SUBTHEME: S4 **University in regional innovation and social development**

SUSTAINABLE TRIPLE HELIX EXPERIENCE IN A BRAZILIAN RURAL AREA

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Abstract

This paper outlines the history of building and implementation of a university extension project (PAAS – Sustainable Upper River Aiuroca Project) which had as main goals: preservation of the environment and creation of sustainable alternatives of jobs for local community. The project was coordinated by the research group NEICT (Center for Studies in Innovation, Knowledge and Labour), Department of Production Engineering, Universidade Federal Fluminense (UFF), Brazil. The objective of this article is to analyze the the role of the University in the balancing dynamics between *the Innovation Triple Helix of university–industry–government and the Sustainability Triple Helix of university–public–government*

Keywords: Local development; Triple Helix; Sustainable Triple Helix; Triple Helix twins; Entrepreneurial University

1) Introduction

This article analyses the balance dynamics between the Triple Helix of innovation (University – Industry – Government) and the Triple Helix of sustainability (University – Public - Government) on a local development project carried out in a Brazilian rural area. It is a university extension project denominated PAAS (Projeto Alto Aiuruoca Sustentável) which was executed at the Itatiaia National Park within the APA which stands for (Environmental Protection Area) located in the Mantiqueira mountain range, in the municipality of Itamonte MG (Minas Gerais State) – Brazil. The main objectives of this project were: contribute towards the preservation of the environment and the creation of income generating alternatives for the local population. The Project was coached by NEICT (Center for Studies on Innovation, Knowledge and Labor), research team of the Production Engineering from Universidade Federal Fluminense (UFF)

PASS was carried out along 2004 and 2006. And it was sponsored (funded) by Petrobras's Environmental Program accomplishing each and every negotiated goal. Hence, under a result appraisal point of view, it can be considered as a successful program as far as a succesful Project when we compare the expected goals to those that were fully accomplished. However, the goal of this article is not results appraisal, but to reflect upon its making and implementation, identifying its trong highlights as well as its flaws while trying to buil up an articulation between the diferente logics of this double Triple Helix.

The bulk of this article starts off by briefly reviewing the concepts on which the analysis conducted is based upon. The first one is the Trple Helix twins concept (innovation and sustainability), proposed by Etzkowitz e Zhou (2006). A short conceptualization of what sustainability is supports the objectives description of this project, positioning and the forces exerted by the different Helix (University, Government, Industry and Public). It has also been necessary to refer back to University expansion project context in the realm of the Brazilian Educational Suystem in order to understand the objectives, conditions and restrictions from the Universuty to actuate on the project.

The article goes on introducing the research and methodology scope. The following sections show a summary of the PAAS Project, highlighting the context in which the local community lived, the project objectives, the institutions involved, the conditions posed by the financincing model as well as the action and results. Under the perspective of the Triple Helix Twins model some relevant facts of the project's history during the conception of solutions, mobilization and implementation are rescued. The assessment of the project has made us perceive the forces exerted by the diferente helix, some drawbacks and successful strategies utilized to align interests and to assure the attaining of the main goal: a contribution for a sustainable local (regional) development. In the findings section, the main carachteristics of the interaction between the Triple Helix of innovation and the Triple Helix of sustainability are identified in the analysed Project. In certain aspects of the project, the roles played by the actors (University, Enterprise, Public and Government) are perfectly aligned with the ideas posed by Etzkowitz e Zhou (2006), in others, we note the concern of enterprises towards environmental preservation as the local community is concerned with the balance amidst social, economical and environmental aspects in the short run. The role of the University is to be highlighted as a connecting and articulating mechanism to manage the different logics that are present in this Triple Helix Twins.

State of the art

Previous works dealing with Triple Helix and Regional/Local Development (ETZKOWITZ, H.; KLOFSTEN, 2005) focus at University as a Regional Innovation Organizer, based on their capacity to produce new technologies, articulate the spread of it and to produce wealth. Recently, the concept of Triple Helix Twins (ETZKOWITZ & ZHOU, 2006) adds a new dimension on the dynamics of Regional Development process where both logics, economic and sustainable development, are presented, and society and industry reaches equilibrium throughout dialogue.

In such enlarged model, the triple Helix twins, Triple Helix twins, "the university–industry–government Triple Helix works to promote innovation and economic growth, while the university–government–public one serves as a balance wheel to insure that innovation and growth take place in ways that will not be harmful to the environment and health" (ETZKOWITZ & ZHOU, 2006).

The evolutionary spiral generated by the this Triple Helix duce dynamics should be capable of contributing to the balance between interests that might seem conflicting, but must be articulated as complementary ones. The dynamics of this project can articulate market and society interests, innovation and preservation, long and short term, etc. Here we are dealing with a special type of Triple Helix twins. Here technologies are not new ones or even produce from knowledge generated by the university. All technologies involved in this process are well-known low-technologies. Here the sponsor of the project is a firm who is expecting that the project reaches results at the environmental domain. The welfare of the local community express their expectative in relation to the project, they want results that improve their conditions of life, at the social domain. Here therefore we have two logics working, the Environmental and the social one.

Therefore, the project treated in this article seeks sustainable development, a term that had been conceptualized in Brundtland Report that was elaborated by the The World Committee on Environment and Development and was issued in 1987, like "the development that meets the needs presented without jeopardizing future generations as to their capability to provide themselves with what they need". Although the term sustainability has been more frequently used to refer to environmental preservation, we intend to build up a systemic thinking process. Sustainable development is a balancing process amidst environmental, social and economic objectives.

In categories of projects similar to this analysed in this paper, that seek sustainable development, we may think that an inversion of the model Triple Helix twins is seen where sustainable Triple Helix is complemented by the innovative Triple Helix. If, in the innovative triple Helix, the University was seen as a Regional Innovation Organizer, in a Sustainable Triple Helix,

it is seen operating as a Sustainable Development Organizer, mobilizing technologies, social organizations and public authorities.

