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In Number 5th presented an article *Environmental Services: Between Conservation and Use of Resources; Public Policy Recommendations* by OLIVERA-VILLARROEL, Sazcha Marcelo & HERNADEZ-MURILLO, Ricardo with adscription in the Universidad Autónoma Metropolitana and Banco Mundial, in the next section an article *Model of educational management for the Career of Commercial Engineering of The Universidad Mayor Real y Pontificia de San Francisco Xavier de Chuquisaca* by MITA-ARANCIBIA, Erick Gregorio with adscription in the Universidad Mayor Real y Pontificia de San Francisco Xavier de Chuquisaca, in the next section an article *The profile of women managers, market orientation and organizational performance: A conceptual theoretical revision for the construction of a cognitive model* by ORLANDINI-GONZALEZ, Ingrid Eliana with adscription in the Universidad San Francisco Xavier de Chuquisaca, in the next section an article *The water and its social and economic relations. Proposed Payment for Environmental Services in the Ravelo River Basin* by CAMPOS-QUIROGA, Zenón Peter.

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## **Environmental Services: Between Conservation and Use of Resources; Public Policy Recommendations**

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### **Abstract**

The study addresses the issue of environmental services from the perspective of providing public goods and services, which must be regulated and regulated by the State. For this, a quantitative approximation is made that gives context to the proposed public policy recommendation. The main objectives of public policy recommendations are the conservation of plant coverage that provides environmental services to society. The conservation of the territory through the payment of the environmental service is a policy that crosses transversally, not only the environmental context, but also the social context; since it is recognized the contribution to the productive system of conservation efforts and resource management of peasant communities and national, departmental and municipal protected areas systems

**Environmental services, Forest systems, Public policies, Land use, Natural resources**

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## Introduction

The recognition of the services provided by the natural system to the existence of the planet, as we know it, is manifested in the multiple efforts that are generated in the world for its conservation and management. One of the efforts that has received the greatest boost in recent years is the payment of environmental services for the conservation of forest systems (Pagiola et al, 2014, Ruíz Perez, 2007).

This leads to the implicit recognition of the importance of the forest in the generation of environmental services, even when there is no research to corroborate this relationship explicitly (Pagiola et al, 2014, Ruíz Perez, 2007).

Given the relatively small participation in employment generation and in national income, national decision makers assign low priority to forest conservation and management activity compared to other sectors that compete for limited budgets, including in the environmental sector. (FAO, 2015).

For this reason, the creation of innovative financial mechanisms such as the payment of environmental services for the generation of water resources has been promoted.

It is precisely the use of water, as the main element and input of human activity, that has generated interest in conserving the sources from which the economy of this vital element is provided.

But this is only one of the services provided by the natural environment to human activity and analyzing it separately destroys the conception of the ecosystem that encompasses the management and conservation of natural systems, especially forest systems.

The services generated by a forest system or any natural environment are part of a system in which the interrelation and dependence of the parties is latent; therefore, administration policies must go to the management of the entire environment and not only of one of its parts (Landell-Mills and Porras, 2002, Bishop et al, 2012).

This recognition of the integrality of environmental services must be done from an ecological, economic, and social perspective and from a resource management approach; since in fact when paying for a service, for example biodiversity, we are conserving the forest in an integral way.

Otherwise, it would be recharging the costs of handling all services to only one group of users, in the case of payment for environmental water services, to potential users of the water service.

Rural landscapes contain stocks (stock) and generate flows (flow) that are used by the population in their existence and in their productive activities. These environmental assets and services provide benefits to the population in an area of influence greater than that of its landscape environment.

The physical sciences help us to understand the existences and flows of energy; while the economy accounts for them as positive externalities, which bring benefits to economic activities outside the area (Jackson, Robert B. et al., 2005).

Research, in this sense, will use environmental economics, ecology and processes of social organization as methods of analysis. To do this, tools from these disciplines will be used, starting with the division of environmental services between claimants and suppliers of the same, but based on existing systems and plant covers in an environment.

From this analysis, public policy recommendations will be derived, which will have as a central axis the conservation of vegetation coverage that provide environmental services to society as a whole.

The conservation of the territory, through the payment of the service provided, is a policy that traverses not only the environmental context, but also the social context by recognizing the importance within the productive system of the peasant communities and the systems of protected areas national, departmental and municipal.

### **Offer of environmental services. The opportunity cost and the willingness to accept a payment from forest owners and / or managers**

The characterization of environmental services in Bolivia starts by differentiating three large zones that have soil cover and differentiated management processes among themselves.

The first is the Andean area, the second is the sub-Andean region and the third are the great Amazonian plains and Chaco. These zones not only differ in their type of coverage but also in their management system and land use determined by their historical and social context.

Each of these regions has its own biogeographic characteristics with a set of flows of environmental services coming from them, for example: the endowment of water sources, stable rainfall, soil composition, type of vegetation cover, etc.

Based on these characteristics and services, society decides the function that will be given to its environment among urban, agricultural, livestock, forestry and conservation uses, among others.

This change in use starts to a large extent from the demands of society in the generation of goods and services for their subsistence and growth. Decision-making for this process of change is not easy and includes not only an economic decision, but a social and cultural one.

Unfortunately, considering environmental services as freely accessible goods and not recognizing the positive externalities provided by the environment, our society has been justly destroying the characteristics that led to use these areas for each of the functions it has been developing for the society (Olivera and Hernandez, 2016)

The greatest pressure to change land use is usually in the conversion of areas of high-quality agricultural use to urban areas, with the consequent increase in the pressure to open new cultivation areas with the substitution of forest areas or other types of soils. So appropriate for agriculture.

This leads to the loss of significant extensions of land surface with vegetation cover that provide other types of environmental services that are ultimately more valued by the economy than agricultural or livestock use..

### **The distribution of land in Bolivia**

The current distribution of land in Bolivia stems from the agrarian reform process that began in the early 1950s. Until 1992, the reform process legally distributed 43% of Bolivian territory to approximately 620,000 beneficiaries, but due to an undue process of land appropriation especially in the eastern region of the country, it is decided to change the distribution system and initiate a process of sanitation of titles through the enactment of law No. 1715 of the National Agrarian Reform Service in 1996. (Sanjines, 2005)

This process of land sanitation, which is still in process, it should be noted that 52% of the territory does not have its proper title, so the legal status of these territories is still in question. Many of these territories belong to the national system of protected areas (20% of the territory), to indigenous communities of the Amazon region and the Andean region of the country.

### The Payment of Ambient Services

The payment for environmental services -PSA- consists of the process of direct compensation to the owners, administrators or users of the land for the environmental services they produce (Pagiola et al, 2014). In this way, direct incentives are generated so that the owners or users of the land include these services in their decisions on land uses. Both Costa Rica and Mexico, among others, have explored this type of payments for the best conservation of their forest cover and the maintenance of their systems and natural environments.

The methods of payment, with more than 800 cases documented to date worldwide, range from cooperative agreements -intra and intercommunity-, to true derivatives markets such as the Clean Development Mechanism of the United Nations Framework Convention on Climate Change.

The inherent difficulty in measuring "intangibles" as the positive externalities of the forest have been called, has led the different contracting parties to adopt various proxies in order to evaluate compliance with the agreements (Mendoza and Garbarino, 2016)

In local bilateral agreements, the "buyer" usually has an idea of the driving behaviors that he wishes to modify or incentivize, as well as the objective manifestations of them.

Even in more complex cases such as the Catskills, the formulation of a management plan per farm has allowed identifying specific actions and parameters such as the construction of a bridge to channel the passage of livestock without affecting the course of the stream.

In massive programs such as calls for payment of environmental services operated by forest authorities, the simple conservation of a parameter such as the percentage of forest cover, is agreed as the indicator synthesis of control of pests, fires and illicit, essential for the conservation of the forest.

In the biodiversity projects, indicator species are usually adopted that, in the same way as the canopy cover, can summarize a series of processes that would guarantee the conservation of said species.

Two currents of thought are faced in daily practice:

- a) That which sustains the social relevance of forest conservation and the willingness to pay of society that explains the existence of bilateral agreements and public programs, tariffs, subsidies, investments and conditional transfers to the conservation of the source of environmental services.
- b) Those who would like to condition social action to a scientific certainty based on means of measuring environmental services whose complexity makes it difficult to adjust reality to a simple model where there is a producer and a user and in which their agreements are conditioned to monitoring of the fulfillment of precise parameters that would be based on a scientific knowledge always in construction (Bishop et al, 2012).

In the first case we are witnessing a treatment of "public good" where society is more interested in the preservation of natural capital and environmental service-aware of the cost to society in case of losing them-and the need to build institutions (social agreements and rules) that guarantee the willingness to pay and exclusion from the free rider given the difficulty of exclusion intrinsic to the positive externalities generated by forest ecosystems.

Without ignoring the need to advance in the efficient allocation of costs and the benefits of their care, this current warns about the risks of trying to achieve it based on models limited to known and measurable variables that do not manage to capture the dynamics of these systems complex.

In the second case, scholars (and some detractors) ignore the strategic dimension of a social phenomenon such as the emergence of the environmental services market, convinced that only positive knowledge of the variables of a linear model of cause and effect that explains the anthropogenic conditions for the provision of a service (and the evidence to "convince" a potential buyer) will generate a market that guarantees not only its permanence but also the greater efficiency in the allocation of costs and benefits as if the objective were limited to the generation of private goods (products), when the challenge lies precisely in the preservation of the complex system of stocks and flows generated by ecosystem services valued by society.

### **The owner's decision to conserve the forest, improve its management or change land use:**

Basic stages in the decision of the forest owner

- Identification of opportunities sets.
- Definition of the disjunctive.
- Correct calculation of costs: opportunity, irrecoverable, marginal

The set of opportunities shows what are the options that the owner of the land has, regardless of whether this is a small, a large owner or the State itself. Each of these actors will have preferences, budget and time constraints that limit the set of real options for each actor. Even within the restrictions there can be a strong trade-off between the real options, and what the correct calculation of costs will have to contribute is an objective weighting when analyzing the options.

Due to the nature of the stock of natural capital required to guarantee the flows of environmental services, the contractual arrangements have to be medium and preferably long-term.

The declaration of protected natural areas, the ecological easements or "land easements", and the contracts of adhesion to programs of compensation for the environmental services of the forest and the conservation of the hydrological basins are all instruments to ensure the natural base of an economic activity, in the long term (Olivera and Hernandez, 2016).

On the other hand, the economic environment that has characterized agricultural production, the main cause of change in the use of forest land in the 60s and 70s, especially in the last 30 years, is one of great uncertainty: a) the industrial revolution ended, the State has stopped supplying supplies, credit and rural extension, there are no longer guarantee prices and subsidies; and b) commercial openness confronts rural producers with subsidized competition from North America and Europe.

Agricultural activity has become, at least for the moment, a high-risk activity that increasingly demands more inputs and capital, and that offers ever lower profit margins with lower certainties of income generation.

The owner of the land may be convinced that we are going through a process of revaluation of planetary natural resources, surely he shares the vision of Mark Twain who advised: "son, buy land, they are not doing more!". But the truth is that the market today still does not reward it. The return of their productive activity is not recognized, but the rural owner clings to the land for cultural reasons or because he senses the future value of his assets (Olivera and Ferro, 2016).

In this context, a medium or long-term instrument may be attractive that guarantees an income that, although modest, allows it to: a) minimize its present risk, and b) preserve its option value.

In addition to the strictly economic certainty, the institutional arrangements that promote the Payment of Environmental Services, explicitly or implicitly, also constitute an acknowledgment of rights over environmental services and, therefore, over the ownership of the land and the biological resources that produce them.

### Property rights

In addition to the ex ante condition proposed by Coase to ensure efficient exchange and allocation through the market, the allocation of property rights is the greatest social, legal and economic challenge in the case of environmental services. The possibility of claiming property rights and the ability to exclude is, in fact, simpler in some goods: historically in the goods produced by the artisan-man. The greater difficulty of claiming property rights and the exclusion of their benefits from "stowaways" or free riders, has always depended on the construction of institutions that regulate legitimately and effectively.

A good as "intangible" as the contribution to climate regulation through the function of carbon "sink" that forests exercise, has been strictly regulated by the Clean Development Mechanism, demonstrating in a paradigmatic way, how institutional construction can effectively handle the difficulty of exclusion present in these goods.

To understand the process of appropriation / allocation and subsequent commitment of rights over environmental goods and services, it is useful to disaggregate them as follows (Rosa et al, 2004):

- Access: Right to enter a defined physical space and enjoy non-extractive benefits, such as recreational activities.
- Withdrawal: The right to extract resources or products from a system (eg fishing, firewood, water for irrigation or human consumption, etc.).
- Management: Right to regulate internal use patterns and transform the resource.
- Exclusion: Right to determine who has rights of access, withdrawal, management, and how these rights are transferred.
- Disposal: Right to transfer management and exclusion rights.

From the review of cases it can be concluded that the main actors affected by PES schemes are the owners or forest owners.

For owners of natural resources, the implications of the Payment for Environmental Services schemes identified include (Madrid, 2006):

- Change in land ownership.
- Total or partial restriction on access and use of biological spaces and resources.
- Changes in management practices.
- Without changes.

### **Demand for Environmental Services. The Willingness to Pay for Change in Land Use**

It can be said that all the inhabitants of the earth are demanding environmental services, being able to demand services from a local, regional or global perspective. Environmental services in most cases are in fact a public good, so they must be treated as such. The classic definitions of public goods and services attributed to them as characteristics: non-rivalry and non-exclusion in their consumption, as well as being a good or service of free access. The recognition of the actual or future shortage of services reflects the emergence of rivalry in a good that, with being public, begins to show its finitude and the recognition of the complexity of the forest ecosystems that produce them has led to the construction of institutions (agreements and rules) that allow the exclusion and "payment" to the owners or "caretakers" of the forest.

This implies that the management of environmental services policy, especially those considered public services, must start from a system of market regulation, this implies that in its analysis all the problems of the provision of public goods intervene. This does not exclude the possibility of agreements between private parties that generate service exchange agreements for a specific payment.

To develop the management of public goods from the economic perspective, Samuelson's rule on the optimal distribution of public goods can be used. Which is a general theoretical construction that indicates that society should optimally provide a public good until the sum of the marginal rates of substitution between the public good and the rest of the private assets of society equals the marginal rate of transformation of the production of this public good by society. (Sterner, 2003).

This rule can answer the following type of questioning: how many hectares of forest would be willing to substitute to obtain so much wood or other goods from the forest? In a competitive society, forest areas should expand or contract until the value of the sum of the marginal rates of substitution of forests by other goods among all individuals decreases and equals the marginal rate of transformation of forests by other goods (Vogel, 1994).

For the case of the conservation of the biological diversity and with it the environmental services that it provides, it supposes a direct policy: all the simultaneous values generated by the biological diversity and the environmental services that it provides are added and it is recommended to conserve the habitat until the The cost of the last hectare conserved equals the increasing added value.

However, there is a fundamental theoretical problem in the methodology: preferences are unstable throughout human generations and any recommendation based on current preferences may result in underestimated values of the preferences of future generations (Vogel, 1994).

Therefore, to maintain a minimum of areas that conserve biological diversity, society should not be guided by economic criteria but by minimum safe standards - the precautionary principle- (Declaration Rio, 1992).

What happens with the rest of the areas that contribute biological diversity and environmental services to society; but that fall outside the priority conservation areas ?, should we leave them aside? For this type of environments that provide environmental services for society but that are framed in the competitive management with other types of land uses, if it is possible to use Samuelson's rule (Duran, 2103).

For this, the change in preferences over time must be taken into account. This implies that it is possible to calculate the contribution of environmental services to the society of these environments and from them determine which habitat to conserve and to what extent; but only in a timely manner at a moment in time, since their contribution must be modified according to the changes in society's preferences.

The owners of the forest and of any natural environment decide to conserve, restore and / or use in other activities portions of the territory according to the preferences and the benefits that their natural environment provides them.

Therefore, if there is a willingness on the part of society to recognize economically the services provided by the natural environment, forest owners will have an additional element to analyze the conversion of the forest to other activities or its conservation as a natural environment.

Therefore, using Samuelson's rule, we will see the contribution in value of these services to the economy in general, that is, the demand for them. Based on this argument, policies of conservation and management of the areas that provide these services will be postulated.

### Calculating the willingness to pay for the change in land use

For this calculation process, the definition of the second part of Samuelson's rule will be used, that is, the marginal rate of transformation of the production of this public good by society will be used. That is, we will see the marginal contribution of public goods provided by natural environments to the production of the economy as a whole.

For this, an indirect technique will be used, which is to calculate the contribution of the entire natural environment of an economy within the production function of society, that is, the territory is considered explicitly as an input of the aggregate production function . This allows to obtain the value of the marginal product of the natural environment

$$Y = f(N, P, K, S, L) \quad (1)$$

It will be considered a production function with three productive factors, capital made by the hand of man or artificial (K), natural inputs understood as the environment as a whole (forests, pastures, agricultural land, etc.) (S) and the labor (L) and two indicators that affect factor productivity, environmental quality (N) and technical progress (P).

$$PMS = \partial f(N, P, K, S, L) / \partial S \quad (2)$$

We proceed to calculate the marginal productivity of the natural environment, which multiplied by the product gives us an approximate value of the marginal product of the environment, which varies from year to year according to the behavior of the product and the preferences of society.

$$\text{marginal product value} = PIB * \partial f(N, P, K, S, L) / \partial S \quad (3)$$

A series of assumptions must be used to approximate this phenomenon; it is considered that the environment provides society with a series of environmental products and services in aggregate form, so in a first stage it is only possible to calculate the average value of the marginal product of the environment, which is only the marginal value in joint divided by the total unit of analysis of the environment. There is a fixed amount of land but it has a variable demand over time, which is observed through the productivity index of the territory.

The calculation process to determine the willingness to pay for the maintenance of environmental services, will start by determining, through an aggregate production function type Solow-Stiglitz (Belloc, 2008).

