic plans of the university. It seeks to incorporate new researchers through an open competition, by involving the teachers of the institution, according to pre-established criteria, lines of research or priority areas.

The program focuses primarily on young researchers, and not on those who are already categorised as experienced researchers. Its objective is to incorporate researchers into the academic community and thus promote the loyalty of the research teaching staff and the formalization of the institutional link with the academic units, following the model proposed by the UC, and supporting the strategic plans regarding research of the units for the next five years. This seeks to encourage research, which is a priority at the university. The incorporated researcher must do teaching (not just research), in such a way that he can also involve students in the research processes.

The program aims to be a space to promote the commitment of teachers with the institution and research; in other words, to generate a formal link between teachers and the institution through research.

In terms of extension, the program seeks that research projects have a community impact for the environment of the unit.

Among the objectives of the institution are mentioned: "Research, autonomous scientific, constantly updated in the field of the sciences it cultivates, developed in the service of all men, in dialogue between the various disciplines and with respect for the Christian vision of man". "The ongoing formation of all members of the community in the scientific, technical and cultural areas cultivated by the university, in accordance with the same principles and orientation."

In addition, some actions expressed in the Strategic Plan regarding research refer to training of teachers and students for the generation of research projects and promotion of the training of researchers.

In short, the Strategic Plan recognises research as an institutional challenge that is in a promising phase, associated with personal initiatives. On this basis, a greater degree of institutionalisation is projected, generating lines of research, training researchers, and establishing more efficient administrative processes of research management.

The dissemination of the call for researchers in the institution is made from the Academic and Research Vice Rectorate, through the General Directorate of Postgraduate and Research, through a call note, which establishes the requirements for the application and the various documents that must be submitted. The call is sent by email to the Deans, General Directors, Postgraduate Directors, who in turn disseminate with the teaching staff, in a general way. Likewise, they are sent in a personalised way to those teachers who have the required profile: master's or doctorate degrees, demonstrated interest in research or professional growth.

<sup>9</sup> Good practice author: Luciano Román





In general, the areas of knowledge covered by the call are Economics, Agricultural Sciences, Biological Sciences, Law, and Engineering. The incorporation of researchers is given through an internal competition targeted to the teachers and academics.

The competition involves several phases such as communication of the call, where various aspects are detailed: deadlines, areas, and lines of research, requirements, forms of incorporation of the winning applicant. Once the preliminary and result is available, the winning applicants proceed to fulfill the formal aspects in the university, for example, signing a contract, assuming commitments. These processes involve the Deans or Directors of the unit where the researcher is assigned.

#### **Steps of the Call:**

- Publication of the call
- Period of preparation and presentation of the projects
- Evaluation period of the projects
- Publication of provisional resolution
- Publication of final resolution
- Start of the scholarship period of the beneficiaries (incorporation of the research teachers, within a period not exceeding 60 days, after the publication of the results).

The incorporation of the researcher through this contest lasts two years. Additionally, the academic unit of affiliation must be responsible for the projection and sustainability, through a budgetary reprogramming or creation of genuine funds, and enabling a space or infrastructure for the development of research.

#### **Selection process:**

The delivery of a research project is requested considering the templates provided and the lines of research established in the call. One of the evaluation criteria of the projects is the impact, which is measured through communication indicators and publication of the results in various media.

#### **Project evaluation:**

A Commission is formed, composed of a member of the General Directorate of Postgraduate and Research and researchers who belong to the area of knowledge of the project. Each member of the commission has a channel to discuss and agree on their evaluation. The General Directorate of Postgraduate and Research and the Academic and Research Vice-Rectorate are responsible for ensuring the homogeneity and fairness of the evaluations, as well as the evaluation of the institutional criteria, characteristics of the affiliation unit, and capacity for the management of the research.

There are pre-established evaluation criteria, inspired by the Marie Sktodowska-Curie program of the European Union: excellence, impact, and implementation.

**The criteria of excellence** refers to the coherence of the project: to be framed in the line or priority areas of the institution, as well as in the training and experience of the applicant researcher, who must have the master's or doctoral degree. Its indicators are:

- Scientific-technical quality of the proposal, institutional framework of the project
- Consolidation of the researcher's line and institutional coherence





• Capacity and curriculum of the researcher.

The **impact criteria** is related to the benefits, usefulness, institutional and social relevance, communication of the results, and the possible inter-institutional link that can be achieved within the framework of the research. Its indicators are:

- Institutional impact and priority
- Proposal for dissemination and communication of results
- Social impact
- Establishing links with external institutions.