The marginal productivity of the natural environment, which multiplied by the product gives us an approximate value of the marginal product of the environment.

Weighting this value of the product by the surface unit of the environment, we obtain the average value that society is willing to pay for leaving the current use of the land in its current conditions.

From this point; since the environment is considered as an input of the production function, the particular demand of each one of its parts must be calculated as a demand derived from the productive process of the society.

The marginal contribution of each one of the parts of the environment is deduced from a system of equations that characterizes the behavior of each one of the types of vegetal coverages, from indices of production and behaviors in the agricultural population.

To do this, a unit of measurement of the natural environment must be used. In this case, surface units will be used, hectares of land (total surface area), differentiated according to the type of vegetation cover existing in the analysis environment, the higher the degree of differentiation the greater the degree of accuracy in the calculation of the contribution of each of the parties.

Although current systems for accounting for national income suffer from serious limitations, GDP remains the basis for evaluating the economic performance of different sectors of the economy (FAO, 2015).

Therefore, using this measure as a basis for the production function is only an approximation of the true process that generates the income of a country, but provides inputs from which government and society generate public policies for the allocation of resources.

### The econometric model

The process was calculated to determine the willingness to pay for the maintenance of environmental services, starting by establishing the marginal productivity of the natural environment through an aggregate production function type Solow-Stiglitz (Belloc, 2008), with an exogenous technological progress that is observe a change in productivity of territory and labor force, where K represents the stock of capital of the economy, measured by gross fixed capital formation- FBKF; I represents the economically active population - PEA-corrected by the unemployment rate and multiplied by an activity index; S the natural environment- EN- expressed in surface units weighted by the productivity of the agricultural and non-agricultural environment:

$$\ln(\text{PIB}) = \beta_0 + \beta_1 \ln(k) + \beta_2 \ln(l) + \beta_3 \ln(s) \quad (3)$$

Which is framed in a system of equations that shows the behavior of the plant cover system

$$\ln(s) = \alpha_0 + \alpha_1 \ln(sa) + \alpha_2 \ln(PP) + \alpha_3 \ln(F) + \alpha_4 \ln(O) + \alpha_5 \ln(PA) \quad (4)$$

The databases of the "World Development Indicator" and the "FAO-Stat" were used in its 2015 version, the base used considers the years 1986 to 2002, it was chosen as the year of beginning 1986 because there is a significant structural change in the economy Bolivian year 1985, which introduces a lot of noise to the regression.



The method of minimum tables in two stages, allows to correct problems of multicollinearity in the system of equations, as well as to develop a consistent estimate that gives an inference that uses the interrelations of the system of equations.

Although the model allows to discuss beyond the average profitability of the type of plant cover, entering into this discussion takes the issue under debate from analysis, that is, the payment of environmental services through recognition as a productive input of the related services provided by each type of vegetation, especially forest and shrub cover.

Total area	Arable	Permanent Pastures	Forest	Other Type of Coverage	Adjustment by Agricultural Population
<i>S</i>	<i>Sa</i>	<i>PP</i>	<i>F</i>	<i>O</i>	<i>PA</i>
0.14937	0.0174	0.05128	0.05133	0.00814	0.0212

**Table 1.** Average Elasticity by Type of Vegetable Coverage.

By means of a small calculation, the elasticity of each one of the vegetal covers can be recovered by means of the multiplication of the partial elasticities, table N° 3.

Year	Global	Arable	Permanent Pastures	Forest	Other Type of Coverage
1986	5.45	31.31	6.15	3.58	5.61
1987	5.99	34.02	6.76	3.95	6.02
1988	6.33	35.61	7.14	4.19	6.22
1989	6.50	36.20	7.28	4.31	6.44
1990	6.70	37.62	7.52	4.46	6.46
1991	7.36	40.56	8.18	4.91	7.31
1992	7.77	42.19	8.64	5.21	7.42
1993	7.90	42.03	8.69	5.32	7.68
1994	8.24	41.43	9.07	5.57	7.84
1995	9.25	43.91	10.18	6.29	8.64
1996	10.19	46.82	11.21	6.96	9.24

1997	10.92	45.58	12.01	7.50	9.91
1998	11.71	47.21	12.88	8.08	10.37
1999	11.41	45.58	12.56	7.92	9.76
2000	11.56	46.70	12.72	8.06	9.46
2001	11.05	45.09	12.16	7.74	8.69
2002	10.75	43.77	11.82	7.55	8.27

**Table 2.** Average Contribution by Type of Vegetable Coverage

### Expressed in American dollars

In turn, using the concept of value of the marginal product seen in the previous section, you can find the average value that the company receives for each type of coverage. Table N° 4. Which shows the average elasticity of each of the coverages multiplied by the product of the whole economy.

This entire calculation process allows us to reveal indirectly the amount that the company receives for having the current land cover in Bolivia, an amount that can be equated according to the Samuelson equation to the willingness to pay to conserve the current state of conservation of the plant cover.

Of these provisions to pay, it is a priority to give emphasis to two: the first is the payment for the conservation of forest cover and the second, the conservation of other types of cover, especially scrub systems. These two types of coverage with their respective ecosystems are to a large extent the suppliers of a multiplicity of environmental services that are not yet recognized by society.

The recognition of this contribution in monetary form, will provide the opportunity to society as a whole, managers and owners of the forest and shrub systems to reevaluate the conservation and management of this system, by generating a policy that enables this payment to the administrators and managers of these systems, the original communities and the systems of protected areas.

### **Between the Offer and the Demand: Public Policy Proposal for the Management of Environmental Services**

From the moment we recognize the existence of a public good, and observe that there is a tendency to its loss or deterioration, it is necessary to define an intervention to correct the lack of recognition -and allocation of resources- of the market to guarantee the adequate provision of these services to society.

If we identify an externality derived from the activity of an individual, (the owner or "caretaker" of the forest), which affects the welfare of another (society as a whole through its impact on national economic activity), without You can charge a price for it, we are facing a market failure that requires State intervention.

The intervention can take the form of:

- **Retribution.** When looking to compensate the owner for the cost incurred in the production of the SA.
- **Compensation.** When a payment is made equivalent to the income lost by the producer of the SA (Opportunity cost).
- **Subsidy.** When a transfer of public resources is made through an investment or through a direct payment, as an incentive to the SA producer to avoid the loss of a public good.
- **Payment.** When the production of an environmental service is recognized (and valued) as a result of a "productive" activity, recognizing the producer the direct and indirect costs, the risk and its legitimate right to a profit (Surplus of the producer).

As it is a public good that requires State intervention, it represents the demand. The decision process of the claimant is equivalent to that of the forest owner, or offeror, described above.

- Identification of opportunity sets.
- Definition of the dilemmas.
- Correct calculation of costs.

In the analysis of opportunities you must identify your second (s) best option (s): Are there other potential sources? What would not achieve the purpose of the intervention? What is the cost to society of losing these environmental services? What is the replacement cost, if this possibility exists? and finally; What is the cost incurred by the producer of the service for producing, maintaining the service or letting go of other opportunities?

Here, it is important to understand the preference framework and to develop the calculations of the monetary and non-monetary benefits that society is given for maintaining the current plant cover.

Within the context of the Bolivian economy, the management and conservation of natural resources may be governed by a productive logic and / or by the greater certainty in land tenure:

- In the first case, economic preferences prevail due to the system of generation of resources, which take precedence over productive processes.
- The second responds to the system of exclusion in production systems related to the market and the poor distribution of land in Bolivia.

Which can lead to the logic of destruction of the land prevail over the process of conservation of territories unsuitable for agricultural production and livestock, since to ensure ownership of the land, the original vegetation cover is destroyed; responding to the concept that the earth is for those who work it and conservation does not represent work for this type of logic.

Both processes are evident in the reduction of forest areas in the country; but from different senses: the first, from the objective of producing food or generating economic resources via agricultural, forestry and livestock production; the second, from the need to secure the property rights of a territory.

The payment of environmental services, tries to face both sides of this coin:

- First, it is based on the recognition of environmental services provided by plant coverage, so it is necessary to pay the service to the owners and administrators of this territory by charging the services to the whole society. This payment means that the owners of the territory, before making a change in land use, have an additional element in their cost structure that allows them to face the benefit of conserving a forest system or dedicating the territory to a productive activity.
- Second, the instrument in fact recognizes the right of property of the community or of the owners of the territory, without the need to develop productive activities in lands not suitable for this type of productive processes.

The payment of environmental services traditionally starts by recognizing the average opportunity costs of the producers, this payment pretends not to use the forest cover existing in traditional production processes, such as agriculture and livestock. In this case, it is proposed that the payment of the environmental service be the average valuation that society has on the forested areas and whether the producer decides whether or not to make the change in land use. Thus the choice of the producer depends on the behavior of the economy as a whole (on which the payment is calculated), of the producer preference framework and of the personal opportunity costs given his productive activities. This can be made operative from a tax collecting and modifying behaviors.

This type of tax is called Pigouvian tax and has a double purpose (not always easy to balance):

- **Collection** To finance the management and conservation of natural resources and "reward" forest owners or caretakers.
- **Modification of behaviors.** To generate incentives, positive or negative, that incline the ground in favor of desirable behaviors or to the detriment of those that are intended to eliminate or reduce.

The advantage of this payment system is that it will be carried out by intensity of use, so that users with higher income and greater intensity of use will be those who pay a greater percentage of the program.

Through a simulation that considers the average collection of environmental services per family for the year 2002, this would not exceed three US dollars per month (approximately 25 Bs.).

The simulation is developed using the data in Table No. 4, with payment coverage of 25% of the territory occupied mainly by forest systems.

As noted, a significant amount of territory can be included in the payment of environmental services without this representing a substantial increase in family spending

### Conclusions

Given the current political conditions in Bolivia (taking into account the development of a new political constitution of the Bolivian State), it is necessary to introduce into the discussion the concept of environmental services, but not only as a tool for forest conservation and management, but as an integral tool that allows facing the environmental conflicts and social conflicts that afflict the country.

This is due to the inequity in access to resources and the non-recognition of the contributions made by the peasant communities to the productivity of the whole society, especially agricultural systems and urban centers, by conserving large areas of forests and shrub lands.

The work starts by defining and exemplifying the payment processes of environmental services and then introducing the need to recognize as a society the importance of managing forest conservation in an integral way, going beyond conservation concepts to reach the contributions of ecosystems.

To the productivity of a territory. If you want to conserve this productivity it is necessary to conserve and manage the resources that generate it.

The main lesson we obtained from this research process is that a small adjustment in the system of rights for the use of drinking water, electric power and fuel use, can help to conserve and manage in an efficient and sustainable way over time, via the payment of environmental services, a significant portion of Bolivian territory in the hands of indigenous and peasant communities.

Although this is a new topic in the academic, social and political discussion in Bolivia, it is necessary to face it from different perspectives, this work being one of these visions, which mainly seeks to put on the table the topic of discussion and advance in the development of the same.

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## **Model of educational management for the Career of Commercial Engineering of The Universidad Mayor Real y Pontificia de San Francisco Xavier de Chuquisaca**

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### **Abstract**

This article presents a model of educational management for the Career of Commercial Engineering, whose construction has identified the trends of educational management adopted in different contexts; Described the leadership style and predominant organizational climate; and identified difficulties in educational management from the perspective of experts. Therefore, the instruments applied to obtain information were, the Organizational Climate Descriptive Questionnaire, applied to measure the organizational climate; The Multifactor Leadership Questionnaire, which made it possible to measure leadership style; an interview with experts with experience in the field of educational management, which was articulated according to the following areas: Directive; Financial; Academic; Investigative; Extension and Social Interaction. The proposed model is structured according to the areas of management, financial management, academic management and management of coexistence and community, as well as being supported by values, focused on service and satisfaction of stakeholders. Therefore, it is a management tool that can be used by authorities and managers not only of the Career of Commercial Engineering, but of different university careers.

**Educational management, Organizational climate, Leadership style, Directive management, Financial administration, Academic management, Community coexistence**

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## Introduction

In Higher Education Institutions (IES), Educational Management, understood as a "process through which the affective, social and academic interactions of the individuals who are actors of the complex educational processes are organized and who construct the educational institution to achieve the formation of individuals and groups "(Sañudo, 2006).

Is in a period of transformation, the framework in which they make their decisions changes, due to the increase in the demands of society and the control exercised by governments over them, however, their autonomy in financial management.

This transformation must respond to the following aspects: the backwardness of education regarding socio-economic and cultural development; reduction of financial resources received by governments; weak correspondence between the needs of the socio-economic environment and the academic offer of HEIs; and the criticism of these for not considering the multiethnic, multiracial, multicultural and plurilingual character of the peoples (Valcárcel & Rodríguez, 2008, García de Fanelli, 2001, Vries & Ibarra, 2004).

According to the Colombian Foundation "Luis Amigó" (sf), Educational Management is composed of four important areas:

- Management (referring to the direction of the human team, design, implementation and appropriation of the institutional horizon)
- Administrative and financial management (which includes the design
- Planning, operationalization and flexibilization of the organizational structures.

The systems of rules and budgets and investments required to respond to the purposes of the institutional educational project), academic management (design, implementation and evaluation of relevant, flexible and dynamic curricula that ensure the integral formation of the human being) and management of coexistence and community (referred to the indissoluble university-society relationship).

Therefore, it plays a vital role in the higher education sector, since it allows improving the efficiency and effectiveness indexes, as a contribution to the improvement of the quality of education, constituting a competitive advantage (Blanco & Quesada, 2014).

Since it allows the concretion of the educational policy in a certain organizational framework based on how it acts in the administration of the processes (Valcárcel & Rodríguez, 2008).

It is undeniable that many universities and careers are going through a crisis that manifests itself in such aspects as: academic offer that does not respond to the demand of the labor market; teaching-learning processes disconnected from the economic and social context; scarce work practice that hinders the formation of necessary skills in students; poor management of research, which is evidenced in a limited scientific production not related to the needs of the socioeconomic environment; very poor international relationship; among many others, that make urgent the introduction of structural and radical changes if it is intended to keep them at the service of society.

The Universidad Real Real and Pontifical University of San Francisco Xavier de Chuquisaca (UMRPSFXCH), is no stranger to the aforementioned problems.

Which reveals the urgent need to implement reforms and transformations aimed at improving the situation in which it is located, as well as, have the tools of Educational Management that make it possible to reorient the processes of teaching - learning, research, extension and social interaction.

Consequently, the present study intends to contribute to this purpose with the development of an Educational Management Model for the Commercial Engineering Career (CIC), which can be applied by the different careers that make up the UMRPSFXCH. To this end, trends in educational management adopted in different contexts have been identified; described the leadership style and the predominant organizational climate; and identified the difficulties in educational management from the perspective of experts.

## Methodology

According to the complexity and characteristics of the object of study, a qualitative and quantitative approach was taken and a descriptive - proactive research was carried out, using, mainly the measurement method, which allowed to obtain numerical information about the leadership style, predominant organizational climate and the perception of authorities, teachers, students and administrators, regarding the different areas involved in the management of the CIC; and the method of modeling, for the analysis, study and discovery of the qualities, relationships and principles of the different variables and components of the proposal as concretion of the Educational Management model for the CIC. The survey and the interview constituted the main information gathering techniques.

Among the instruments applied, the following were used:

- Organizational Climate Descriptive Questionnaire (OCDQ), originally proposed by Halpin and Croft (1963), which allowed to measure the predominant organizational climate in the CIC, from the point of view of the teachers.
- Multifactor Leadership Questionnaire (MLQ 5X), developed according to the proposals of Bass (1994), which made possible the measurement of the leadership style exercised in the CIC.
- Interview with experts with experience in the field of educational management, which was articulated according to the areas: Directive; Financial; Academic; Investigative; Extension and Social Interaction.

Given the small size of the population of authorities, teachers and administrators, a census was applied.

In the case of the student population, stratified random sampling was used, with 365 surveys. On the other hand, 15 interviews were conducted with experts in educational management.

For the systematization of data, the statistical package SPSS Version 22.0 was used, which enabled the preparation of frequency distribution tables, radial type charts, determination of arithmetic means and variances.

## Trends in university careers management

The management of universities is in a process of transformation, various studies and experiences highlight their need for change and adaptation to the current context, highlighting the application of different approaches.

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And tools for their approach, such as strategic planning, quality control, reengineering and benchmarking (Ferrer & Pelekais, 2004), knowledge management (Estrada & Benítez, 2006), organizational climate, transformative leadership and democratic and participative leadership styles (Hoy, Smith & Sweetland, 2003). Being essential the incorporation of Information and Communication Technologies (ICTs) as a tool and instrument to support university management (Donini, 2014, Sosa et al, 2014).

Another current global trend is the use of management models in the education sector, having developed proposals that are supported by ICTs (Sosa et al, 2014), management models focused on administrative academic processes for higher education institutions (Gómez Mora & Pérez, 2008), systemic models composed of input elements or inputs, processes and outputs (Blanco and Quesada, 2014), models of integrated control of academic management for university careers, focusing on the administrative control component (Uribe, 1997), among others. The models developed, undoubtedly present advantages and solutions to the problems that arise in the field of management of a university career, but, these respond to realities and educational environments totally different to that of the careers of the UMRPSFXCH, aspect that makes it difficult appropriation and make necessary the construction of a model appropriate to the characteristics of the context.

### Organizational climate and predominant leadership style in the CIC

Having knowledge about the organizational climate and the type of leadership exercised in the organization is fundamental, to establish proposals for action tending to improve management and the achievement of institutional objectives.

Through the Organizational Climate Descriptive Questionnaire (OCDQ), the different organizational climate components that characterize the work of the CIC teachers were analyzed, for which the arithmetic means of the variables were determined: union, friendship, contact, emphasis on the performance, exemplariness and consideration.

Variables	Average	Variance
Union	3,2265	0,9253
Friendship	3,2265	0,9253
Contact	3,3179	1,6151
Emphasis on performance	3,3187	1,3644
Exemplariness	3,5698	1,3051
Consideration	3,7619	1,2957

**Table 1.** Organizational Climate CIC

Source: Self made

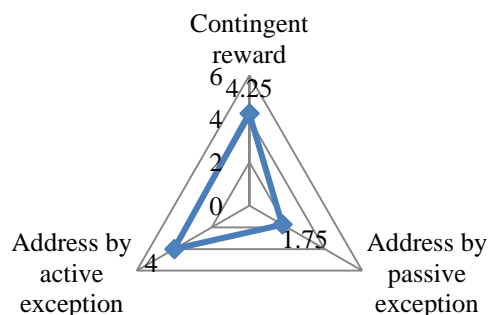
The CIC has a relatively harmonious work climate, since all the scores are above the average, but it is necessary to improve the organizational climate, in specific elements such as union and friendship, where the lowest scores have been obtained, in order to achieve greater cohesion among the teaching staff.

On the contrary, the qualifications must be maintained where there is a good performance, that is to say, the individual consideration that the teachers perceive of the authorities of the Career and Faculty towards their work and on the exemplariness.

Knowing and understanding the variables that determine the organizational climate is extremely important, because it provides feedback about the processes that determine organizational behaviors, also allowing to introduce planned changes in the organizational structure or in one or more of the subsystems that comprise it.

The type of leadership measured through the Multifactor Leadership Questionnaire (MLQ) indicates that the predominant leadership style in the CIC is transactional, given that the average of the career director's responses (3.83) has been included in the range corresponding to 3 and 4, which corresponds with this characteristic in the management style, marked by the establishment of objectives, monitoring and control; where the members of the organization must fulfill their activities and make some additional ones, in order to obtain a reward, which in general is translated in addition to the salary in the issuance of certifications to obtain a score in the teaching career ladder.

The leadership style of the CIC Director has been analyzed from the identification of the predominant characteristics in the transactional leadership.



**Figure 1.** Analysis of the Transactional Leadership Style CIC  
Source: *Self made.*

According to the above table we can see high averages in the factors corresponding to contingent reward and direction by active exception, which indicate that the leadership of the CIC director is characterized by clarifying the expectations of his followers and providing recognition when the objectives are achieved.

As well as, to correct the failures and deviations of the employees at the time of achieving the objectives proposed by the organization.

**Difficulties in educational management from the perspective of experts**

To determine the main difficulties and needs in the management of university careers, a structured interview was used, which was applied to a group of experts, which was composed of former university authorities, therefore, with experience in the field of educational management in the UMRPSFXCH. Among the areas under analysis are: Directive; Financial; Academic; Investigative; Extension and Social Interaction.

Areas	Difficulties and needs
DIRECTIVE	<ul style="list-style-type: none"> <li>- Excessive bureaucracy and decisions concentrated at the central level, make management difficult.</li> <li>- Little predisposition and commitment of the teaching sector regarding the creation of groups and work teams to support management.</li> <li>- Difficulties and need for greater transparency in the processes of teacher recruitment.</li> <li>- Conflicts between the estates, affect the decision making.</li> <li>- Little attention from the university authorities to the requests of the races.</li> </ul>
FINANCIAL	<ul style="list-style-type: none"> <li>- Impossibility of using IDH funds due to existing regulations.</li> <li>- Financial resources limited to the payment of teachers, which do not consider training activities and teaching updating, research, extension and social interaction.</li> <li>- Lack of financial autonomy</li> <li>- Scarce leveraging of resources through the presentation of projects.</li> </ul>

ACADEMIC	<ul style="list-style-type: none"> <li>- Permissive regulation that does not allow to increase the levels of academic demand.</li> <li>- Massification in the registration of the races.</li> <li>- Difficulties in the standardization of analytical programs of subjects, due to lack of coordination and teaching individualism.</li> <li>- Low commitment and aversion to change the teaching staff.</li> <li>- Pressures of the student body to the teachers.</li> <li>- Difficulties in the control of the teaching activity.</li> </ul>
INVESTIGATION	<ul style="list-style-type: none"> <li>- Scarce budget allocated for investigative activities.</li> <li>- Few incentives for the development of research by the teaching staff.</li> <li>- Low level of application of specific university policies to promote research activity.</li> <li>- Little relevance of the research activity with the problems of society.</li> </ul>
EXTENSION AND SOCIAL INTERACTION	<ul style="list-style-type: none"> <li>- Difficulties to sign agreements.</li> <li>- Limited financial resources for the development of extension and social interaction.</li> <li>- Projects and proposals do not respond in a relevant way to social problems.</li> <li>- Low level of application of specific university policies to promote the activity of extension and social interaction.</li> </ul>

**Table 2.** Difficulties and needs in educational management

Source: Self made.

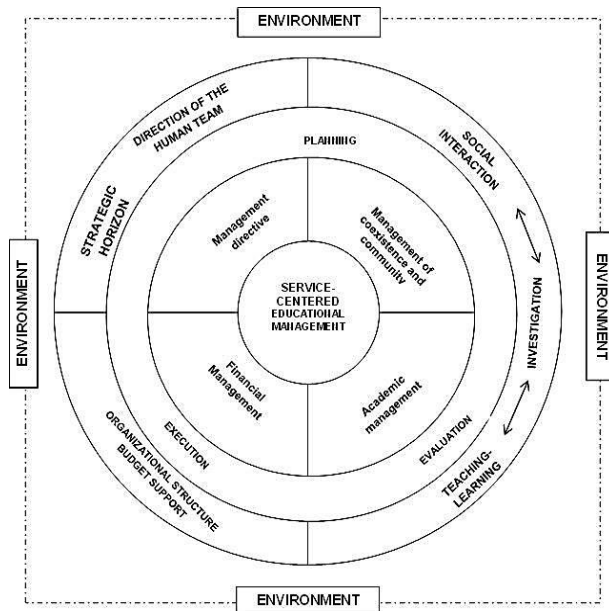
**Educational management model proposed for the Commercial Engineering Degree (CIC)**

The educational management model proposed for the CIC aims to: Contribute to the improvement of teaching-learning, research, extension and social interaction processes.

Establish a management tool that makes it possible to improve the quality of the services provided, in a comprehensive manner, orienting it to the satisfaction of stakeholders or key groups (State and society, students, parents and guardians, employers, teachers and administrators); Assist in the processes of self-evaluation, external evaluation and accreditation.

One of the first steps for the construction of this model is to establish the values or principles that the CIC must internalize among the teaching and administrative staff for the provision of the service, which are referred to relevance, honesty, competitiveness, quality and human talent, responsibility and compromise. Considering the incorporation of values as a basis for the proposed management model, highlights the humanistic philosophical nature of the proposal (Chanto & Durán, 2014).

The educational management model proposed for the CIC, at a first level, demonstrates its focus on the service and the values identified, as fundamental aspects for the management of an HEI. In a second level, the elements that make up the integral educational management are included, that is to say: directive management, financial administrative management, academic management and coexistence management and community; which must be subject to a process of planning, execution and evaluation by the members of the organization, processes that are presented at a third level, which considers the resources available to the IES, which can be classified into: financial capital, human capital, relational capital, technological capital and organizational capital. In the fourth level the tasks inherent to the educational management, which specify the components, of the second level, are disaggregated.



**Figure 2.** Educational management model CIC  
Source: Self made.

### 1. Directive Management Component

The managerial management has for work the planning, organization, integration, direction and control of the substantive processes that are developed in a university career, for which, it is important to establish the strategic horizon that the organization aims to achieve in the long term, as well how to manage human talent in an appropriate manner, generating a favorable work environment, which encourages the involvement of staff with the stated institutional objectives.

It is necessary that the leader of the organization assumes a transformational leadership, in which elements such as the idealized influence, (charisma), inspiring motivation, intellectual stimulation and individual conspiracy are fundamental; added to the values that should characterize its action towards authorities, teachers, administrators and students.

Within the directive management, the political management must be developed, to face the diverse interests that exist between the estates that compose the university, in this respect the behavior of the leader is fundamental, which must be characterized by a dialogical attitude, transparency, impartiality, objectivity and interest solely for the well-being of the race, beyond the group objectives that could exist between the different classes. Operational management is based on intellectual capital, more precisely on human, relational, organizational and technological capital.

### 2. Administrative Financial Management Component

The administrative financial management aims to provide the economic resources necessary for the operation of the career and the processes that are developed in it; therefore, given the scarcity of resources that characterizes organizations, this component seeks efficiency and productivity.

It is important to develop a proactive financing management, characterized by the development of activities aimed at obtaining resources mainly based on the presentation of projects and the generation of own resources. To obtain financial resources is fundamental human capital, consisting of the knowledge and skills of teachers who are the main actors in the development of projects, the career director must present them to the corresponding instances, follow up on the processes of evaluation and to manage before the higher authorities the approval of the same ones, making possible the disbursement of resources and execution of projects according to the regulation and current regulation, that will contribute to the achievement of institutional objectives and therefore to the satisfaction of the interest groups identified for the career.

In the case of obtaining external cooperation resources, relational capital is important, since this will allow taking advantage of the positioning of the Career and the University in the middle, to manage the financing of specific projects by institutions with which have institutional relations.

### **3. Academic Management Component**

Academic management is mainly related to the design, implementation and evaluation of relevant, flexible and dynamic curricula that ensure the integral formation of the human being, is of utmost importance in educational management, since it is inherent in the fundamental or essential service that every educational institution provides to society.

Therefore, it is important that careers have a relevant curricular design that guarantees that knowledge, skills and values contribute to the achievement of a professional profile that responds to the demand of the labor market.

It must have a relevant and updated curricular design, for which a process is proposed, in which a curricular redesign commission develops a proposal based on the needs of the local, regional, national and international socioeconomic context, which is disseminated and consensus between the teachers of the race and the student representatives; work that will allow collecting contributions that will enrich the proposal.

Once the corresponding adjustments have been made, it is necessary to present the curricular redesign in a general teaching meeting, where it is approved through the signing of a record, which will serve as a supporting document in the procedures that will be followed for approval in the different instances university.

Throughout this process it is imperative that the career director assumes a dialogical attitude, to enable the generation of consensus that favor the updating and curricular adjustment, since conflicts of interest will arise in both the teaching and student sectors, which may arise. consider this process harmful, due to the natural resistance to change that exists in organizations.

With regard to the planning, implementation, monitoring and control of curriculum management it is important to take into account the following elements:

- Planning, during the curricular redesign stage the political, social, economic and technological context must be considered; the demands of professional training of the environment; and the scientific and technological progress that is presented in the area of knowledge, this analysis will allow the formulation of an adequate professional profile that considers the knowledge, skills and values that the socioeconomic environment demands of the professional
- On the other hand, it is important that the subjects of the curriculum are classified according to their type (basic, specific basic and professional practice) and belonging to a specific discipline.
- Implementation, at this stage the decision must be made to implement the curricular redesign at all levels or to carry out a gradual implementation of it, for both cases it is essential to have a transition plan where measures are established to facilitate the change of plan studies, as well as a plan of homologations of subjects.

- Follow-up and control, it is important that through career management a follow-up and control of the curricular development is carried out, this implies a series of activities such as: filling in progress reports of the subject, designation of coordinators of levels and discipline, Conduct coordination meetings and content adjustment by disciplines and levels. This type of activities will allow to strengthen the teaching-learning processes, through the fulfillment of the subject programs, incorporation of teaching methods according to the discipline, assignment of practical and investigative activities in coordination with different subjects, among others.
- Feedback, at this stage it is important to track the graduates of the race, since they are the target group that according to the work activity that develops can provide information on the degree of usefulness of the knowledge and skills acquired during the race. This information can be used to take corrective measures aimed at achieving the professional profile and therefore of the identified stakeholders or stakeholders.

In order to properly develop curricular management, human capital and organizational capital are important, the first represented by the capacity and knowledge of the teachers who are the main responsible for the implementation of the curricular redesign; and the second represented by the regulations issued by the different instances of co-government that regulates the monitoring and control processes to be developed by career management.

#### **4. Coexistence and Community Management Component**

The management of coexistence and community, contemplates the indissoluble university-society relationship, which is evident through different teaching-learning processes (previously addressed), research, extension and social interaction, for whose development are necessary human, relational, organizational and technological.

##### **4.1 Research Management**

The research activity is essential in educational management since it fosters the generation of knowledge, which will be transmitted to students through the teaching - learning processes; as well as, it allows to transfer knowledge to the socioeconomic environment. Certainly, the conditions in which teachers develop their work do not facilitate research, however, it is important to take advantage of the qualification of the teaching ladder as a motivating aspect, which makes it possible to involve more teachers in the research processes. Next, some elements that should be considered in the management of the research are described, which are considered to allow their dynamization and strengthening.

- Normative instruments, it is important that the academic units conform commissions headed by the career director, with the purpose of formulating regulations and plans that allow orienting and organizing the research activity. In this regard, the following regulations must be in place: Research Regulations; Operating Regulations of the Career Research and Interaction Unit; Regulation of Updated Graduation Modalities; Regulation of tutorials; among others.

- Planning and operational instruments, it is necessary that career management and teachers work on the preparation of documents that allow planning and facilitating the research work, such as: Plan for Strengthening the research activities and extension of the Career; Research lines formulated in coordination in institutions of the socioeconomic environment; Follow-up forms for research fellows; among others.
- Logistical support, one of the factors why teachers do not want to be involved in investigative processes is the excessive bureaucracy and time that is required from the formulation of the research project, approval, disbursement of resources, execution of the project and closure; This is why the Career Research and Interaction Unit must provide the necessary logistical support during this process, with the teaching-student team responsible for the investigation being solely responsible for the stages concerning the realization of the investigative process itself, in the framework of the research lines defined by the Career.
- Dinamización, This work should be headed by the direction of Career, it has as an aim that the teachers go from being subjects not active in the research work to being informed, sensitized and involved in this type of activities.
- Dissemination and transfer, it is essential the dissemination and scientific transfer work that must be carried out once the investigative processes are concluded, therefore, the mechanisms for the effect must be managed.

This work will allow the Career to acquire greater presence in the socioeconomic environment, improve its positioning and strengthen its relational capital.

#### **4.2 Management of Extension and Social Interaction**

The extension and social interaction activities must be developed assuming a conception of integral development, which seeks to contribute to the democratization of knowledge and the greater and better quality of life of society, from an interactive and multisectorial dialogue with the different actors involved in the relationship.

Thus, the extension and social interaction must contribute to the social and economic transformation and with it to the own transformation of higher education institution that develops it.

The activities of extension and social interaction must contribute effectively to society, as well as to the Career by increasing their relational capital and generating a more favorable image and position in the socioeconomic environment.

Extension and social interaction activities must be developed from the Career Research and Interaction Unit, which provides the necessary logistical support to the different projects that are in execution, in the regulatory, planning and operational framework, described in the previous subtitle.

With the execution of the extension and social interaction projects, the following objectives should be sought:

- To provide services to the socioeconomic environment;

- Facilitate the development of work practices for students;
- Transfer information and scientific knowledge, which is an input for decision making in organizations;
- Sign agreements that strengthen existing projects and the generation of new projects;
- Improve the relationship and relationship of the Career with institutions and companies;
- Develop social responsibility activities that strengthen the position of the Career in the socioeconomic environment;
- Among others.

The development of activities of extension and social interaction will undoubtedly allow to satisfy the interest groups or stakeholders defined for the Career, and its development must be in charge of the teachers who will benefit from said projects, having a space for the labor practice and relationship for students, which will affect their evaluation and score in the teaching ladder.

**5. System of Indicators of Educational Management Model**

Educational management is a continuous process of decision making, in which risk and uncertainty are factors that will always be present, however, to mitigate them, it is imperative to have updated data and information regarding the problem to be addressed.

The model proposed, proposes an "informed management", where managers must make decisions, using as input information that is characterized by being sufficient, relevant, accurate, available, updated and predictable (Pedret, et al 2002: fifteen).

Therefore, a system of indicators has been developed that are grouped into the following areas: management, management, financial administration, academic management and coexistence and community management.

It should be clarified that the system of indicators that has been built is not a quality management model, but will allow the career director to evaluate the educational management on an annual basis, while providing information to make decisions aimed at to the improvement of the substantive educational processes, thus contributing to improve the quality of the educational service provided to the stakeholders or stakeholders.

It is important to mention that there are systems of indicators that consider multiplicity of variables, however, in the proposed system the most relevant variables in educational management are included, which will provide the manager with timely information to apply corrective measures if the case requires it, or on the contrary, maintain the efforts made.

<b>MANAGING DIRECTORS</b>	<ul style="list-style-type: none"> <li>- University regulations</li> <li>- Planning instruments</li> <li>- Institutional Policies</li> <li>- Leadership and work climate</li> <li>- Communication system</li> <li>- Management support system</li> </ul>
<b>FINANCIAL ADMINISTRATIVE MANAGEMENT</b>	<ul style="list-style-type: none"> <li>- Administrative organization</li> <li>- Regulation and support system for financial administration</li> <li>- Access to financing sources</li> </ul>



<b>ACADEMIC MANAGEMENT</b>	<ul style="list-style-type: none"> <li>- Curriculum management</li> <li>- Teachers</li> <li>- Students</li> </ul>
<b>COORDINATION AND COMMUNITY MANAGEMENT</b>	<ul style="list-style-type: none"> <li>- Support structure for research, extension and social interaction activities</li> <li>- Research management</li> <li>- Extension management and social interaction</li> </ul>

**Table 3.** Variables of the Indicator System  
*Source: Self made.*

**Discussion**

There are different management models applied in different universities, however, before selecting one of them and promoting their application in the careers of the UMRPSFXCH, one must carefully plan their factors and elements, taking into account the characteristics of the teaching functions, research, extension and social interaction, as well as the phases of planning, organization, direction and control; they must keep the necessary correspondence with the local and national socioeconomic context, as well as with the characteristics of the institution.