Finally, **the implementation criteria** has to do with the feasibility and viability of the project, and how it will be executed, as well as with the characteristics of the academic unit where the project will be carried out, its infrastructure, and its experience in research management. Its indicators are:

- Quality and excellence of the work plan
- Management plan and institutional support
- Scientific and technological capacity of the receiving academic unit.

In each criteria, minimum thresholds or scores are established so that the project can be awarded.

#### **Supervision of project:**

This is in charge of the Postgraduate Directorate of the headquarters or academic unit where the researcher is assigned.

On the other hand, the incorporated researchers must send quarterly reports to the DGPI, on the progress of the work with the approval of the supervisor of the unit where the research is developed.

#### Success factors in the incorporation of new researchers:

- The supervision and monitoring by the directors of the university, the periodic deliveries of reports, which allowed to meet the objectives.
- The involvement of students (mainly thesis) in research, which allows research to be promoted among young students.
- Connection with the community or environment through research (extension).

The accompaniment (or involvement) of the headquarters or unit of affiliation of the researcher (deans, directors) is fundamental for success, and above all, the sustainability of research over time.

#### The overall impact of the incorporation of new researchers allows:

- The connection between the program and the students (thesis students) of the university, who managed to participate in the research processes with their professors.
- Publication of papers in international congresses and local scientific events.
- Greater commitment of research professors with the university.
- Greater formalisation or institutionalisation of the investigation.
- Formation of research groups.

The relevance of the incorporation of researchers lies in the very role of universities, which should not only be dedicated to the training of professionals, but also to the production of knowledge (research) and extension.





Research is closely related to teaching. In this sense, the program establishes that the person who is incorporated as a researcher must dedicate a certain number of hours to teaching, where it is sought to transfer knowledge to students, as well as promote research in them. With the incorporation of new researchers, institutional development and commitment to the institution are sought.

Regarding responsibility and economic procedure for the incorporation of new researchers, in the first instance, the incorporation of the researcher is solved through genuine funds at the central level, from the DGPI, for the duration of the program contract (two years). However, as an objective it is proposed that the academic unit of affiliation, once the program contract is over, incorporate the researcher through genuine funds or a budgetary reprogramming, to achieve sustainability over time.

The monthly fee for the researcher is set at around 500 US dollars, for a dedication of 80 hours per month.

The monitoring plan of the activities of the new researchers consists of requiring reports and evidence of the work carried out.

The previous work of awareness at the institutional level, about the importance of publishing, is usually carried out in the meetings of deans, directors and teachers, and in the trainings organized in research topics, scientific events.

The Research centre has a website, which lists the various research centres of the university, considering the complexity and diversity of venues and centres<sup>10</sup>. Dissemination is carried out through scientific activities or events organised with other universities, such as congresses, where the preliminary or definitive results of the research are presented. These results are published in the summary book of the event.

Other channels of dissemination of the research produced are the scientific journals, the congress reports and the website of the university, an aspect considered as an impact evaluation criterion.

There is cooperation between the university and civil society to develop research, since, in addition to obtaining an institutional impact, it is sought that the social impact is relevant to the community.

Students are part of the research centre, since the objective of the program is to connect research and teaching, offering spaces for those to participate in research, either by collecting samples, or doing surveys and interviews, or in dissemination, through participation in scientific events.

There are no grants for the continuation of research; however, researchers can access benefits within the institution, or example, discounts to access graduate programs and grants to attend scientific events. In any case, the sustainability of the program, as well as the research initiated, constitute a challenge or an aspect to be improved.

### 4.5.2 Monitoring and evaluation of research management: evaluation of performance indicators

The supervision and evaluation of the research activities are carried out based on the monthly reports of the researchers on the development of their work including evidence of the activities carried out, taking as a reference the objectives of the research. The process is carried out in the unit where the researcher works, and at the central

<sup>10</sup> https://www.universidadcatolica.edu.py/pensamiento-e-investigacion/





level, in the DGPI. Each unit applies its own supervision methodology, being able to differentiate from each other according to the characteristics of the areas of knowledge.

The DGPI receives quarterly reports on the development of the research and carries out a mid-term evaluation, based on the partial report of the expert peers in the area, in a "blind" way and communicates it to the evaluated beneficiary.

If there is reason for the suspension of the subsidy, it may be invoked within a period not exceeding 15 days after the communication of the evaluation results to the beneficiary.

The development of performance indicators is an aspect that must be improved and considered in the programme. Each unit where the researcher is incorporated applies its own control methodology, generally: reports, memoranda, assignment of teachers who carry out a close accompaniment to the researcher. The reports are based on concrete data such as what was done, who participated, where, when, what progress was made and what difficulties are encountered. The results are delivered taking into account the objectives of the project.

The budget is allocated by the General Directorate of Postgraduate and Research, and covers the fees of the researcher, for a part-time dedication (80 hours per month). This part-time dedication facilitates the incorporation of researchers, considering that these mostly already have other activities, such as teaching.

Research activities are disseminated in academic activities or teacher meetings, where a summary of the year's activities, achievements, challenges is usually communicated.

International dissemination is done through presentations at international congresses and publication of research results in international scientific journals.

At the university, development strategies for building research capacity are addressed in high government. The Academic and Research Vice-Rectorate, together with the General Directorate of Postgraduate and Research (dependent on the Vice-Rectorate), are the main bodies that mark the policy regarding research. In the academic units, the Postgraduate and Research Directorates are responsible for promoting research, in coordination with the Academic Directorate and the General Directorate or Dean's Office.

It should be noted that in each period of government (five years) a Strategic Plan is established, which guides actions in various areas, including research.

The organisation of the meeting between multidisciplinary research groups to share ongoing research work and define future opportunities for collaboration is an aspect to be improved. There is little multidisciplinary interaction. There are faculties, according to the areas of knowledge, where greater emphasis is given to research or there is a greater research tradition. On the other hand, in some areas of knowledge the presence of research is scarce or almost none.

There are several spaces for the dissemination at the institutional level of the common work of multidisciplinary research groups: meetings of professors, scientific dissemination days, posters, triptychs, web pages, WhatsApp groups.

The community benefits from the research, mainly from its results. Therefore, the impact on the community is one of the indicators that is evaluated in the projects presented and, in this way, the connection of the studied topic with the social reality (relevance) is guaranteed. The selected research topics are in line with the needs of the community, seeking to generate social impact and establish a link with the community.





Table 7. Monitoring and evaluation framework

Summary	Performance indicator	Means of verification
The program has led to the	Number of publications	Report of the researchers
training and strengthening of	in scientific journals and	to the academic unit of
new researchers' skills. The	other media	affiliation
involvement of students in the		Report of the researchers
research, dissemination and	Number of results	to the General Directorate
publication processes was also	presented in discussion	of Postgraduation and
achieved, as well as the	spaces, such as	Research
commitment of researchers to	conferences, congresses,	Evidence of field or
the institution	etc.	laboratory work carried
		out
The benefits of research are	The institution manages	Reports submitted by
institutional, and community	to connect teaching,	researchers.
based	research, and extension	Presence of the institution
	through the researcher	in international journals.
	incorporation program	Evidence of the number of
	Society benefits from the	university extension
	results of the research	activities

#### 4.5.3 Recommendations for improving research management

- The promotion of research must be done from a systemic approach: categorisation of research professors, investment in infrastructure and hiring of full-time teachers. Otherwise, interventions are isolated, and are not institutionalised or do not remain in time.
- Initiation to research at the university can be promoted in several ways: competitions, conducting scientific events, opening of postgraduate programs related to research, and categorisation of researchers.
- The initial visibility of the research of new researchers can be increased through dissemination in the institution itself: publication on the website, oral presentations, participation in scientific events, etc.
- For international visibility, inter-institutional networks and agreements are important, which allow academic activities and scientific events to be carried out. Have a specific budget allocated to research and that is sustainable over time, to avoid isolated and sporadic interventions. The academic units that benefit from the incorporation of researchers must assume a formal commitment, which stipulates the permanent incorporation of researchers.
- It is necessary that new researchers assume the formal commitment with the institution, about their permanence for a period of time or long term, to avoid escape or abandonment to the institution.

For the program to be replicable in other higher education institutions in Bolivia and Paraguay, it will be necessary to have a regulation or guide document, to carry out the contest / call, define in the institution priority areas or lines of research, have a unit in





charge of carrying out the contest (Research Directorate, Postgraduate Management, Vice-Rectorate for Research, etc.).

#### **5** Good practices based on Projects

- 5.1 GOOD PRACTICE 6: Raising national and international funds: Successful Project Management by the Climate Change Working Group (CCWG), Universidad Nacional de Asunción (UNA), Paraguay<sup>11</sup>
- 5.1.1 Research management: evaluation of the context of good practice at institutional level

To understand the research management of this good practice, we divided the analysis into two areas: one, aimed at the institutional level (UNA), and the second, related to the projects of the JSWG.

#### **Institutional level**

Currently, the UNA does not have a specific plan for research, however, its Strategic Plan 2021-2025, incorporates research processes as a strategic axis. The UNA is carrying out work to socialise and work on the implementation of the plan with the Academic Units and General Directorates of the Rectorate. The coordination of research at the UNA is in charge of the General Directorate of Research, Science and Technology, in accordance with the Statute of the UNA. This unit is a Senior Management Body of the Rectorate of the UNA, with direct dependence on the Highest Authority of the Rectorate, and in financial management, of the General Directorate of Administration and Finance.