The objective of human resources management is the development of personnel and their relationships in the organization, which is why an optimal organizational climate must be achieved and maintained, making workers feel motivated, satisfied so that they can develop their skills and abilities, which will contribute to the individual development of each one of them and therefore the organizational growth will be reflected (Cervera, 2012).

In the CIC there is a favorable organizational climate that can contribute to the achievement of the institutional objectives, by making it possible to involve more teachers in the planned activities, to achieve this, the leadership style is a fundamental element (Cortés, 2004 Alho da Costa, 2013).

In this regard, the CIC presents a style of transactional leadership predominantly characterized by the application of contingent rewards and direction by active exception, which in no way is inadequate, however, organizations currently require transformational leadership, characterized by the demonstration of attention and individual consideration of the leader on the staff, worry about their needs, support their growth and development.

Brunet (2004) indicates that this type of leadership can contribute to generate a more harmonious organizational climate and achieve the objectives pursued by the institution.

Among the difficulties in the management area, there is evidence of the need for greater decentralization in decision-making related to the processes inherent to academic activity, which makes it necessary to de-bureaucratize in terms of procedures and processes inherent to the teaching staff, curricular redesigns, approval of projects, among others. It is necessary to highlight the problem of the organizational climate prevailing in the academic units, which manifests itself in the scarce teacher commitment.

The difficulties existing between the estates that make up the cogovernment - teacher and student - highlight the need for a transparent political management, based on ethical values and oriented to institutional welfare as the main negotiation and development mechanism.

The main problems identified in the financial area are the few budgets for the area of research, extension and social interaction, the lack of financial autonomy.

It will be difficult to count on sufficient budgets, due to the application of the zero enrollment and the excessive benefits to which students can access, without the requirement of an optimal academic performance.

Faced with this panorama, the university careers must finance the activities incorporated in their annual operations program, through the sale of services such as: seminars, workshops, consultancies, among others; demanding from the managers an additional work, if it is to obtain the necessary resources for the execution of the planned activities.

Likewise, it is necessary to leverage resources through the signing of agreements, where the counterpart of university careers can be constituted by the teaching human resource, approved resources for research and extension projects, own resources obtained from the sale of services, among others.

In the academic area, one of the most important problems is the massification of the enrollment in the careers; the difficulty of updating, standardizing and monitoring compliance with the analytical programs of the subject; and the permissive regulation that does not allow to increase the levels of academic demand.

In this area, the need for a greater teaching commitment, manifested in the fulfillment of their academic activities and constant and coordinated updating of their analytical programs, is again evident, in parallel with the progress of science and technology.

The areas of research, extension and social interaction are related to the management of coexistence and community, for the relevance that the socio-economic environment demands of these processes, which contribute and feed back into the teaching-learning processes.

The difficulties identified in this area are the non-application of university policies for the development and incentive of research, extension and social interaction; scarce allocation of specific budgets; and the need for greater social relevance.

To strengthen these areas, the directors of university careers can access resources from the Directorate of Science and Technology (DICYT) and the Directorate of Extension and University Social Interaction (DIESU), which will never be enough, but can be used to leverage resources through agreements with institutions such as the Municipal Government, the Departmental Government, non-governmental organizations, among others.

The proposed management model has the characteristic of being systemic, holistic and based on an axiological basis that favors the rendering of the service and satisfaction of the stakeholders or stakeholders.

It is also focused on the service as a fundamental aspect of HEIs and incorporates in each of its areas the different components of intellectual capital, ie, organizational capital, human capital, technological capital and relational capital, as essential inputs for educational management.

It also includes a system of indicators grouped in the areas of: management, management, financial administration, academic management and coexistence and community management.

This system is not a model of quality management itself, but will allow the career director to evaluate the educational management on an annual basis, while providing information to make decisions aimed at improving substantive educational processes, thus contributing to the improve the quality of the educational service provided to interest groups or stakeholders.

The operationalization of the model involves the preparation of strategic and operational documents to guide decision-making, these documents are constituted by the Institutional Development Plan that defines the strategic guidelines for the four areas of management, which are operationalized by the Operational Plan Annual; the Curricular Design and the Plan for the Strengthening of the Research and Extension Activities, which are formulated to guide respectively the academic and coexistence management and community.

The Self-Assessment Report is an integral diagnosis of the Career, from which the Improvement Plan emerges, which involves decision-making and carrying out specific activities in the different management areas. Educational management is a permanent task, just as the search for quality in education, which is why it is necessary to have management tools, such as the proposed model, to guide the actions of IES managers and contribute to overcome The challenges and challenges that arise daily in university careers.

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## **The profile of women managers, market orientation and organizational performance: A conceptual theoretical revision for the construction of a cognitive model**

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### **Abstract**

The profile of women in managerial positions has been analyzed in a descriptive way, limited to sociodemographic variables as the main determinants, but no studies have been found to analyze, from a gender perspective, the profile of female entrepreneurs in the effects of the market orientation on the organizational results of companies.

Therefore it is considered important to develop a theoretical model for this purpose arises:

- 1) Design, based on the literature consulted, a cognitive model, which describes the relationship between the profile of female entrepreneurs and market orientation.
- 2) To know the determinants of the profile of the female entrepreneurs that are in the directions of the organizations.

This study is considered of a descriptive scope in function of documentary revision, therefore its methodological approach is transversal and exploratory through review of academic articles contained in databases of different virtual libraries. Its main contribution is the theoretical construction of a model that shows that there are four dimensions that determine the profile of women who hold management positions in companies and their relationship with market orientation.

### **Entrepreneurship, Gender, Market orientation, Managerial profile**

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## Introduction

The orientation to the market is an approach that combines the marketing activities of the company and its strategic direction, therefore it becomes an intangible resource of the business that provides commitment and information for the development of a value offer that fully satisfies the needs and preferences of clients, appears between the 80s and 90s. From that moment on, many jobs began to study the relationship between market orientation and other variables.

Several investigations (Cauzo & Cossío, 2012) (Ospina & Pérez, 2013) (Ynzunza & Izar, 2013) (Ruiz, 2014) point out that there is a relationship between the market orientation and the institutional results that are reflected in the creation of value for customers that has an impact on better sales levels and financial effects favorable to the management of companies. On the other hand, other authors point out that there is a relationship between the profile of managers and organizational performance (Echeverri, 2015) (Torrejón, 2016) (Hernández, Armenteros, Villanueva, Montalvo, & Del Rio, 2016).

Some studies analyze the profile of women in a descriptive way (Matteo, 2012) (Morales, 2011) but no studies have been found that analyze, from a gender perspective, the relationship between the profile of women who are in the direction of the companies and the orientation to the market and consequently the organizational performance. As for the women's ventures Moreno (2015) Ventura and Quero (2012) characterize the dynamics of women's ventures, the success factors, their process, their environment competitiveness, taking into account women as generators of economic movement in their regions and indicating that the promotion of women's enterprises gives rise to economic empowerment, from a theoretical gender perspective.

Therefore, it is considered important to develop a theoretical model that explains the influence of the profile of women entrepreneurs in the effects of market orientation on the organizational results of companies.

Therefore, in this article we propose:

- 1) Design, based on the literature consulted, a cognitive model that describes the relationship between the profile of women entrepreneurs and market orientation.
- 2) Know the determinants of the profile of entrepreneur women who are in the addresses of organizations.

This study is considered to be descriptive in terms of documentary review, therefore, its methodological approach is transversal and exploratory through review of academic articles contained in scientific information resources such as Scielo, Bolivian Journals, Latindex, and PERii virtual libraries.

The main result is the theoretical construction of a model that shows that there are four dimensions that determine the profile of women who hold managerial positions in companies and their relationship with market orientation+3.

Future lines of research are also determined, such as the need to determine if the theoretically described relationship is evidenced by empirical information; analysis of the willingness to orient to the market by differentiating the production or services sector and the analysis of the effects of market orientation and the profile of the directives according to the size of the company.

## Conceptual and descriptive development

### Market orientation

Being oriented to the market, in its basic definition, is to assume the need to be proactively oriented to the external environment of the company, continuously generating value for the target population in order to ensure its sustainable permanence in the market.

In this sense Alvarez et al. (2001) indicates that to the extent that companies adopt market orientation as an organizational culture will no longer emphasize, in the use of techniques or activities of classic marketing but focus their attention on the continuous generation of value for the target audience as a way to ensure their own long-term survival.

Consequently, market orientation can be considered an organizational resource (Ynzunza & Izar, 2013). As an organizational resource, market orientation, in strategic terms, is a source of competitive advantage whose development and exploitation has a direct impact on the finances of companies. This mentioned impact is achieved through the generation of value.

In this sense, a company that assumes market orientation can improve its profitability, adapts better to the demand of its product or service and achieves a greater value in customer satisfaction.

That is, it allows us to guide the strategies of the companies in satisfying the needs and tastes of the clients (Pinzón et al., 2013)

According to Jaworski and Kohli (1993) the paradigm of market orientation is based on the assumption that firms gain and sustain a competitive advantage if they know the changing needs of the market.

The concept of market orientation is determined by three constructs: customer orientation, competitor orientation and inter-functional coordination (Jaworski & Kohli, 1993, Narver & Slater, 1990, Ynzunza & Izar, 2013).

The customer-oriented construct refers to the actions of the company aimed at providing quality products and services in order to generate value. For its part, the competitive orientation construct means analyzing and building a competitive advantage and the third construct, the coordination between organizational functions, refers to sharing information and integrating the different departments.

### The prospects of market orientation

There are four perspectives from which the meaning of market orientation can be understood: (1) as a business philosophy; (2) as processing of market information; (3) as interfunctional coordination; and (4) as a resource based on organizational learning (Alvarez, Santos, & Vázquez, 2001)

But there are two main perspectives: The cultural perspective that indicates that market orientation is a management philosophy is to say an organizational culture with objectives, beliefs and values aimed at customer satisfaction (Narver & Slater, 1990). and the behavioral perspective that refers to the fact that organizations must collect information in a coordinated, systematic and continuous way of their market in order to know the needs of their customers, the global offer and the behavior of competitors.

Only in this way can it have sustainability and competitive advantage (Kohli & Jaworski, 1990) (Jaworski & Kohli, 1993).

The combination of both perspectives will have better results, since companies that take market orientation as an organizational culture must accompany this philosophy by carrying out their organizational actions based on the analysis of market information.

### **Women's ventures**

Several studies have proved that the ventures arise due to the market opportunity or the need to obtain their own income: Morales, Bustamante, Vargas, Pérez, and Sereno (2015); Ormeño (2014); Escandón and Arias (2011); Moreno and Spirit (2010).

The concept of entrepreneurship has had a considerable evolution since the nineteenth century to the present, Castiblanco Moreno in 2013, makes a synthesis of the definitions of authors such as Richard Cantillón (1755); Jean Baptiste Say (1803); Marshall (1880); Schumpeter (1942) among others, arriving at the conclusion that the definition of entrepreneurship with a gender focus is not completely constructed (Moreno, 2013).

The studies of Moreno (2015) Ventura and Quero (2012) characterize the dynamics of women's ventures, the success factors, their process, their competitiveness environment, taking into account women as generators of economic movement in their regions and indicating that the promotion of women's enterprises gives rise to economic empowerment, from a theoretical gender perspective.

According to Ortiz, Duque and Camargo (2008), documents have been found that analyze the intentions to undertake their differences according to gender, among the most important ones we can mention the works of Cromie (1987), Kourilsk Walstad (1998); Sarri Trihopoulou (2004); Langowitz Minniti (2007).

In general, the conditions, intentions and motivations to undertake are different in both sexes. According to Hisrich, Peters and Shepherd (2005), the variables or factors that explain the performance of the ventures are the individual motivations (need for control, motivation to achieve, ability to take risks, tolerance to uncertainty); social motivations (culture, social capital) economic motivations (employment opportunities, employment discrimination, market conditions: business opportunities, access to financial support networks, work raw materials).

Based on the study of the motives for entrepreneurship, authors such as Cromie (1987), Kourilsk Walstad (1998), Sarri Trihopoulou (2004), Langowitz Minniti (2007), Casero, Escobedo, and Jiménez, (2007) have concluded that both, women men, seek autonomy in their income.

However, for them the most important thing is the satisfaction of the needs of their children; presenting greater aversion to risk perceiving fewer advantages in the business environment, ie the perception of good opportunities and the fear of failure depend on sex.

On the other hand, Rodriguez et al. (2011) indicates that the idea of creating the business, as the development of it is conditioned by the reproductive life care of dependent family members, which evidences the assumption of the multiple responsibilities of businesswoman mother / wife / daughter / housewife.

Therefore, the desire to achieve the welfare of the children of the family provide them with better living conditions, appears as the main motivation to start their business experience.



### **Profile of the directives**

Most of the studies are related to the profile of managers based on competencies and without a gender focus, among these we can mention Torrejón (2016) who discusses the importance of cross-cutting competences for the success of entrepreneurial entrepreneurship; Rodríguez (2016) that relates how the evolution of marketing in MSMEs directly impacts on the development of the competencies of managers who manage organizations immersed in a global scenario; Santos-Álvarez and García-Merino, (2016) analyze the motivational orientation that drives entrepreneurs to internationalization and their information preferences.

Vargas and Campos (2013) compare the effectiveness in the development of the entrepreneurial skills of young people based on the entrepreneurial promotion programs of three public universities in Mexico.

The relationship between the profile of managers and organizational performance is explained as the determination and evaluation of the peculiar features that characterize the ability to make decisions, the relationship with the business environment and the improvement of business conditioning in the market (Echeverri, 2015 )

Studies that incorporate the gender perspective are descriptive in order to identify the sociodemographic profiles of women managers (Morales C. C., 2011, Matteo, 2012)

### **Methodology**

The work is an exploratory, descriptive investigation for the following reasons:

Exploratory; it constitutes an initial step to the research process because they consist of exploring or examining the object of study to specify the design of the research. According to Malhotra, (2004) this type of research is carried out in order to formulate or define a problem with more precision, identify the various actions to be followed, establish hypotheses, isolate the variables, fundamental relationships for further analysis, obtain knowledge in order to establish the method to face the problem to establish priorities for research.

Descriptive; They seek to specify the important properties of people, groups, communities or any other phenomenon that is subject to analysis. The dimensions and variables that are part of the explanatory model will be described.

The entire research process is governed by the review of the theoretical information of the object of study, the variables and dimensions were conceptualized for the construction of an explanatory model.

For the selection of the articles, the database of the Vice Ministry of Science and Technology of the Plurinational State of Bolivia was taken as reference, which constitutes the electronic resources available free of charge for the Bolivian University system.

This database is made up of Scielo Bolivia, which is a collection of Bolivian magazines; Bolivian Magazines, which is a collection of scientific, technical, technological and academic dissemination magazines; Latindex with magazines available in digital newspaper archives of Latin America, the Caribbean, Spain and Portugal, adhered to the open access movement and Virtual Libraries PERii international electronic resource with access to scientific information in various areas of knowledge.

The search was made in a systematic way taking into account the following topics for the literature review:

- Articles about ventures.
- Articles on market orientation.
- Articles about management profiles and values.
- Articles on social capital.
- Articles on human capital and organizational learning.

The search gave the following detail:

THEMES	N° OF ARTICLES	PERCENTAGE
Organizational learning and human capital	6	13%
Social capital	7	15%
Entrepreneurship	16	33%
Market orientation	10	21%
Directives and values profile	9	19%
<b>TOTAL</b>	<b>48</b>	<b>100%</b>

**Table 1.** Themes and articles reviewed

Source: *Self made.*

Once the articles were selected, a stage of analysis of the central aspects and the main conclusions contributed by the investigations with respect to the variables object of study of the present article was initiated.

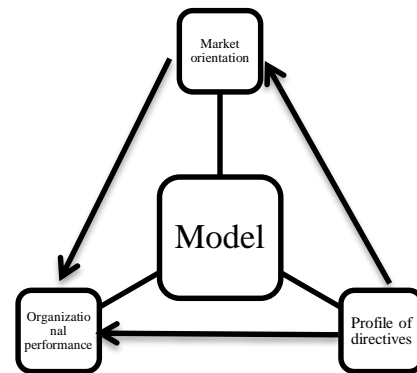
In this way it was possible to conceptually define the variables, establish their relationships and build the cognitive model presented below.

**Explanatory cognitive model**

Market orientation is a complementary asset that contributes to improving the performance of the company (Villao, 2016) (Flores, Ojeda, Lee Kim, & Ramírez, 2016) therefore a direct causal relationship between these two variables is recorded.

On the other hand, the profile of managers according to Gomez (2008) managers shape and shape the values and market orientation and therefore that profile affects the performance of the company. In this sense the relationship between market orientation and the profile of the directives is direct.

But also the profile of managers has a direct and positive relationship with organizational performance. (Echeverri, 2015) (Hernández, Armenteros, Villanueva, Montalvo, & Del Rio, 2016) The relationships described are shown in the following diagram:



**Figure 1.** Relationship between the three variables of the model

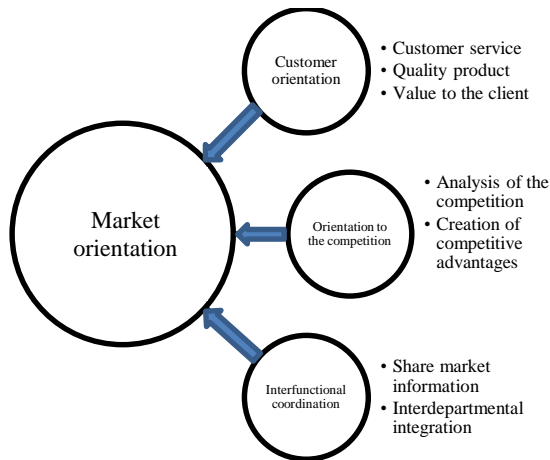
Source: *Own elaboration*

The market orientation variable serves as a mediating variable between the profile of the directives and the organizational performance.