The main objectives and priorities of the unit are:

- To promote the development of policies, regulations in research and innovation, considering the objectives proposed by the Institution, through its Strategic Plan, and national programs;
- To coordinate research, innovation and transfer actions with Faculties, Institutes and university centres;
- To manage the logistics that ensure the editorial process;
- To articulate the scientific initiatives promoted by the faculties, university research institutes and university research centres, granting them institutional support;
- To manage the plans, programs, lines, groups and research and innovation projects of its dependencies.

Main functions of the unit:

- management and technical execution of research projects
- technical and scientific editorial management
- information management and scientific and technological communication
- management of scientific training

The area of management and technical execution of research projects is responsible for the technical documentary management and monitoring of the processes. The information is available on the website <sup>12</sup>.

<sup>&</sup>lt;sup>11</sup> Good practice author: José Manuel Silvero

<sup>&</sup>lt;sup>12</sup> <u>https://www.una.py/investigacion/</u>.





The dissemination of research results, the training of researchers and the development of a research database are the main results of the unit.

One of its main difficulties is the administrative management for the development of research projects, it is also necessary to define a research policy and a general regulation that allows it to be promoted.

#### The GTCC:

The GTCC belongs to the Polytechnic Faculty of the UNA and is responsible for the Virtual Centre on Climate Change – Paraguay (CV\_GTCC) and the master's degree in Global Change. The need for planning requires the evaluation of the present variability, the occurrence of extremes and the generation of future scenarios that will allow the development of strategies ranging from medium to long term, and that are concentrated in more specific areas, sectors and activities of society; this type of activity is what the GTCC is developing.

These investigations required multi and interdisciplinary teams, made up of interested professors and collaborators of the master's program in Global Change (MCG), grouped in a Virtual Centre on Climate Change, from where the contributions and research of the researchers will be disseminated.

#### **Implementation and Management of the GTCC:**

The implementation of the group was carried out through international meetings and congresses, and the lack of research in Paraguay on climate change led to the need to increase human resources in climate change research (Priority: Water Resources, Agriculture and Health). In its first stage, the centre provided climate change scenarios for Paraguay and research projects whose abstracts were presented at congresses.

The main objectives of the Virtual Centre on Climate Change of the Polytechnic Faculty of the UNA are:

- To disseminate and offer collaboration to generate public policies by the relevant institutions.
- To build a (virtual) entity that concentrates, organises, and coordinates information on the impacts of climate change made in the faculty.
- To promote collaboration in the development of public policies with the capacity to adapt and reduce the vulnerability of the social sectors.
- To create a framework for collaborative policies for adaptation, vulnerability, and mitigation for Paraguay.
- To promote the creation of Climate Change Research Networks.
- To make visible the work carried out by the GTCC and collaborators in the MCG.

There are two lines of research of the Meteorological Centre: *Physics of the Atmosphere (Radiation, Ozone, its Effects); Climate, Climate change (Droughts, Floods of Paraguayan rivers, Forest fires, GHG emissions).* 

The group has a regional reach, with a set of different people working: G. Nagy (Uruguay, co-Nobel Prize laureate), G. Coronel, M. Pasten, J. Baez, R. Monte Domecq. M. Bidegain, A. Galeano, L. Flores. Edgar Crinó (Argentina/Rosario), Rubén D. Piacentini (Argentina/Rosario), M. Effen (Bolivia). It is the CONACYT that makes calls and selects or invites collaborators.





#### National and international funds

National and international funds are requested. The nationals are from CONACYT. The international ones are from the IAI (Inter-American Institute for Global Change Research), through the Agreement signed in Montevideo in 1992).

#### Projects, outputs and results of the JSWG

Currently, projects are being developed on forest fires and emissions of polluting gases in the region of Paraguay, research that will later be published in national and international journals.

#### **Difficulties and challenges**

At the national level, the work of the researcher is not known, so it is necessary to manage a standard on research at the University level.

#### Comments

Promote more interaction between researchers from the region, such as the "Successful International Meeting on Global Change and Climate Risks, in 2017 supported by CONACYT-FPUNA and GYRA-Paraguay).

### 5.1.2 Monitoring and evaluation of research management: assessment of performance indicators

The objective of this section is to understand how to monitor and evaluate research management in relation to the vision of the JSWG.

The main outputs and results of the implementation of the JSWG, based on the performance indicators, are presented in the following table.

Summary	Performance indicator	Means of verification
Project management and research	Technical and financial performance approved and verified by the funding institution. Audited opinion and regulations in force according to DNCP and control bodies	Project closing minutes
Technicalandscientificeditorialmanagement	Arbitration by editorial committee according to current regulations	Published journals
Information management and scientific and technological communication	Digital spreadsheet with data of institutional interest based on national and international requirements	UNA Research Database
Management of scientific training	Established personal and administrative information	Certified trainings
Strengthening of programs and lines of research, development, and	Research system that integrates academia, administrative management, and extension around research	Implemented research system

#### Table 8. Monitoring and evaluation framework





innovation (R +D + I)	
Strengthening	Dublished
scientific	iournals
dissemination	Journais

#### 5.1.3 Recommendations to improve research management

Several recommendations are made for the improvement of research, especially regarding the challenges of climate change:

- Simplify the financial administration of research projects, for greater dynamics, better management, and development;
- Increase in funding sources;
- Promote the organisation of the Conference of Young Researchers of the UNA, which are held annually;
- Offer incentives to the best youth research papers;
- Design clear institutional communication strategies (website, social networks) in terms of research;
- Establish alliances with local media;
- Increase in human research capital on climate change;
- Organise social and academic awareness campaigns;
- Commit institutional funds for the financing of projects in the area;
- Allow the university to lead trainings and trainings in other national institutions.

# 5.2 GOOD PRACTICE 7: CLEAN AIR Project - RED MONICA, Fundación Universidad Privada de Santa Cruz de la Sierra (UPSA), Bolivia<sup>13</sup>

5.2.1 Research management: evaluation of the current context of good practice at institutional level

To understand the research management of this good practice, we divided the analysis into two areas: one, aimed at the institutional level (UPSA), and the second related to the Red MoniCA project.

#### **Institutional level**

Currently, the strategic plan of the Private University of Santa Cruz de la Sierra, UPSA, PLAN HORIZONTE UPSA 2034, integrates policies and goals defined with the purpose of reaffirming its institutional positioning by strengthening teaching, enabling the faculty of competencies for research and interaction, strengthening the University-Business link, the promotion of private, governmental, community and voluntary sector research in research projects. The HORIZONTE UPSA 2034 Plan has been disseminated to all interested parties and has also been published permanently on the University's website.

The Research Directorate is the unit responsible for the management of research and is framed in the Research Regulations of the UPSA.

<sup>&</sup>lt;sup>13</sup>Good practice author: Ing. Cynthia Bojanic





The management of research at the UPSA is conceived mixed, being coordinated by a Research Directorate, and the head of the Research Council, who reports to the Rectorate and Vice-Rectorate. The research plan is built from the projects carried out by the Research Centres and are created within the Faculties and Postgraduate Management.

The Research Directorate has among its main functions: to propose and direct the execution of an Annual Research Plan of the UPSA, which is proposed to the Vice-Rectorate, with its respective budget. However, due to the absence of personnel, currently the Research Directorate of the UPSA is not functioning as an autonomous and separate unit of the faculties. It is the Research Centres of the Faculties that carry out research projects with funding provided by the university or by external sources. However, the activation of the Research Directorate is considered necessary to manage these funds.

It has also been found that hardware and software are currently not available in research centres.

The financial management of the university's units is centralised in the General Management. As the Research Directorate is not active, it is the Research centres that receive the calls and apply, therefore, there is no systematised follow-up to the calls for funding. The unit also doesn't have a website.

The main challenge is the activation of the Research Directorate. Currently, the management and monitoring of the research carried out by the research professors of the university is carried out by the Research centres.

The support of the INNOVA project is necessary for the activation of the Research Directorate at the university.

#### The CLEAN AIR Project - RED MÓNICA

The UPSA, in agreement with SDC (the Swiss Foundation for Cooperation for Technical Development), through Swisscontact and the Municipal Government of the city of Santa Cruz, developed this project with the aim of installing and maintaining an air quality monitoring program in the city of Santa Cruz, a municipality sensitive to air pollution by vehicular traffic and industries, and vulnerable to wildfires, jackets and burning.

The invitation to the entities was made through Swisscontact, who coordinated the participation of the institutions that expressed their interest in getting involved:

- 1. SDC-Swiss Development Cooperation-Financier of the Swisscontact Project-Project Implementer
- 2. Municipal Government of Santa Cruz-Authority and governing body of environmental control
- 3. Private University of Santa Cruz de la Sierra Monitoring Network Operator.

#### **Project Implementation and Management**

For the UPSA, three people have worked on the project: the person in charge of the project and 2 assistants (students of the last courses); two workers from the Municipal Government and the Swisscontact Staff.