The orientation to the market will be determined by a double cultural and operative perspective, therefore it implies customer orientation, serving it, providing quality products and ultimately generating value; orientation to competition, analyzing and building a competitive advantage and coordinating between organizational functions, sharing information and integrating the actions of the different departments.

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But also must be oriented to the benefit as a way to demonstrate organizational performance. (Alvarez, Santos, & Vázquez, 2001) (Narver & Slater, 1990) (Hurley & Hult, 1998)



**Figure 2.** Determinants of market orientation.

Source: Self made

The determination of the profile of the directives that is the objective of this article is explained below.

### Dimensions of the entrepreneur profile

There are studies that have determined the dimensions for the measurement of the profile of female entrepreneurs who are directives of the companies, one of them raises that there are three dimensions that determine the aforementioned profile:

1. Orientation to the task that highlights the profession, training, entrepreneurial spirit.
2. Interpersonal orientation that includes teamwork, empathy, new ideas and responsibility.
3. Cognitive skills referred to the capacity of abstraction and association of ideas, creativity and innovation, inclusion of new ideas. (Morales C. C., 2011).

Also Echeverri (2015) in his study of the competitive profile of small business managers takes into account three types of skills: Operational skills: are the skills or competencies that enable effective performance in the workplace. Interpersonal skills: are skills or competencies that relate to success in tasks that involve interpersonal contact with others for the proper performance of the job and managerial skills: are the skills or competencies to direct others within the organization.

Studies that specifically analyze female profiles are restricted to studying sociodemographic factors (age, educational level, marital status, child custody, positions they occupy) as determinants of the profile of directives (Matteo, 2012).

Taking into account the previous studies and paying attention to the motivations to undertake and the specific conditions of women as directors of companies, their profile must be determined by factors such as human capital, social capital, learning style and values.

### Human capital

The theory of human capital indicates that education is the determining variable of success in the labor market (Pico, Quejada, & Yáñez, 2012). A greater education possibilities of higher productivity and income.

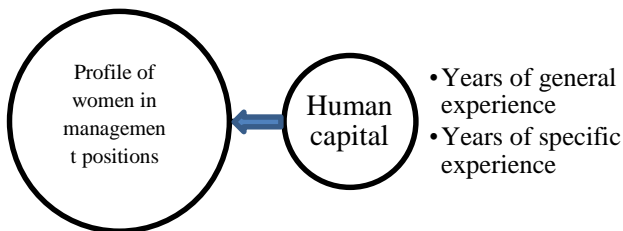
Therefore investment decisions in training bring future benefits higher than the costs of training.

Regarding human capital as a determinant of the profile of the executives, it is explained that the educational level and continuous training are two aspects that determine a good level of human capital (Barbosa & Ayala, 2012) (Pérez & Serrano, 2013)

According to Morales, it refers to socio-demographic aspects such as age, marital status and number of children; and a set of productive capacities that an individual acquires by accumulation of general or specific knowledge and that can be stored and used, in this case they will be referred to the level of instruction, the general and specific experience. (Morales and Pineda, 2015)

In the case of women who are in management positions, variables such as years of general experience and years of specific experience will be taken into account.

Therefore the relationship is presented as follows:



**Figure 3.** Human capital as a determinant of women's profile.

Source: *Self made*

### ***Social capital***

The current bibliography indicates that the analysis of this variable is centered on the study of the role of social capital in the dynamics of the process of entrepreneurship. Among the most cited authors are Davidsson Honig (2003) who study the role of human social capital in the development of entrepreneurship.

Social capital is understood as the set of social relations based on trust reciprocal cooperation behaviors.

This concept appears in the 90s with the studies of authors such as Bourdieu, Coleman, Putnam and Portes.

For Bourdieu, social capital is like a network of objective relationships, of domination or subordination, of complementarity or antagonism (Bourdieu, 2006).

For Durston (1999), social capital encompasses norms, institutions, organizations that promote trust, cooperation among people, communities, society as a whole.

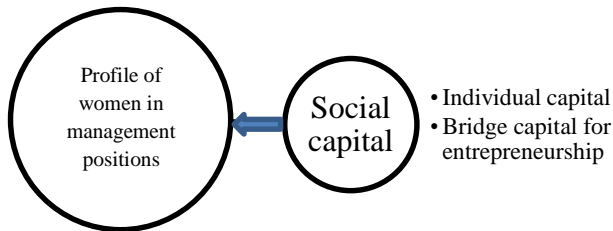
This social capital is important for female entrepreneurs as explained by Ventura Quero (2012), indicating that participation in social networks becomes a critical factor in the decision to become an entrepreneur the subsequent result of the action to undertake.

As social capital for women is the support of the family, useful to lessen the family burden but also takes into account a social capital that comes from institutions or a network outside the family ties that helps to build bridges for the start-up of entrepreneurship Precisely, the work of Liñán Santos (2006) differentiate two types of social capital: cognitive social capital binding cognitive social capital that builds bridges.

The first one is based on strong ties derived from kinship or friendship relationships.

The social capital that builds bridges derives from the individual's relationships with certain business networks.

Therefore, this capital can also be considered as determining the profile of women in management positions.



**Figure 4.** Social capital as a determinant of women's profile.

Source: *Self made*

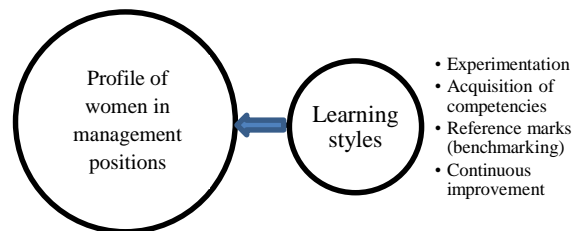
### Learning style

Organizational learning is considered as the ability of companies to create, organize and process information from their sources and thus generate new knowledge (Gálvez, Contreras, & Maldonado, 2013)

According to Gómez et. al, (2015) citing Yeung et al., (2000) indicates that organizations learn through 2 basic sources: 1) direct experience, where they learn as a result of their own actions and reflections; and 2) the experience of third parties, which is based on what is learned from them, as advisors, suppliers or competitors, as well as including learning by observation. Organizational learning has four dimensions: commitment to learning, open-mindedness, shared vision and the exchange of knowledge (Hurley & Hult, 1998).

As a determinant of the profile of women in management positions, learning is not analyzed taking into account the dimensions but rather taking into account the learning styles. Learning styles are ideal types to learn (Gómez, Villarreal, & Villarreal, 2015), in the business field the style of learning and the generation of knowledge is a key to guarantee the permanence of the business in the market but also to generate its own growth. (Fernández, Alegre, & Chiva, 2012)

According to Arias (2014) and Gómez et. to the. (2015), learning styles are the strategies that people use to assimilate, incorporate and process new information. Organizations have 4 styles to learn: 1) experimentation, where you learn by trying new ideas and adopting a receptive position of the environment; 2) acquisition of competences, which consists of the acquisition of new skills by people and teams, focuses on the experience of third parties; 3) reference marks (benchmarking) you learn by finding out how others work and from there try to adapt this knowledge; and 4) continuous improvement, where you learn by improving what was already done constantly.



**Figure 5.** Learning styles as a determinant of women's profile.

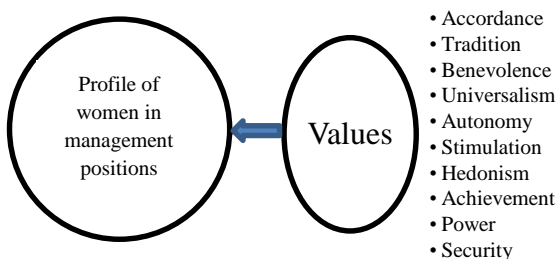
Source: *Self made*

### Values

Values are motivational constructs that orient people's lives toward desirable goals. Both Rondan, Navarro and Arenas (2016) and Navarro (2011) can analyze 10 values in managers:

- Autonomy: what is independence and self-confidence, and gratification based on their own decision and action capabilities;
- Stimulus: oriented to emotion, novelty and the challenge of a varied, exciting, daring and curious life;

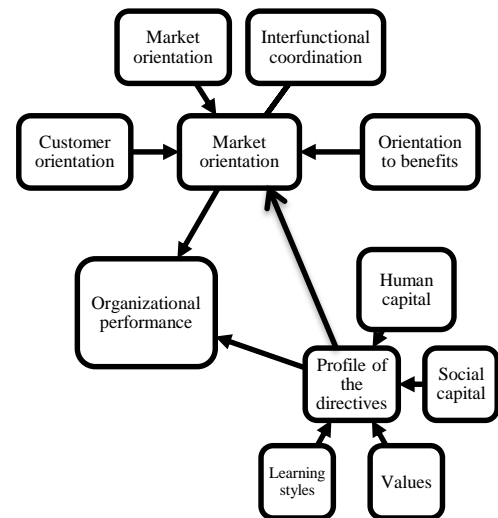
- Hedonism: centered on organic needs and the pursuit of pleasure associated with their satisfaction and the sensual gratification of the subject;
- Achievement: o the pursuit of personal success and demonstration of socially established competences;
- Power: whose objective is to achieve status of achievement and social prestige, and control or domination of others and existing resources;
- Security: that pursues the harmony and stability of society, of interpersonal relationships and of the self;
- Conformity: that seeks to restrict actions and potential impulses that may alter or harm others, and / or violate social expectations;
- Tradition: whose motivation is respect, dedication and acceptance of the proper customs of the subject's culture or religion;
- Benevolence: prosocial value, concerned about the well-being of others through daily interaction;
- Universalism: whose objective is the attainment of the welfare of all people and nature in general, being broader than Benevolence.



**Figure 6.** Values as a determinant of women's profile.  
Source: *Self made*

**Complete cognitive model**

Depending on the definition of the variables, the model that will explain the relationships between the variables: market orientation, the profile of the directives and organizational performance is integrated as follows:



**Figure 7.** Complete cognitive model.  
Source: *Self made*

**Conclusions**

The objective of this paper was to present the design of a cognitive model, which describes the relationship between the profile of women entrepreneurs and market orientation.

As a first conclusion it can be indicated that in the majority of the studies they take separately the variables subject of study; that is to say, the determinants of the profile of executives and their relation to the performance of the company on the one hand and on the other the influence of the orientation to the market with the success of the companies are studied.

There are few works that integrate the two variables mentioned in the study of women entrepreneurs who are in the organizations' directions and this is the second conclusion found.

The conceptualisation used for the variable orientation to the market in all the reviewed works has a coincidence as far as the combination of the theoretical approach, take to the orientation of the market as behavioral combined with the organizational culture, this constitutes the third conclusion.

A fourth conclusion would be about the general profile of managers because the results of research have not been raised from a gender perspective, are mostly about skills and competencies, the few studies referring to the profile of women entrepreneurs pay more attention in socio-demographic characteristics.

The fifth conclusion is that the studies that have linked the profile of managers with organizational performance do so from the perspective of internationalization of companies.

On organizational performance the sixth conclusion of the review is the relationship of business performance with learning styles and with the values of managers: on the values most of the studies coincide with the theoretical basis of Schwartz that from social psychology constitutes a theory of universal structure of the motivational content of values with a cross-cultural validity (González & Arciniega, 2015). Regarding learning styles, a scale of four is used: Experimentation, acquisition of competences, reference marks (benchmarking) and continuous improvement, either at the organizational level or at the individual level.

In all articles dealing with the profile of managers is related to human capital, values and style of arpendizaje but does not establish the relationship that may exist between this variable and social capital, this is the seventh conclusion.

The eighth conclusion refers to social capital; for the conceptual analysis of this determinant, the main authors have been reviewed and it has been shown that the studies place special importance on the relationship between this type of capital and the enterprises that are owned by women; but no direct relationship has been established between social capital and the profile of women managers, even worse their relationship with market orientation and organizational performance.

The latter is due to the fact that most studies focus on studying market orientation only from the general perspective and do not take into account the gender approach.

Based on the previous analysis, some lines of research are proposed that are considered to be useful for those who wish to deepen this topic:

- It is necessary to determine if the theoretically described relationship is evidenced with empirical information.
- Analyze the willingness to orient to the market by differentiating production or services sector.
- Analyze the effects of market orientation and the profile of the directives according to the size of the company.

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## **The water and its social and economic relations. Proposed Payment for Environmental Services in the Ravelo River Basin**

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### **Abstract**

One of the regions of Bolivia, which suffers most from water scarcity is its capital Sucre, whose main source of water supply is the Ravelo River Basin that is being affected by a significant process of degradation of its environment by anthropic action of the inhabitants, with the consequent danger of a decrease in the amount of water. The objective of the research is to establish a payment mechanism for Hydrological Environmental Services through an agreement between families of the city of Sucre and community members of the Basin, which will guarantee the water supply. Using the Contingent Valuation Method, we identified and calculated the willingness to pay (DAP) of the families of the city of Sucre for the conservation of the Ravelo river basin, applying surveys whose results establish the willingness to make a payment for conservation of Basin. The Disposition to be Compensated (DAC) of the community members of the basin was determined, working in meetings-workshops with the participation of approximately 53% of the total of families, identifying that they are willing to receive compensation for conserving the basin. Based on the determination of the DAP and the DAC, a payment scheme for environmental services was proposed.

### **Payment for Environmental Services, Willingness to Pay, Willingness to be Compensated, Conflict for water, Shortage of water**

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## Introduction

According to the Vice Ministry of Watersheds and Water Resources (VMCRH) of Bolivia, the country has a high availability of water, but unfortunately its poor spatial distribution generates scarcity of this resource in several regions, to which extreme seasonal events due to the change are added climate, as well as, a gradual deterioration in the quality of water bodies. One of the regions suffering from water scarcity is the city of Sucre<sup>1</sup>, whose main source of supply is the Ravelo River basin that provides approximately 90% of the liquid element. Both now and several years ago, not all the city of Sucre receives water in regular and continuous conditions; in the high and peripheral areas, there are several neighborhoods where the service is irregular.

Only a little more than fifty percent of the population of the city of Sucre lives with drinking water in a sustained manner, the other half must wait for the night shift, or the tank car, or go to a ravine or nearby well to get water. drinkable and with contamination problems. Although the balance in water sources shows that there is still no deficit, in a very few years, due to the population growth that will bring with it a higher demand volume of water, there will be a significant deficit, and even worse if we observe that in the Ravelo river basin, there is a significant process of degradation of soil, water and vegetation resources, which have been and continue to be preyed upon by the anthropic action of the inhabitants, who, besides not taking sufficient awareness of this process, they do not perform significant practices that allow stopping and / or reversing the process of ecological imbalance that has been taking place.

In such a situation, a payment system can be created that generates an income stream that contributes to the preservation of the sources and to encourage, mainly to the agricultural producers of the Ravelo river basin, to change degrading practices by conservative land practices and water, taking into account their different organizational structures. The PSAH is included within a water management framework that allows building a virtuous circle in which the willingness to pay (DAP) of the users feeds a fund of investment and conservation, which in turn, will maintain the quality of service by the one that the plaintiffs are really willing to pay.

The PSAH modality could represent an alternative to address the problem, allowing the different social actors (claimants, service providers and institutions) to be involved in co-responsibility in actions that allow conserving the ecosystems that provide water.

Therefore, it is important to establish and suggest the ideal instrument through which the PSAH will be effective, applying in this case a fee for water conservation. This environmental canon has an ethical, educational and financial nature that would motivate users to use water efficiently, discouraging excessive use or spending and encouraging the conservation of the environment and the basin ecosystem at the same time.

The investigation will allow to collect on the one hand the perception or revealed preferences of the population of Sucre before the problem of the shortage of the water that lives constantly, determining its Disposition to Pay (DAP) for the Hydrological Environmental Services that it receives and will receive; and on the other hand, it will allow knowing the willingness of the communities to receive a payment as compensation (DAC) in exchange for the management, conservation and restoration activities of the Ravelo River basin.

<sup>1</sup> The city of Sucre is located in the Oropeza Province of the Department of Chuquisaca and is the Capital of the Plurinational State of Bolivia.

From the above, the following question arises that will guide the investigation in a general way:

Is it possible and valid to establish a payment mechanism for Hydrological Environmental Services where users participate in the internalization of negative externalities and in their possible improvement / reduction in the future?

The general objective is: Establish a Payment System for Hydrological Environmental Services (PSAH) through an agreement between families of Sucre and community members of the Ravelo River Basin to ensure the supply of potable water to the city of Sucre

For this, the availability to pay (DAP) of the families of the city of Sucre and the Disposition to Accept Compensation (DAC) of the community members of the Ravelo River Basin should be determined.

The main hypothesis states that: A Payment System for Environmental Services will allow the improvement of the management of the environmental services (soil, water and forest resources) existing in the Ravelo River Basin and will contribute, through substantive improvements both in the offer as in the demand, to recover the sustainability of drinking water for the city of Sucre, involving suppliers, beneficiaries and institutions, based on the economic valuation of the SAH.

At the same time, for the establishment of a payment mechanism for environmental services, it is expected that water users in the city of Sucre would be willing to pay to reduce the shortage of drinking water by protecting and conserving the environmental services already mentioned. .

To achieve an integrated operation of compensation / provision of water resources, it is expected that the community members of the Ravelo River Basin would be willing to receive a payment or compensation in exchange for the protection and conservation of the basin for the provision of Hydrological Environmental Services within of their different organizational and productive structures that they have, incorporating institutional arrangements between the Municipalities of Ravelo and Sucre, private users and ELAPAS within established, consensual and well-defined legal norms.

### **Methodology**

To identify the willingness to pay (DAP) of the users of the city of Sucre for the Hydrological Environmental Services provided by the suppliers of the Ravelo river basin, the Contingent Valuation Method was used, which is used when there is no market information or surrogate values about the preferences of individuals (willingness to pay or accept) with respect to certain natural resources or environmental services.

Through this method, individuals are presented with hypothetical situations (contingent to) and asked about their possible reaction to such a situation.

This method allows us to find out, through the direct question, the valuation that people give to the changes in the well-being produced by the modification in the supply conditions of an environmental asset not traded in the market.

The fact that the assessment finally obtained depends on the opinion expressed by the person based on the information received is what explains the name given to this method (Barzev, 2002: 60).

420 surveys were applied to families in the city of Sucre using simple random sampling.

The municipality of Sucre has 59,845 families in its five urban districts; their three rural districts were not taken into account because they do not receive water from the Ravelo river basin.

The questions were organized into three groups: the first group refers to the contextualization of the problem of water scarcity in Sucre; the second group is related to the willingness to pay (DAP) and the third group of questions focuses on important socioeconomic aspects to determine the correlation of these with the DAP.

The variables analyzed in each group of questions were:

1. Variables related to domestic water: water quality, quality of service, hours that receive water a day, how water is supplied (mains pipe, well, cistern, etc.), how to save the use of water, importance of water for the development of their daily activities, importance of the forest in the supply of water in quantity and quality.
2. Variables related to the DAP: how much you pay for the service, willingness to pay, reasons why you are not willing to pay, proper institution to receive payment and function as an intermediary in the PSA, who must ensure the conservation of the basin.
3. Characteristics of the interviewees: Sex (% and WTP according to sex), age (WTP according to age), etc., education, number of family members, income.

For the determination of the Disposition to be Compensated (DAC), the population inhabiting the Ravelo river basin, composed of approximately 1,830 families in 27 communities and corresponding to the sub-centers, was taken into account<sup>2</sup> of Pampas de Ravelo (includes the town of Ravelo), Challuma, Sasanta, Sauce Mayu, Yurubamba and the Patoqa community of the Moroto Sub-center.

Applying a participatory methodology in workshop meetings in the communities, valuable information was obtained about the situation of the Ravelo river basin and the possibility of receiving compensation for the conservation works carried out was determined.

Different areas of the basin were visited, agreeing with the leaders to carry out the workshops that would be carried out in each community. Only in Pampas de Ravelo, it was agreed to hold the workshop in an extended meeting with the participation of six communities, for the ease of holding the event in the town of Ravelo with the participation of families and the closeness of the member communities.

Subsequently, the communities with which they worked directly with all their members were selected through workshop meetings, applying the instruments for collecting information and data in order to determine the DAC. For the selection of the sample of communities, two criteria were taken into account: 1) the strategic location of the same within the basin and 2) its importance to contribute with water sources to the basin.

<sup>2</sup> The Subcentralías are organizations more functional than territorial, and these in turn are composed of several communities that are territorially defined.

In the 11 workshops carried out, 16 of the 27 member communities of the basin participated, that is to say that 59% of the communities that represent 75% of the total families of the basin worked with:

- Six communities of the upper basin: Sauce Mayu Centro, Sauce Mayu Norte, Teja Huasi, Tanga Tanga, Mojón and Chillcani.
- Six communities of the middle basin: Pampas de Ravelo, Pista Loma, Ampasuyuc, Surihuana, Chuñuchaca and Chullpas.
- Four communities of the lower basin: Socorro, Sasanta, Yurubamba Centro and K'uchu Yurubamba.

On average, in each meeting-workshop, between 60% and 70% of the representatives of the total families of each community participated, which means that they worked with approximately 45% to 53% of the population of the entire basin.

This aspect provides great reliability regarding all the information obtained, since it is a representative majority of the families, in addition to evidencing that the different communities are very homogeneous in the socioeconomic, political, environmental, organizational and cultural aspects.

The workshop meetings were carried out through participatory techniques and tools with motivating questions that allowed the work to begin and then gave way to other complementary questions to obtain the desired information.

In each workshop we worked directly with all the attending community members and the initial distrust and suspicion was changing as the workshops were developed, showing great interest, especially at the time of working the "talking maps" identifying the water sources existing in each community and speaking of its natural resources.

The inhabitants of the Ravelo river basin speak the Quechua language, although approximately 30% of the inhabitants are bilingual (Quechua-Spanish), however, they prefer to communicate in their mother tongue.

### **The willingness to pay (DAP) of the families of the city of Sucre**

#### **The city of Sucre**

It is located in the Oropeza Province of the Department of Chuquisaca and is the Capital of the Plurinational State of Bolivia. Its climate is temperate with an average environmental temperature of 18°.

It is located in the south central part of the country with an O Longitude of 65° 14' and Latitude S of 19° 02', at an average altitude of 2,780 meters above sea level, on the border between the valleys of the middle lands and the descent to the lands lowlands of the plains of the great Bolivian Chaco, in the hydrographic division of the Amazon and the basin of Plata.

### **1. Shortage of water in Sucre**

The results of the study show the shortage of drinking water in the city of Sucre and the different problems that the population has due to this situation:

**Water supply:** Only slightly more than half of its inhabitants (52.2%) receive water in a sustained manner 24 hours a day; the other half of the population receives water only a few hours and only during some days of the week, suffering constant rationing in its supply.

The greatest shortage of water occurs in the second semester, especially during the quarter from July to September. In contrast, during the first semester, water rationing is lower, with the April-June quarter being the one with the greatest scarcity; in May the dry season begins.

**Importance of water sources:** 91.8% of families recognize the importance of forests and vegetation for water sources.

Other aspects considered as important for the provision of water to the city, but to a lesser extent, are: population growth, poor distribution of water by areas, poor management of the local water distribution company in Sucre (ELAPAS) the lack of infrastructure and resources for investment and the lack of maintenance of infrastructure,

**Water saving in Sucre:** An effort is appreciated by the families of the city of Sucre to save water, thus 93.5% of the families maintain in good condition the system of pipes, taps, tanks, etc. performing the corresponding maintenance.

The cases in which water is most frequently wasted are: Vehicle washing with hose, where approximately one third of the families that have a vehicle (30.6%) still follow this practice.

Almost half of the families that have a garden (47.2%) still irrigate with hose, and only 52.8% use sprinklers and sprinklers to perform this task and not waste water.

In the subject of body hygiene, two thirds of families (67.2%) do not have the habit of using a glass of water to wash their teeth, keeping the tap open while doing this activity; or closing the shower tap while soaping, thus incurring one of the most common ways of wasting senseless water. The World Health Organization (WHO) recommends that the shower should be limited to 5 minutes for sustainable use of water and energy, however, in Sucre the shower lasts between 10 to 20 minutes, especially in the younger population.

Highlights that 72.6% of families reuse water from washing clothes to wash their vehicle, floors, walls and others. In the rainy season, 4.2% of families collect rainwater in containers, especially for cleaning purposes; This situation occurs in the high areas of the city where water rationing is greater.

## 2 Willingness to Pay for Environmental Services

**Monthly payment for drinking water (In Bs.)<sup>3</sup>:** Approximately 90% of users pay monthly between Bs. 10 and 170 while approximately 8% pay between Bs. 170 and 300. Finally, 1.3% of consumers pay between Bs. 300 and 500 and .6%, between Bs. 500 and 780.

**Willingness to Pay:** 77% of respondents are willing to pay for the conservation of the Ravelo river basin and only 23% do not want to do so. The former hope to have access to water of adequate quality and quantity if they make that payment.

The estimation of the DAP was made under the probit model using the STATA software. The amount obtained was: DAP = Bs. 8.2987.

<sup>3</sup> Bs Moneda Nacional Boliviana. Tipo de cambio 1 \$US. = 6.96 Bs

CAMPOS-QUIROGA, Zenón Peter. The water and its social and economic relations. Proposed Payment for Environmental Services in the Ravelo River Basin. ECFORFAN Journal-Republic of Peru. 2017



That is, on average, the families of Sucre are willing to pay \$ US monthly. 1,20. Therefore, taking into account that in total there are approximately 60,000 families in the five urban districts of the municipality of Sucre, a fund could be set up for the conservation of the Ravelo river basin with an income of close to \$ US. 72,000 each month and \$ US. 864,000 a year.

This DAP of \$ US. 1,20 is very significant if we compare it with results in other regions of the world and it is not correlated with the level of income or with the level of education, but above all with the need of the population to be able to count on sufficient quantity and quality of water. as to meet their needs and is also linked to the awareness of the population about this problem.

**Institutionality for the Administration of Funds of the DAP:** The majority of the people would like to make the payment by means of the water bill (76.2%); while 20.2% would prefer the issuance of a special receipt; only 1.7% want this payment to be made through the electricity bill; 1.4% through the gas bill, and only 0.6% through another means.

There is confidence of the population in the Local Company of Drinking Water and Sewerage Sucre (ELAPAS), since more than half of the people want this institution to be in charge of the administration of the payment funds for the conservation of the river basin Ravelo (52.8%), while a significant percentage (31.5%) prefer that a special institution created to administer the fund take charge of it. The percentages corresponding to the Mayor's Office of Sucre, the Government of Chuquisaca and NGOs are very small with only 3.6%, 2.2% and 5.5%, respectively, a fact that shows the little confidence that exists on the part of the population in these institutions for the management of these funds.

**Reasons not to make the Payment for Environmental Services:** Of the total of people who are not willing to pay for environmental services, ie 23% of the sample, a third (33.3%) indicates that they can not pay because "their situation economic does not allow it "; 21.1% indicate that "the government should pay" and 11.4% indicate that "it is the Municipality of Sucre who should pay"; finally, 2.6% of these interviewees commented that "it is the community members of Ravelo who must conserve their watershed". On the other hand, 11.4% "do not believe that this payment works"; 9.7% say "do not agree with the proposal" and 6.1% express their fear that "these funds may be diverted".

According to Riera (1993), there are answers that do not reflect the fact that people assign a market price of zero to the good but, rather, as in our case study, to the belief that the national government should be, the government municipal or the own comunarios who should pay.

These types of responses are called "protest or rejection responses" and in our case, they are around 10% that share this perspective, and it is a percentage that is within the parameters that are usually considered acceptable.

The "protest or rejection responses" identified in the study were:

- It's the government that should pay.
- Is the municipality of Sucre who should pay.
- Are the community of Ravelo who must keep their basin.

**The Disposition to be Compensated (DAC) of the community members of the Ravelo River Basin**

## Municipality of Ravelo- Ravelo River Basin

The Ravelo Municipality is located northeast of the Department of Potosí in Bolivia. The town of Ravelo is the most important town and is only 46.5 km from the city of Sucre. The territorial extension of the Ravelo section is 1,268.00 km<sup>2</sup> and its surface is formed by mountain ranges, hills, mountains, slopes, foot hills, terraces, rivers and streams, with reliefs that change sharply determining the ecological floors. The existing water sources in the Ravelo Municipality are generally rivers, streams and springs (pujyus). The basin of the Ravelo River within the territory of the Municipality of Ravelo, covers an extension of 245.81 Km<sup>2</sup> and belongs to the River Basin of La Plata.

Ravelo is made up of Subcentralías that are more functional than territorial organizations, and these in turn are composed of several communities that are territorially defined. The Ravelo River Basin is composed of five (5) Subcentralías: Pampas de Ravelo, Challuma, Sauce Mayu, Yurubamba and Sasanta, additionally only the Patoqa community of the Moroto Sub-center is part of the basin.

### The results:

The five motivating questions used in the questionnaire during the workshop meetings and the rest of the questions incorporated allowed us to collect valuable information to determine the DAC of the community members of the Ravelo River Basin.

### 1 Economic activity

The main economic activities of the basin are agricultural and livestock production. The main product that is grown is the potato in its different varieties, becoming its main source of economic income; next in importance are wheat, corn, oats and quinoa.

The tarhui, the broad bean and the papalisa are also cultivated on a smaller scale. These products are destined in the first place to the commerce and later to the family consumption, with the exception of the oats that are used mainly as fodder.

Within the livestock activity, the main species reared are cows, sheep, pigs, donkeys and chickens; their destination is self-consumption, mostly.

Oxen and donkeys are also used as a working tool. Women and children are responsible for carrying out this activity throughout the year and are concerned that the animals have pups so that this resource is not lacking in the home.

The average payment of the work wage fluctuates, in the communities between Bs. 50 and 60 (US \$ 7.18 and 8.62, respectively). However, the payment is not always in cash since, in most cases, it is canceled in product; This varies according to the crop in which the work is carried out: that is, if a person worked in the potato crop, he is paid between 2.5 arrobas to 1 quintal (4 arrobas) of this product and if the work was made in the cultivation of wheat or corn is canceled with 1 or 2 arrobas of the same product.

In some communities, other types of customs are still practiced, such as family ayni: it is an economic-social system that the Aymara and Quechua cultures practice from pre-Hispanic times to the present, with some modifications, to live in harmony and balance in order to community.

It consists in the reciprocal and complementary work in the agricultural activity in which several members of the community sow the lands of a companion along with it; the beneficiary must "pay" his ayni by sowing the lands of the people who worked with him.

## 2 Natural resources available to the community

**Water resources:** The communities of the headwaters of the basin are those that contribute the most to feed the Ravelo River with rivers, springs, water features and streams. The communities of the middle part of the basin also contribute to the flow of the Ravelo River, but to a lesser extent than the previous ones and the communities of the lower basin are those that in a lesser proportion contribute to the flow of the Ravelo River in comparison with the communities of the Upper and middle basin.

In many cases, the community members do not know the name of their slopes or rivers that normally take the name of the place or community, such as: Teja Huasi River, Mayu Mill, Chillcani River, Mojón River, Ishu Kollu River, Chaka Stream Pampa and Inti Cancha river; all of them feed the Ravelo river flow, name that adopts the main watercourse from the town of Ravelo.

**Conflict for water:** Interestingly, the importance of the issue of the water supply of the upper basin is reflected in the thinking of its community members who believe they are "owners of the water" that is born and runs through its territory; they also indicate that the communities of the lower basin, especially Sasanta and Yurubamba, are only areas of water passage.

A strong position was observed in considering that the community owns the water resource: the community members indicate that if they would make the decision not to supply the city of Sucre with water, they could do so at any time. They expressed their annoyance indicating that, being the "owners of the water", they do not receive any benefit or incentive from Sucre institutions and families.

They note that the Local Company of Drinking Water and Sewerage Sucre (ELAPAS) is not supporting the communities to be able to conserve the basin, and that they should have a representative in the directory of that institution, for being "owners of the water". This position about the idea of water ownership is much stronger in the communities of the headwaters of the basin, where the community members emphasize that they have more rights than others because they are the ones who take care of the water: therefore, they should receive Benefits.

It has identified two conflict situations that are latent and could be activated at any time, causing serious problems. The first conflict situation arises between communities of the upper basin in relation to the communities of the middle basin and especially those of the lower basin (Sasanta and Yurubamba), because these last two were negotiating on their own a series of benefits and compensations for the construction of a dam in its territory by ELAPAS to improve the supply of drinking water to the city of Sucre. Due to this fact, there is a strong resentment on the part of the communes of the upper basin towards those of the lower basin and unfortunately this manifest conflictivity is also unloaded towards the city of Sucre, because they were not taken into account in these negotiations.

The second situation shows a strong current of conflict between the communities of the middle and lower basin with respect to the city of Sucre, especially because all the negotiations and offers made for the construction of the dam did not reach any agreement, to the extent that ELAPAS decided not to build the dam in the Sasanta area of the department of Potosí, but in a place in the department of Chuquisaca called Tumpeca. In most of the communities, several positions were heard on the subject, some of them very worrying, such as:

- Wherever you make the dam, the water is still from Potosí.
- The peasants could rise up and there would be no water for Sucre.
- The water leaves the Ravelo basin and we receive nothing.
- All the water that Sucre receives comes from the basin, but nevertheless we do not benefit from anything, and we should even have the right to have a Director in the ELAPAS Directory, because they own the water.

Therefore, this issue must be treated with great care and it is vital to find a solution before this latent conflict that exists in the communities of the Ravelo river basin explodes and reaches extremes that could harm all families in the region city of Sucre.

Forest resources: The communities do not have forests, there are only small extensions of land with eucalyptus plantations, pines and native species such as alder, oak, chijri, thola that are used to obtain firewood and commercialize them as wood in some cases.

In all the communities an annoyance was expressed because in past years, some institutions and the Mayor's office of Ravelo motivated the community members to carry out eucalyptus plantations that little by little were drying some water sources existing in the area and caused the disappearance of some plants native of the place.

However, today despite being aware of the problem that this generates, some families still continue with this practice, although a majority no longer performs these plantations.

The community of Teja Huasi stands out within the basin, because it has many sectors that were forested with pines and alders, work carried out with a project with the Foundation against Hunger (FHI).

In this community no one is currently carrying out eucalyptus plantations and a greater degree of awareness and awareness of environmental care is observed, an aspect that helps to develop water conservation practices.

In the entire basin, firewood is scarce, due to the deforestation caused by the community members and the non-replacement of the native trees, which causes problems due to the use they give to this resource as an energy source.

Pollution: The community members of the upper Ravelo river basin indicate that they do not pollute the water sources; on the contrary, they would be taking care of them and they assure that the communities of the middle basin, from the town of Ravelo, and those of the lower basin, are the cause of water pollution, generating a large amount of garbage that includes waste of the town's sewage system. This fact was recognized by the inhabitants of Ravelo, indicating that the wastewater from their sewage system was evacuated directly to the river.

A workshop participant in Ravelo stated categorically: "Ravelo's sewage system directly contaminates the river. We pollute and then we take that in Sucre. "

On the other hand, in the lower basin, although the community members of Socorro and Sasanta assure that their communities do not pollute the rivers, the presence of garbage and contamination of the waters and farmland, as well as in the surroundings of the housing (plastic bags, paper, disposable bottles, insecticide containers, etc.).

In turn, Yurubamba community members did recognize that they pollute the waters of the Ravelo River, especially with plastic bags and dead animals that they throw themselves into the river.

**Erosion:** In all the communities, the lands are very eroded and this process is presented with increasing force.

The soil is in the process of degradation and the lands that used to be cultivable now are no longer.

The community members are aware that one of the causes of pollution comes from the excessive use of chemical fertilizers in potato production and also the presence of garbage, at the same time ensuring that changes in the intensity of rainfall and winds make that the earth becomes unproductive.