The implementation process of the RED MONICA project has had several phases:

1. The support of the university was sought for the generation of scientific, reliable, and safe data for the implementation of the project, from the





location of the measurement sites to chemical analysis and the obtaining of real data, since Municipal Governments usually have a lot of staff turnover and both knowledge and data are lost.

- 2. The UPSA assigned infrastructure for the operation of the central office of the Air Quality Monitoring Network, including its own computer and printer equipment.
- 3. A suitable place was assigned for the protection of the equipment delivered for the Network.
- 4. It was equipped with a space for research. exclusive within the Chemistry laboratory.
- 5. Communication services were secured.
- 6. Sample analysis was performed.
- 7. On-site controls were carried out at the fixed stations (providing transport, personnel, necessary tools).
- 8. The administration and maintenance of the Air Quality Monitoring Network was carried out.
- 9. Reports and studies were prepared based on data obtained from the Network.
- 10. The students of the university were motivated to carry out research work in the Monitoring Network.
- 11. Scientific publications and reports were disseminated to the public through newspapers and websites.
- 12. Air quality reports and data were provided to the Municipality of Santa Cruz and Swisscontact.

The management of the project has been carried out through permanent measurements and coordinating and sending the information to the Municipal Government, which by law is responsible for air quality-in the cities.

#### National and international funds

National and international funds have been requested. The national funds were granted by the UPSA and the Municipal Government. The International Funds were a donation from SWISSCONTACT.

	Institution	Value
	UPSA	27.000 \$
1 management	Municipal Government	9.500 \$
	Donation SWISSCONTACT	99.750 \$
	Total	136.250 \$
	UPSA	27.000 \$
2 monocomont	Gobierno Municipal	13.000 \$
2 management	Donation SWISSCONTACT	58.250 \$
	Total	98.250 \$

The funds were divided into:

The first two steps concern the implementation of laboratories and equipment, within the space allocated in the CHEMISTRY Laboratory of the UPSA. From this point, all operating expenses were covered by the contributions of the UPSA and the Municipal Mayor's Office of Santa Cruz de la Sierra.





The process of international funds was carried out by Swisscontact, with the air measurement equipment coming directly as a donation.

#### **Current activities**

The inter-institutional agreement ended, and the Clean Air project became the sole responsibility of the Municipal Governments.

#### **Project Products**

- Implementation of the MoniCA Network (Air Quality Monitoring Network) with the measurement points according to the WHO and validation of the pollutants to be measured.
- Local air quality reports.
- Departmental Reports of Air Quality in Santa Cruz de la Sierra.
- National Reports on Air Quality in Bolivia by the Ministry of the Environment and the National Institute of Statistics (INE)
- Publication of international data in the journal The Clean Air Institute (CAI) and Clean Air Initiative for Latin America.
- Municipal and National Laws to avoid pollution, for example, restriction of bonfires in San Juan and Pedestrian Day.

#### Results

- Measurement for the reduction of pollution and conservation of air quality in the city of Santa Cruz.
- A consolidated network in different cities of Bolivia of the MoniCA Network (Air Quality Monitoring Network) based on the initial experiences of Santa Cruz, Cochabamba and La Paz.
- Involvement of departmental and national authorities in Air Quality Management.
- Greater citizen awareness in the reduction of pollution.

#### Feedback

Eight of Bolivia's nine departments have implemented the MoniCA Network. Currently, there are new real-time monitoring technologies that are replacing those used in this project. Although national standards are designed for the passive and active method that the project has used, this can be implemented with new technologies.

### 5.2.2 Monitoring and evaluation of research management: assessment of performance indicators

The objective of this section is to understand what the resources were necessary for the development of the project, what methods were used, how it was supervised, controlled and evaluated, what are the benefits for students and researchers involved in this type of projects, and what are the final results of these. It is also intended to understand how students were involved in the project and how it has contributed to promoting awareness of climate change.





#### **Resources and methods**

There are several resources necessary for the development of a project related to air quality monitoring. Those resources and methods are presented in the following table.

 Table 9. Necessary resources

Resources	The chemi	stry laboratory is required, with an exclusive space for the
	project	
	PC equipm	ent for data
	Active	Particulate matter (PM10): Harvard MiniVol type
		impactors.
		Portable equipment Pumps with 4 1/min flow restrictor,
		with 24-hour electric timer, standardized filters
		Precision balance.
Equipmont	Passive	Passive diffusion by visible UV spectrophotometry (MBTH
equipment		color reaction)
and materials		Passive diffusion; extraction and determination of Nitrogen
useu		Oxide (NO2) passive containers
		Standard PVC containers with sampling tubes
		Ozone Determination (O <sub>3</sub> )
		Passive containers
		Standard PVC containers
		Sampling tubes
Measurement	The air q	uality monitoring carried out was adjusted to protocols
protocol	established	by Bolivian Regulations, and procedures developed by the
-	MoniCA N	etwork according to the type of pollutant
	They were	carried out in the laboratory, after the process of field
	monitoring	of exposure and collection of samples.

#### Supervision, monitoring and evaluation

The supervision of the project was carried out in periodic meetings of the project with the peers of La Paz, El Alto and Cochabamba. It should be noted that the passive monitoring was carried out by the technical staff of the Municipal Government and the students of the UPSA. The analyses are carried out in the Chemical Laboratory of the UPSA, under strict quality controls in every one of the stages that comprise the monitoring by the passive method. Interlaboratory audits were done to verify the measurements.





The monitoring and evaluation were done in regular meetings with the other members of the MoniCA Network and Swisscontact. External audits have been carried out for the measurement.

A proposal was developed that allowed to prevent the deterioration of air quality in the city of Santa Cruz through the monitoring of the main pollutants. The criteria for the design and implementation of an air quality monitoring network required the definition of a measurement strategy, with the location of the measuring stations being one of the most decisive aspects and requiring greater harmonization.

For the location of the sampling sites, different methods of spatial selection were analysed. To start the process of choosing the sampling sites, the following aspects relevant to the city were considered: types of emissions, sources of emissions, topographic and meteorological factors, economic activity of the population and population density.

The group produces reports based on the results of monitoring and evaluation, namely tables by measurement and annual reports containing the following information: introduction, monitoring stations, results and conclusions for nitrogen dioxide, ozone, particles less than 10 microns.

In accordance with the initial objectives, the evaluation of the products and results of the project was carried out by the Municipal Government, which was equipped with a booth with automatic equipment in a representative point of the city. The UPSA, following the measurement protocol, measured the main pollutants and their influence on air quality in 11 points of the city of Santa Cruz, with the passive and active method, one of those points being that of the automatic equipment. Thus, measurement trends could be evaluated, to correlate the results obtained and reduce the uncertainty of the data generated by monitoring.

#### Student participation and benefits for researchers

The students were trained to participate in the preparation, collection of samples and analysis, under supervision. The students also inserted the data in spreadsheets. With that, they had benefits such as periodic training, sharing with the other members of the Network, knowledge transfer, measurements and analysis with statistical and scientific bases, and curricular experience.

Regarding the benefits for researchers, in addition to a deep and permanent training in the subject, environmental awareness, participation together with students in different seminars held in other departments of the country and abroad (for example, Peru, Ecuador) to share experiences, can be outlined.

#### **Results of the project**

The concrete results of the project are measurable. The following results can be identified:

- Measurement database
- 6 undergraduate theses
- Article in the journal of the Society of Engineers
- 12 Annual publications of departmental reports
- 4 National reports
- Clear Air -USA Reports

#### Dissemination

Annual reports published on the website were made, which, in addition, were sent to the Municipal and National Government. National reports published by the





Ministry of the Environment have also been made. The data were published internationally in the journal by The Clean Air Institute (CAI) and the Clean Air Initiative for Latin America.

#### Promoting awareness and citizenship about climate change

Before this project, there was no information on the city's air quality. This project has served to raise awareness about the importance of air quality, both in social terms and climate change. The project has not continued. However, currently, it is the Municipal Government that issues the results with its automatic equipment.

A National Network has been formed with all the Municipal Governments of the departments involved and is carried out based on the experience gained from this project.

With respect to this analysis, this project allowed to improve the air quality in the city of Santa Cruz. The main outputs and results of project implementation, based on performance indicators, are presented in the table below.

Summary	<b>Performance indicator</b>	Means of verification
Implementation of the MoniCA Network	$\mu g$ of NO2 in the air $\mu g$ of O3 in the airParticles smaller than 10micronsparticles)	Comparative analysis with automatic equipment
Application of international criteria for the measurement of air quality	Permissible limits for air pollutants	New municipal and national regulations to reduce air pollution

Table 10. Monitoring and evaluation framework

#### 5.2.3 Recommendations to improve research management

The analysis of this project has made it possible to draw up some recommendations for the improvement of research, especially regarding the challenges of climate change.

It was concluded that it is necessary:

- Make investments in infrastructure, training, access to international databases, and policies that promote university-business participation;
- Involve students in research, through lectures and publications so that they understand the importance of research;
- Publish in specialized journals and through social networks, to increase the visibility of the research;
- Provide economic resources, technology, and teacher-student and authority support;
- Promote research on climate change, through the information generated and the incentive of the use of renewable energies;





• Implement good practices in other higher education institutions in Bolivia and Paraguay through inter-institutional agreements and the dissemination of findings.