They indicate that now, the rains are too strong and they take the land, "washing" the land and letting out the rock or the slab; therefore, agricultural production becomes very difficult if not impossible.

The same happens with the strong winds that also take the fertile land: "Before you could cultivate the land with pure oxen, but now the earth has become hard as cement and even with a tractor it can be plowed," the community members say concern.

Right of property of water: Within the communities, the villagers assure that nobody owns the water: everyone has the right to it. Those who live on the banks of rivers are only considered owners of the land.

The lands where the springs are born have an owner: they are private properties, but when someone requires this liquid element, then everyone has the right to take advantage of it.

The following opinions expressed in the workshops confirm this situation:

- The water belongs to everyone.

- Everyone uses water.
- Decisions are made in the family about firewood, but it is the community over the water.

This situation of community water law within the communities, in which "water belongs to everyone", contrasts with the idea of the same communal water rights in relation to the right of the families of the water. city of Sucre, because they no longer consider that "water belongs to everyone", but that "water belongs to us, and Sucre uses it without us benefiting".

In this regard the New Political Constitution of the State approved in 2009 (NCPE), establishes guidelines on the rights and obligations in environmental matters of citizens and authorities or organizations, as well as the ownership of natural resources.

**Irrigation:** It is striking that most communities do not have an irrigation system. In the case of those that do have this system, much of it captures water from sources that do not feed the Ravelo River; therefore, they do not harm its flow, nor compete with the use that is given to it in the city of Sucre.

It is evident that there are very few communities that take advantage of the waters of the basin for their irrigation systems.

One example is the community of Teja Huasi that has undertaken a micro-irrigation project using the waters that go down to the Ravelo River, where a dam and an irrigation system for the community are under construction; this fact will mean a reduction of the flow that descends from the community of Jailluwa through Teja Huasi and that feeds the river Ravelo.

### 3. Changes in the time of natural resources

The community members assert that there are too many changes in their water resources. In past years, the flow of the rivers was greater and there were other slopes in the area, but now, those are dry. Before, they were not hit by so many natural disasters and their production did not require the use of agrochemicals to be able to bear good fruit. Nowadays, they do not have good production if they do not use these inputs. They are aware that all the changes they are experiencing come from pollution and bad agricultural practices that have been increasing.

Affirmations such as the following, expressed by the community members, reflect the existing changes:

- The climate changed completely, it rains when it should not rain and there is a lot of drought, climate change is affecting the agricultural calendar.
- This is caused by the pollution of large factories in cities, the use of chemicals in the production cycle and the bad habits of people to generate and throw garbage everywhere.
- In past years there were greater sources of water.
- Little by little the water is decreasing.
- The pujuys (eyes of water) dried up, a lot of eucalyptus.
- The time has changed.
- It is not like it used to be: it does not rain or it rains a lot and the water takes away the land, leaving the fields pure slab. The production is ruined.

- There is a lot of wind that also takes away the earth.
- It is very hot.
- Before you could cultivate the land with pure oxen, but now the earth has become hard as cement and even with a tractor you can not plow.
- No more original trees such as alder, thola.
- No firewood, no more trees.

Also, there is a strong position that water will not increase, no matter how much preventive measures are taken, they even consider that they will disappear, but they also say that we must try to avoid this situation.

### 4. Organization and decision making on the use of natural resources

When any natural resource of the community is available, the decision is made in conjunction with the family that owns it, if the resource is located on private property, then at the level of the community in general and then at the community level subcentralía

There is no organization exclusively dedicated to caring for natural resources in the communities, in some cases there is a portfolio in your union organization, but without significant significance in its actions; all the decisions that are made in this regard are at the family level. It is the owners who determine or authorize the use or exploitation of trees and grass among others, but the water is for the use of the whole community and the community members express it this way:

- Decisions are made in the family about firewood, but it is the community over water.
- Decisions of the entire community.

## 5. The Disposition to be Compensated DAC

***What do they do in the communities so that the water does not run out and still have water:*** Despite being aware of the problem of water shortage and how much this represents in their lives, the community members do not take preventive action to guarantee the resources natural for future generations. Only the community of Teja Huasi is the exception, since it is dedicated to caring for and preserving the existing water eyes.

The following expression summarizes the situation regarding the total lack of actions to conserve the basin and the need of the community to do something about it: "We do nothing; We need help".

***Disposition to be compensated:*** The possibility of receiving compensation in exchange for carrying out conservation work in the Ravelo river basin was accepted positively by the community members, since they see the possibility of being able to benefit in the medium and long term. They are also willing to give part of their land to plantations on the banks of the rivers, if necessary.

The response was positive in 14 of the 16 communities; only in two there was some resistance, not precisely against the proposal, but rather because of too much distrust and susceptibility because, previously, the community members were deceived by institutions, according to the testimony provided by some community members of Sasanta and Sauce Mayu North.

In the case of Sasanta, this susceptibility and distrust was generated due to the fact that they spent a long time negotiating compensations and benefits as compensation for the lands that were going to be affected by the construction of the dam by ELAPAS, and for this a survey was carried out. of information; but in the end this institution decided to leave this project aside and implement it in another place, downstream, not in the territory of Potosí but in Chuquisaca.

According to the perception of the community, "everything was nothing" and they lost time. Despite this position, it could be seen that there was a group of people who agreed with the proposal but did not dare to express their opinion.

On the other hand, in Sauce Mayu Norte, the community members stated that they consider that this compensation could take away their property rights over water and land. It is feared that, even with the passage of time, they will not be allowed to approach the water sources.

The community members are susceptible because they believe that, when receiving money or another type of compensation coming from the city of Sucre, little by little they would be selling the property and the slopes that would change ownership and pass into the hands of the municipality of Sucre. Here, as in Sasanta, they finally expressed that they were not completely denying the proposal and that, if the majority of the communities of the sub-center accepted it, they would submit to that decision and also participate.

In conclusion, we can indicate that the communities are willing, for the most part, to accept compensation in order to conserve the Ravelo River basin, establishing agreements with the families of the city of Sucre.

**Form of payment for the works of conservation of the basin:** The comunarios although they accept a payment in cash, they would prefer that the funds were destined to projects and emprendimientos that could benefit the whole community, putting as examples the following: improvement of houses, pig farm, micro-irrigation, dairy cattle breeding, fish farming, beekeeping: "This would be a good opportunity to diversify our productive and work alternatives," they say.

They also suggest that works should be carried out as cut-offs (technique by which rainwater runoff, or water from other sources, is stored in ponds dug in the ground), dams, wells, ponds, among others, in communities, in addition to receive training in conservation and preservation of the environment.

A community member stated the following: "Only if you have a healthy environment and with sufficient natural resources will families be able to live with dignity."

**Institutional organization:** According to the community members, the organization for the management of the funds to be collected for the conservation works of the Ravelo river basin should be made up of different institutions and social organizations such as: ELAPAS, the municipal governments of Sucre and Ravelo, the communities involved, the provincial central office and the sub-centers.

However, the fact that in several of the communities, it is not desired that the municipal government of Ravelo participates in this point and even in a community, the opinion was very strong regarding this issue, expressing its community members the following:

- The City Hall of Ravelo does not help at all.

- Many times, the mayor reports that projects have been carried out in our name and nothing has ever happened to us.
- So they are always those of the Mayor's Office: they deceive us.
- Where will the money they say reach the community go?

The Government of Potosí, nor the ONG, showing that there is little credibility towards public institutions and institutions that worked with them for a long time without achieving positive results.

**Calculation of the amount of the Disposition to be Compensated:** For the calculation of the DAC took into account two components: The first refers to the payment in wages that the community members would receive for their work, that is to say, the community members will receive an economic compensation to use its approximately 60 free days during the year to be able to devote itself to the work of conservation of the basin; the second component is the income that the community will fail to perceive by departing their working land, which are on the banks of rivers and ravines, to work of conservation and preservation.

Number of families in the basin (1)	1,830
Daily wages in *Bs (2)	50
Quantity of daily wages (3)	60
Total DAC in Bs = (1) x (2) x (3)	5,490,000
<b>Total DAC in \$US</b> (1 \$US = 6.96 Bs)	<b>788,793</b>

\*DAC Amount to be compensated

\*Bs Bolivian currency

**Table 1:** \*DAC Calculus (daily wages)

Source: Own elaboration based on data from workshops in the Basin. 2014



Table 1 shows the calculation for the first component of the DAC, taking into account the 60 days of work at Bs. 50 per day and considering one member per family of the 1,830 existing in the basin, making a total of 5,490,000 Bs. which is equivalent to 788,793 US Dollars.

Potato yield *tn/ha	5.4
Potato yield *kg/ha	5400
Potato yield @/ha	476.19
Number of families in the basin	1,830
Average possession per family in *Ha	3
Total of land used to work in the basin (Ha)	5,490
% land close to river	5%
Total of land to work close to river (Ha)	274.5
10% land contributed to be conserved (Ha)	27
Potato price per @ in Bs	25
Quantity of potato in @ without production	13,071
Total incomes not earned in Bs.	326,786
<b>Total incomes not earned in \$US (1 \$us = 6.96 Bs)</b>	<b>46,952</b>

\*tn Ton

\*Kg Kilogram

\*ha hectare

**Table 2:** DAC calculus (land contributed to be conserved)

Source: Own elaboration based on data from workshops in the basin. 2014

Table 2 shows the calculation made for the other component of the DAC, that is to say, the income that was left to be received for carrying out work on working lands on the banks of rivers. For this we consider an average working landholding per family of 3 Ha, there are 5,490 Ha in the entire basin taking into account the 1,830 families, of this total of working land, approximately only 5% is on the banks of the rivers in the basin, that is 274.5 Ha, of which it has been estimated to contribute 10% to be allocated to conservation works in the basin.

On the other hand, if we take into account that the average potato production per hectare is approximately 5 tons equivalent to 476.19 @, we have a total production of 13,071 @ potatoes that would stop producing on arable land on the banks of the rivers of the basin.

Therefore, if the arroba (@) of potato has an average price of Bs. 25, the total amount of income left to be received would be Bs. 326,786 (US \$ 46,952).

Currency	DAC (daily wages)	DAC (contributed land)	TOTAL DAC
<b>Bs</b>	5,490,000	326,786	<b>5,816,786</b>
<b>\$US</b>	788,793	46,952	<b>835,745</b>

**Table 3.** DAC Calculus (daily wages + contributed land)

If we add the amounts of the two components of the calculation of the DAC, that is to say the 46.952 \$ US. of income not received for assigning working lands to the conservation of the basin and the 788,793 \$ US. for the wages dedicated to carrying out conservation work in the basin, there is a total for the DAC of 835,745 \$ US per year.

DAP vs. DAC: In table 5, comparing the annual amount of the DAP of \$ US. 864,000 with the annual amount of the DAC of \$ US. 835,745, it is appreciated that the compensation is sufficient to cover the opportunity cost of alternative use in conservation work of the wage of the community members and the land use of the lands on the banks of the rivers, leaving a positive difference of \$ US. \$ 28,255; that is, the amount that the families in the city of Sucre are willing to compensate the community members for the SA, is enough to cover the amount that the latter would be willing to receive as compensation for the conservation of the Ravelo River basin.

Currency	DAC	DAP	Difference
In Bolivianos (Bs)	5,816,786	6,013,440	196,654
In Dollars (\$US) (1 \$US = 6.96 Bs)	835,745	864,000	28,255

**\*DAP amount to be paid**

**Table 4.** DAC vs \*DAP

Then, the implementation of a PES scheme is viable, allowing the conservation of the Ravelo River Basin, in such a way that the necessary Hydrological Environmental Services are provided to have potable water in the city of Sucre in sufficient quantity and quality.

### **Institutionality**

Given the interpretation and susceptibility on the part of the community members of the term "payment" included in the concept of PES, in the sense that this fact could in the future imply the transfer of the right owner of their lands where the water sources are, to In favor of the families of the city of Sucre, which are those who would make these payments, it is proposed to change the use of the term of Payment for Environmental Services (PSA), for the Recognition and Compensation for Environmental Services (RCSA).

In accordance with this denomination, it is also recommended to use the term Disposition to Recognize and Compensate (DARC) instead of the well-known term Disposition to Pay (DAP), keeping the other term of Disposition to be Compensated (DAC). In this way, problems that could arise with the community members in the implementation of the compensation scheme due to the terminology used will be avoided.

Within this line of thought, and some authors like Herman R., Kandel S. and Dimas L. (2004) following Born (2002), avoid talking about Payment for Environmental Services, referring to Compensation schemes for Environmental Services (CSA).

### **RCSA outline design:**

The Recognition and Compensation for Environmental Services (RCSA) schemes require an institutional infrastructure for their proper functioning, in order to guarantee the capture of the economic resources paid by the beneficiaries of the Environmental Services.

For the conformation of the institutional framework that will take charge of the management of the funds, it is important to rescue the opinion both of the families in the city of Sucre and those discharged by the community members in the basin, highlighting the confidence of the population in ELAPAS for the administration of these funds.

On the other hand, although there is little confidence on the part of the families of Sucre and the basin in favor of the participation of the Municipal Governments of Sucre and Ravelo, as well as of the Governorates of Potosí and Chuquisaca, it can not be ignored, take them into account, as their participation is essential to achieve institutional sustainability of the RCSA scheme, giving it the corresponding legal backing.

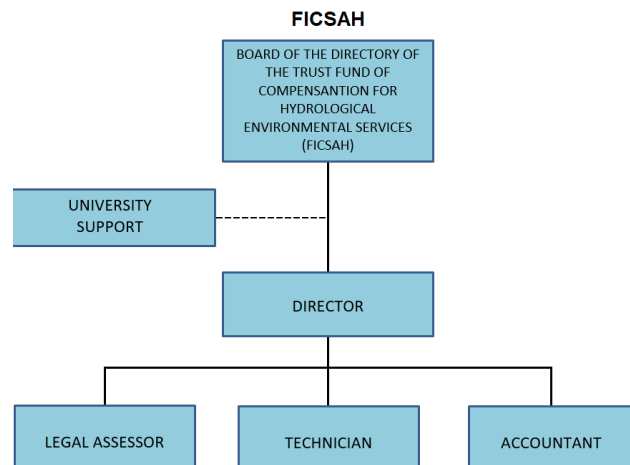
Therefore, in the institutional framework of the RCSA scheme, the following institutions and organizations must necessarily be involved:

- 1) Sub-centers of the Ravelo River Basin; because its members (community members) are the direct beneficiaries of receiving funds from the RCSA scheme and those responsible for providing the SA. In each Subcentralía a Committee of Conservation of the Basin with five (5) members must be organized: President, Secretary General, Treasurer and two vowels, who are in charge of the money management of the RCSA Fund and to guarantee the fulfillment of the activities within of the established agreements.
- 2) Neighborhood Boards of the city of Sucre; because they are a representation of the families of the city of Sucre that will make the payments for the SA in order to guarantee the provision of potable water in sufficient quality and quantity.
- 3) Municipal Government of Ravelo; because all the actions of conservation and preservation of the basin takes place in the territory of the Municipality of Ravelo.
- 4) Municipal Government of Sucre; because the beneficiaries of the SAH are the families of five Districts of the Municipality of Sucre. It is responsible for the provision of drinking water to the population of Sucre through ELAPAS.
- 5) ELAPAS; because it is the decentralized public company of the Municipal Government of Sucre, responsible for managing the water resources of the Ravelo River basin, transporting the raw water from its sources, making it drinkable and distributing it to the population of Sucre.

- 6) Governorate of Potosí: because the territory of the Municipality of Ravelo, of which the Basin is part, is part of the Department of Potosí and therefore is also the responsibility of its Government.
- 7) University: because the training of the community members is necessary, as well as actions of supervision and monitoring of the proposed actions. He will be responsible for the formulation of the projects that they require in each community and that will be executed with the funds of the proposed compensation scheme.

The Governorate of Chuquisaca would not participate in the structure, because when carrying out all the conservation actions in the Department of Potosí, it does not have sovereignty over that territory.

**Compensation Trust for Hydrological Environmental Services (FICSAH):** Within the proposed institutional framework, the creation of an entity responsible for the administration of funds called the Compensation Trust for Hydrological Environmental Services is proposed. The organizational structure of **FICSAH** will be as follows:



FICSAH Board: Will be integrated among stakeholders or interest groups indicated above and will be composed of eight members as follows:

- Two representatives of the sub-centers of the Ravelo River Basin
- A representative of the Municipal Government of Sucre
- A representative of the Municipal Government of Ravelo
- A representative of Gobernación Potosí
- A representative of ELAPAS
- Two representatives of the Neighborhood Councils of Sucre

The FICSAH Board will ensure compliance with both the general guidelines under which the proposed compensation scheme will work, as well as the commitments and institutional contributions of those who are part of the institutional framework.

The operative part will be in charge of:

- Director: Contribution of the Municipal Government of Sucre. Responsible for the administrative, technical and financial management of the funds of the Recognition and Compensation of Environmental Services (RCSA).
- Legal Advisor: Contribution of the Municipal Government of Sucre. It draws up contracts with communities and community members.
- Accountant: Contribution of the Municipal Government of Sucre. Prepares the financial information of the RCSA funds. Design information systems (accounting and management).
- Technician: Contribution from the Government or Municipal Government of Ravelo. It will be responsible for the management or technical management of the scheme.

**Financing mechanism:** The financing will be based on the payments made by the users of drinking water in the city of Sucre, which will be included in the drinking water bill prepared by ELAPAS. This amount of money will go directly to compensate the community members of the basin on the one hand collectively for the work developed in conservation and on the other hand as a compensatory payment to each family that provides working lands on the banks of rivers for reforestation and other works of conservation of the basin.

Additionally, for the proper functioning of the RCSA scheme, it is proposed to take advantage of the resources of the Government within a project that has already been approved with a budget close to 7 million dollars and which is called "Integral Management of the Ravelo River Basin", Whose actions are compatible with the proposals of the RCSA scheme allowing the provision of seedlings, barbed wire, meshes, etc. For its part, the Municipal Government of Ravelo will also contribute with resources defined in its Annual Operations Program for the conservation of the basin. Similarly, the resources contemplated for the Management and Conservation of the Sucre III Project Basin (Dam Construction) formulated by ELAPAS and financed by the KfW Kreditanstalt für Wiederaufbau (Credit Institute for Reconstruction) can be used.

These three sources of financing, the Governorate of Potosí, the Municipal Government of Ravelo and ELAPAS through the Sucre III Project, would be the ones that finance the part of materials and seedlings necessary for all the conservation works required in the Ravelo River basin.

**Mechanism of payment:** Most people would like to make the payment by means of the water bill (76.24%), this being the proposed medium.

The amount collected will be deposited or transferred monthly to a specific bank account in the name of the institution created to manage the funds.

**The contracts:** Necessarily contracts must be drawn up, according to which the users guarantee the payment by the SA, but also the suppliers (community members) ensure the continuity of the provision of the SA. The rights and obligations of both parties will be detailed, the actions that will be implemented to maintain or increase water environmental services. The terms of the payments, their frequency and the transfer mechanism must be established. In addition, clauses will be clearly established establishing the corresponding sanctions in case of breach of contract by the parties.

## The proposed canon

### Consumption of drinking water

To propose the application of a canon for water conservation, which allows the creation of a fund for the management of SA (soil, water and forest resources) of the Ravelo River Basin, an analysis of the total drinking water consumption has been made and per inhabitant in the city of Sucre, analyzing at the same time the tariff structure applied by ELAPAS for the payment for the service of drinking water supply to the population.

There are five categories of consumption:

1. Domestic Category (Family consumption: Includes a Solidarity Category when family consumption barely reaches 10 m<sup>3</sup> per month).
2. Commercial Category (Consumption of commercial premises).

3. Industrial Category (Consumption of productive units).
4. Social Category (Consumption of social establishments such as homes, homes, hospitals, etc.).
5. State Category (Consumption of public institutions, markets, schools, etc.).

The Home Category in the total consumption of drinking water is the most important with a percentage of 83%, meanwhile the Commercial Category has a 4% participation, the Industrial Category is the one that has less incidence in the total consumption of drinking water, with only 1%, the Social Category also maintains an average percentage of 6% and the State Category with the same 6% share in consumption.

### Allowance per capita for urban housing (L / hab.día)

The National Regulation of Domiciliary Sanitary Facilities of Bolivia establishes reference values for the per capita allocation for urban housing. In the case of the city of Sucre (located in Valle), the daily per capita drinking water supply must be between 80 - 100 liters and ELAPAS effectively complies with this provision.

The drinking water consumption information per inhabitant day, shows how this consumption rarely passed the 100 liters a few months, this situation only being presented during the 2010 management, however as of 2011 no month the consumption increased from 100 liters per inhabitant.

The per capita consumption of drinking water in the city of Sucre is below 100 liters, being within the recommended international parameters, and well below the daily consumption per inhabitant of other cities in the world.

A very interesting aspect is the behavior of consumption per month during the year, highlighting the months of July and October as those with the lowest consumption of drinking water per inhabitant day, and the months of January and November as the most consumed.

### Rate structure

The tariff structure of ELAPAS for the potable water service of the city of Sucre includes five categories (the Solidarity is part of the Domestic) and includes differentiated rates for consumption ranges separated by 10 m<sup>3</sup> up to 50 m<sup>3</sup>, then there are two ranges separated by 25 m<sup>3</sup> and finally there is the consumption range greater than 100 m<sup>3</sup>.

In addition, all categories have a fixed rate independent of the volume consumed in m<sup>3</sup>, which is the amount of the column that establishes the first consumption range = a 0 m<sup>3</sup>.

**RATE STRUCTURE**  
(In Bolivianos Bs x m3)

CAT	= a	1 a	11 a	21 a	31 a	41 a	51 a	76 a	> a
EGO	0	10	20	30	40	50	75	100	100
RY	m3	m3	m3	m3	m3	m3	m3	m3	m3
SUPP ORTI VE	11. 93	1.24 3	0	0	0	0	0	0	0
DOM ESTI C	18. 00	1.93 2	4.02 5	5.87 0	11.5 04	15.6 46	18.6 20	21.57 2	24.5 41
COM MER CIAL	89. 56	15.6 67	15.6 67	18.6 47	18.6 47	21.6 08	21.6 08	24.57 4	24.5 74
INDU STRI AL	149 .19	21.6 08	21.6 08	21.6 08	21.6 08	24.5 74	24.5 74	24.57 4	24.5 74
SOCI AL	18. 00	7.60 5	7.60 5	7.60 5	7.60 5	7.60 5	7.60 5	7.605	7.60 5
STAT E	18. 00	16.3 89	16.3 89	16.3 89	16.3 89	16.3 89	16.3 89	16.38 9	16.3 89

**Table 5.** Rate Structure  
Source: ELAPAS

### The proposed canon

With the information on drinking water consumption and the tariff structure applied for its endowment in the city of Sucre, the canon that is proposed to apply to each of the consumption ranges is calculated an amount that allows the creation of a fund of allocated resources. to the conservation of the Ravelo River Basin.

For the calculation of the rate of the canon to be applied, two variables were taken into account, the first the rate by consumption ranges charged for drinking water in Sucre, the second the Average Consumption of drinking water l / day.

With both indexes added was applied to the amount paid on average by each user in each of the ranges of consumption in the Domestic Category, thus obtaining the amount in Bs that must be paid on each bill for the potable water service provided ELAPAS.

To avoid the handling of cents, the amount of the canon is adjusted to the next higher value and added to the average monthly payment made by each user in the different consumption ranges.

FEE CALCULATION														
Rank from... to...	Category	Number of users	Volume (m <sup>3</sup> )	RATE		Average consumption %habitant	USER'S MONTHLY PAYMENT	RATE 1 (RATE)	RATE 2 (AVERAGE CONSUMPTION PER MONTH)	TOTAL RATE (RATE 1 + RATE 2)	FEE (Bs)	ADJUSTED FEE (Bs)	USER'S MONTHLY PAYMENT RATE + FEE	INCOME PER FEE (In Bs)
				FLAT	VARIABLE									
=>0 M <sup>3</sup>	D.SOL	3,349	0	11,93	0		11,93	0,00	0,00	0,00	0,00	0,00	11,93	-
1 a 10 m <sup>3</sup>	D.SOL	19,184	1,330,878	11,93	1,243	38,54	19,12	0,01	0,01	0,02	0,44	0,50	19,62	115,394,00
11 a 20 m <sup>3</sup>	DOM	14,155	2,450,012	18	4,025	96,16	55,11	0,04	0,03	0,07	3,67	4,00	59,11	679,440,00
21 a 30 m <sup>3</sup>	DOM	5,329	1,581,487	18	5,870	164,87	105,34	0,06	0,05	0,10	10,96	11,00	116,34	703,428,00
31 a 40 m <sup>3</sup>	DOM	1,777	778,961	18	11,504	243,53	211,39	0,11	0,07	0,18	38,32	39,00	250,39	431,636,00
41 a 50 m <sup>3</sup>	DOM	651	360,300	18	15,646	307,48	347,06	0,15	0,09	0,24	83,20	84,00	431,06	456,208,00
51 a 75 m <sup>3</sup>	DOM	371	285,913	18	18,620	428,14	672,55	0,18	0,12	0,30	203,84	204,00	876,55	908,208,00
76 a 100 m <sup>3</sup>	DOM	70	71,659	18	21,572	568,72	1,095,68	0,21	0,16	0,37	407,49	408,00	1,503,68	342,720,00
>= 100 m <sup>3</sup>	DOM	42	124,894	18	24,541	1,652,04	5,039,98	0,24	0,47	0,71	3,579,87	3,580,00	8,619,98	1,804,320,00
MESTIC TOTAL		44,928	6,984,104	-	103,021	3,499,48	7,558,15	1,00	1,00	2,00	4,327,79	4,330,50	11,888,65	6,041,064,00
abitants per day														

Table 6. Fee Calculation

As can be seen in the table, the income generated by the payment of the fee reaches the sum of Bs 6,041,064 equivalent to \$ US. 867,968.97., -

This canon is progressive, since it is applied more to those who consume more drinking water and pay more for that consumption on a monthly basis, being these families the ones with the highest economic income.

Surely it draws attention that in the last range of consumption > 100 m<sup>3</sup> there are only 42 users and yet the amounts that come to pay are higher than the rest of the users.

This is because it is not really a single user who will pay a fee of 3,580 Bs, but in this range there are condominiums and apartment buildings and they only have one potable water connection, but nevertheless there are several families, arriving for example in the biggest apartment buildings even to live 50 families or more. In that case each family would come to pay a fee of just 71,60 Bs.

## Conclusions

In the city of Sucre only slightly more than half of its inhabitants (52.2%) receive water in a sustained manner during the 24 hours a day, while the other half of the population suffers constant rationing in their supply, receiving water some hours and only during some days of the week.

Sucre is facing a situation of deficit of drinking water supply, which, according to the projections made, will continue during the next few years, if urgent measures of adequate management of the Ravelo River Basin are not taken, efficiency in the consumption, as well as in the works of catchment, conduction and distribution of the water to the users.

Urgent measures are required not only to maintain the flow of the Ravelo River, but also policies to save drinking water in the city of Sucre, which allow consumption to remain between 90 and 100 liters / day / inhabitant, thus allowing consumption per capita sustainable capita.

The problem of water supply to the population of Sucre is not only due to the scarcity of natural sources, but also to the unsustainable use of water in general by economic, social and institutional factors, that is, not only the problem of the anthropic degradation of soils, vegetation and environment, but also that of the bad distribution and administration of the demand. Surprisingly, most families recognize the importance of forests and vegetation for water sources, assigning a scale between important and very important.

The results of the study show that the population of Sucre is willing to pay for the conservation of the Ravelo river basin, as long as that guarantees the sufficient quantity and quality of water for its use and consumption.

The calculated Payment Disposition is US \$ 1.20; This sum, multiplied by the approximately 60,000 families of the municipality of Sucre, gives a total of \$ US 72,000 that could be collected each month, reaching an amount of \$ US 864,000 per year.

When there really is a problem of water scarcity, such as that of the city of Sucre, the level of income or education, are determinants for the willingness to pay by families, but most importantly the conscience awakened by the real need to have water in sufficient quantity and quality to meet the needs. Therefore, the study shows a very significant DAP of \$ US. 1,20.

The community members of the Ravelo river basin are willing to accept compensation for carrying out conservation work in the basin and prefer that this payment be concretized in projects and ventures that benefit all communities instead of individual payments by family.

The community members would accept a payment in cash, but prefer that the funds be allocated to projects and ventures that benefit all communities, giving as examples the following projects: housing improvement, pig farm, micro-irrigation, dairy cattle breeding, fish farming, beekeeping and others that may develop in the basin.

The annual DAP of \$ US. 864,000 is enough to cover the opportunity cost of the alternative use in conservation work of the wage of the community members and of the land use of the lands on riverbanks calculated in \$ US. 835,000; that is, the amount that the families in the city of Sucre are willing to compensate the community members for the SA, is enough to cover the amount that the latter would be willing to receive as compensation for the conservation of the Ravelo River basin.

There is a latent conflict between communities of the upper basin and those of the lower basin that originated in the lack of compliance in the agreements and negotiations between the communities of Sasanta and Yurubamba with the company ELAPAS in which no communities of the headwaters of basin.

On the other hand, there is another conflict between the communities and the city of Sucre that could reach truly worrying and irreversible levels at any moment if they are not found and apply solutions on time.

The implementation of a scheme of Recognition and Compensation of Environmental Services (RCSA) for the conservation of the Ravelo River Basin, in such a way that the necessary Hydrological Environmental Services are provided to have drinking water in the city of Sucre in the quantity and quality enough, it is viable.

### **Recomendations**

Coinciding with the opinion of the community members, it is proposed that the organization for the management of the funds to be collected for the conservation works of the Ravelo river basin should be made up of different institutions and social organizations such as: ELAPAS, the municipal governments of Sucre and Ravelo, the communities involved, the provincial central office and the sub-centers.

Within the proposed institutional framework, the creation of an entity in charge of the administration of funds called the Compensation Trust for Hydrological Environmental Services (FICSAH), which would be integrated among stakeholders or interest groups with the participation of eight members, is proposed.



Apply the proposed canon for drinking water consumption categories, as an instrument to collect income for the FICSAH labeled to conserve the Ravelo River Basin. This has the characteristic of imposing a greater burden on users who use and consume more liters per day, thus constituting a restrictive element to the greater consumption of drinking water and its subsequent contamination.

Compensation schemes for environmental services must be carried out in areas of interest and conflict, as is the case of the Ravelo River Basin, and must be governed by participatory and sustainability criteria, combining the efforts of municipalities, governorates, central government and organizations of base (community members in the basins and neighborhood councils in the cities), in addition to the participation of the universities for the corresponding technical support.

It is necessary to prepare and approve specific legal regulations that support and strengthen the application of instruments such as payment schemes for environmental services.

As a matter of urgency, the Municipal Government of Sucre and the Governorate of Chuquisaca must have a plan to raise awareness among the population about the rational, sustainable use, economic value and importance of water and the need to conserve and protect it. Encourage the culture of payment, that is to say that families assume costs related to the protection and conservation of the watersheds to which they are related.

As a very important additional measure to restrict water use, a seasonal tariff system should be applied, imposing higher water prices during the months of the dry season (in our case from April to September).

This would mean establishing a tariff system that takes into account the situation of relative scarcity of water resources.

ELAPAS must draw up a plan to improve the distribution of drinking water by zones, at the same time build storage tanks in the high areas to avoid water shortages, especially during critical hours during the day.

At the same time, it is necessary that the Municipal Government of Sucre elaborate and approve an Ordinance of Management and Efficient Use of Water in the City of Sucre.

ELAPAS must urgently carry out infrastructure works to meet the growing demand for potable water in the city of Sucre, such as:

- Expand the capacity of capture, conduction, treatment and distribution of water to the city of Sucre.
- It must improve its efficiency in the collection, conduction and distribution of water.
- Build storage tanks with sufficient capacity to satisfy especially the high and peri-urban areas of the city of Sucre.

On the other hand, in the long term, you should seriously think about other alternatives of water sources taking into account studies and projects such as the Cachimayu project or the wells around the city of Sucre.

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## Instructions for authors

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### [Title in Times New Roman and Bold No.14]

Last name -First name, (in uppercase) -1st † Last name -First name (in uppercase) -2nd Author's name

*Institutional mail No.10 Times New Roman and Italic*

(Report Submission Date: Month, Day, and Year); accepted (Insert date of Acceptance: Use Only ECORFAN)

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### Abstract

Title

Objectives, methodology

Contribution

(150-200 words)

Keywords

Indicate (3-5) keywords in Times New Roman and Bold No.11

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† Researcher contributing as first author.

# Instructions for authors

## Introduction

Text in Times New Roman No.12, single space.

General explanation of the subject and explain why it is important.

What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

Explanation of sections Article.

## Development of headings and subheadings of the article with subsequent numbers

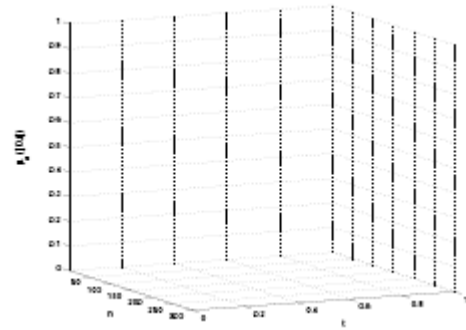
[Title No.12 in Times New Roman, single spaced and Bold]

Products in development No.12 Times New Roman, single spaced.

## Including graphs, figures and tables-Editable

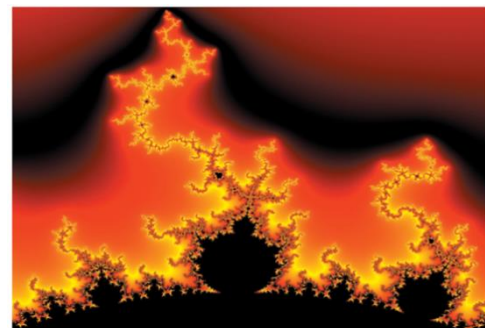
In the article content any graphic, table and figure should be editable formats that can change size, type and number of letter, for the purposes of edition, these must be high quality, not pixelated and should be noticeable even reducing image scale.

[Indicating the title at the bottom with No.10 and Times New Roman Bold]



**Graphic 1** Title and Source (in italics).

Should not be images-everything must be editable.



**Figure 1** Title and Source (in italics).

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**Table 1** Title and Source (in italics).

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Each article shall present separately in **3 folders**: a) Figures, b) Charts and c) Tables in .JPG format, indicating the number and sequential Bold Title.

## For the use of equations, noted as follows:

$$Y_{ij} = \alpha + \sum_{h=1}^r \beta_h X_{hij} + u_j + e_{ij} \quad (1)$$

They must be editable and number aligned on the right side.

## Instructions for authors

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### **Methodology**

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

### **Results**

The results shall be by section of the article.

### **Annexes**

Tables and adequate sources thanks to indicate if they were funded by any institution, University or company.

### **Conclusions**

Explain clearly the results and possibilities of improvement.

### **References**

Using APA system, should **Not** be numbered, either bulleted, however, if necessary, will be because reference number or referred to in any of the article.

### **Data Sheet**

Each article must submit your dates into a Word document (.docx):

Journal Name

Article title

Abstract

Keywords

Article sections, for example:

*1. Introduction*

*2. Description of the method*

*3. Analysis from the regression demand curve*

*4. Results*

*5. Thanks*

*6. Conclusions*

*7. References*

Author Name (s)

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References



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