### 6 Appendix A: GOOD PRACTICE (GP) ASSESSMENT FORM

Name(s) of Applicant(s)	
Name of the Good Practice	

#### **GP QUALIFICATION CRITERIA**

CRITERIA	COMPLIES	DOES NOT
		COMPLY
It belongs to the field of		
Research Management.		
The GP has been submitted by a		
teacher, student, administrator,		
or research team of a university.		
The GP has means of		
verification of its development or		
results.		

#### **GP ASSESSMENT CRITERIA**

	SCA	LE			
ASSESSMENT CRITERIA	1	2	3	4	5
1. Relevance to the context (useful, novel,					
transferable, developed with external stakeholders)					
2. Has solved a problem or contributed to improving					
a dimension (process, service or function).					
3. Expansion in terms of the applicability of similar					
schemes to other institutions in the consortium.					
4. Cost-effectiveness: The case studies will identify					
and promote actions that have produced optimal					
results at minimum cost.					

#### \* To evaluate criteria 1, 2 and 3:

5= International, 4= National, 3= Institutional or University level, 2= Area, faculty, career or Institute level, 1= Researcher level.

**\*\* To evaluate criterion 4:** Carry out a qualitative and quantitative assessment based on the following questions: To what extent has research with the GP been promoted? Has the quality of research been improved with the GP?





#### 7 Appendix B: SELECTED GOOD PRACTICES

Paraguay	University	Pre-selected good practice	Selected good practice
	Universidad Católica «Nuestra Señora de la	Programme for the incorporation of new researchers	Programme for the incorporation of new researchers
UC	Asunción»	Good practice in research teaching	
UNA	Universidad Nacional de Asunción	Raising national and international funds: Successful Project Management by the Climate Change Working Group (CCWG) Continuous monitoring system of physico-chemical and biological parameters of the surface waters of Lake Ypacaraí and its hydrographic basin	Raising national and international funds: Successful Project Management by the Climate Change Working Group (CCWG)
UNE	Universidad Nacional del	Specific research management policies and strategies at institutional level. Creation of the Office for the Transfer of Research Results (OTRI)	Specific research management policies and strategies at institutional level. Creation of the Office for the Transfer of Research Results (OTRI)
Bolivia	Lite	Pro-selected good practice	Selected good practice
			Deletted good practice
	Universidad Católica	National or international Fundraising	Research promotion among young researchers at the Centre for Research in
UCB	Universidad Católica Boliviana "San Pablo"Ing. Susana Vargas	National or international Fundraising Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES)	Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES)
UCB	Universidad Católica Boliviana "San Pablo"Ing. Susana Vargas	National or international Fundraising Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR PROJECT - MONICA NETWORK	Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES)
UCB UPSA	Universidad Católica Boliviana "San Pablo"Ing. Susana Vargas Universidad Privada de Santa Cruz de la Sierra	National or international Fundraising Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR PROJECT - MONICA NETWORK Study on the Characterisation of Domestic Solid Waste in Santa Cruz de la Sierra"	Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR Project - MONICA NETWORK
UCB UPSA	Universidad Católica Boliviana "San Pablo"Ing. Susana Vargas Universidad Privada de Santa Cruz de la Sierra Universidad Mayor Real y Pontificia de San	National or international Fundraising Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR PROJECT - MONICA NETWORK Study on the Characterisation of Domestic Solid Waste in Santa Cruz de la Sierra" Construction of research lines with society actors with the support of the Strategic Research Program Foundation in Bolivia	Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR Project - MONICA NETWORK Construction of research lines with society actors with the support of the
UCB UPSA USFX	Universidad Católica Boliviana "San Pablo"Ing. Susana Vargas Universidad Privada de Santa Cruz de la Sierra Universidad Mayor Real y Pontificia de San Francisco Xavier de Chuquisaca	National or international Fundraising         Research promotion among young researchers at the Centre for         Research in Water, Energy and Sustainability (CINAES)         CLEAN AIR PROJECT - MONICA NETWORK         Study on the Characterisation of Domestic Solid Waste in Santa         Cruz de la Sierra"         Construction of research lines with society actors with the support         of the Strategic Research Program Foundation in Bolivia         Biodiversity management: Identifying stakeholders and factors         that encourage active participation"	Research promotion among young researchers at the Centre for Research in Water, Energy and Sustainability (CINAES) CLEAN AIR Project - MONICA NETWORK Construction of research lines with society actors with the support of the Strategic Research Program Foundation in Bolivia









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