The performance of the University as a Regional Sustainable Development Organizer is very much alike its performance in an extension activity, as that conceptualized in the Brazilian University. The University Extension definition, as it is in the Brazilian National Extension Plan (1999) is “the educational, cultural and scientific process that articulates teaching and research in an unseparable way as it makes the shifting relationship between University and Society possible”. Under such perspective, scientific knowledge produced in the academic realm may be permeated by that of the common man, contributing for the making of a democratic University committed to promoting social shifts (LIMA 2003)

The role of the university here is to work out like a Sustainable Local Development Organizer, mobilizing technologies, social organizations and public authorities. Akin to the concept of Triple Helix Twins, we may say that we are dealing so with a special type of a Triple Helix, the Sustainable Triple Helix. The contribution of the University towards achieving a sustainable development lies on the exertion of its third mission apart from teaching and research: University extension.

The Triple Helix of sustainability reinforces, among others, the relationship between society and the university. In the Brazilian History, according to Lima (2003), as late as 1964, criticism towards Brazilian universities was about the lack of connection between the universities and the development of the country while some authors were for the engagement of university in projects for social and assistance welfare. During the First Forum of Brazilian “Public” (State owned) Universities held in 1987, university extension courses were defined. It is now seen not as a mere service, but as a possibility of establishing dialog between academic knowledge and objective reality. Under such perspective, scientific knowledge produced in Universities can be permeated by folk knowledge, contributing for the making of a democratic University commited to social shifts (LIMA 2003).

The university extension course concept, as in the Extension National Plan (1999) is “the educational, cultural and scientific process that articulates teacing and research in an inseparable way and it makes possible the transforming relationship between University and Society”. Correa (2003) suggests that extension concept must be complemented by four prospective guidelines, according to which, every extension action must be coached: (1) the impact social relationship – the interaction must promote changes, seeking the improvement in life quality; (2) bilaterality – based on knowledge exchange, favouring knowledge democratization and the effective participation of the community; (3) interdisciplinarity – the interaction of models, concepts, materials and methodologies being built upon the interaction and interrelation of institutions, professionals and people and (4) the indissociability teaching-research-extension – no extension action can be disconnected from the investigation process, generation and propagation of fresh knowledge.

The Project discussed in this article is carachterized indeed as a university extension project owing to its objectives that meet the impact social relationships, aiming to advances towards preserving the environment and generating sustainable income alternatives for local dwellers. Bilaterality and interdiscipinarity have been built during the conception and onset of the project. Many experts from different areas of knowledge were involved in this phase as partnership among several regional organisms was made: Iamonte’s City Hall, Dwellers Association, IBAMA (Brazilian Institute for the Environment and Renewable Resources) among others. The indissociability among teaching-research-extension is explicit in articles and dissertations as well as in several actions regarding knowledge transfering to a local community.

Research focus

This paper presents the most important results reached from the analysis of the dynamic of the project, considering it as a Sustainable Triple Helix, taking in account its drawbacks and strengths.

The goal is to understand the role of University as it contributes for the balancing of the the two Triple Helix (innovation and sustainability). On one hand the University raises issues regarding necessitites and interests of the local community and government, on the other, the University identifies technologies and financing sources so that the project can be feasible by seeking support from companies and governmental institutions. The University also accounted for articulating interests and resources during the making of the project.

Methodology

It was conducted a documents analysis comparing the results achieved, the results previewed in the approved project, and the initial project. Based on this documents analysis, interviews were conducted with the main actors involved in the process in order to assess their interests, their expectations and their strategies.

The Community of *Alto Aiuruoca*

The community Sustainable Alto Aiuruoca is made up of 5 rural borrougs in the municipality of Itamonte, MG. Namely: Vargem Grande, Serra Negra, Fragária, Capivara e Campo Redondo. Around 1200 people live there. The borough that has the largest number of dwellers is Campo Redondo. And the smallest one is VArgem Grande. There were two Dwellers Associations officially constituted when the project was launched (Serra Negra e Campo Redondo).

The community, then, discussed about issues such as social and economical development and environmental preservation.

On a socio-economic point of view, the community faces a change that holds some important dimensions: the resuction of soil productivity as a source of food and products for trade, electric power installed from 1980 up to the end of 1990's, new generations' shifting interests because of television and the outer urban world.

From the 1980's, and more intensely from the 1990's, tourist activities have grown in the region. Thus, buying and selling realstate gets more intense as well, and some long-time dwellers sell their properties while outsiders come and settle their families more intensively than ever before. In some cases, the families sold all their land and moved into faraway urban centers, and regreted that later.

The traditional life style based on farming the land as a means of survival had become more and more unsustainable on a socio-economic-environmental point of view.

On an environmental point of view, the community faces typical issues regarding populational growth and others that are apparently antagonistic. The populational growth brings about environmental impact caused by water pollution and garbage disposal. The existing conservational unities (National Park and Area of Environmental Protection) helps promote economic activities based on tourism and, on the other hand, requires restrictions as to using the land and its natural resources.

Regarding the environment it is important to highlight that the populational growth had been impacting the quality of the water, since basic sanitation had not been implemented in the region. So typical diseases related to water contamination were in expansion throughout the region, in particular, in the most populated borough, Campo Redondo.

The mission of the Brazilian Government in the region has assumed conflicting roles within the very scope of the Government. The City Hall whose mission is to foster social and economic development in the region, every now and then conflicted those of Environmental Organs that are to assure environmental preservation. As an example of this conflict, is the building of a road by the City Hall which would connect two borroughs (Serra Negra e Fragária). The conflict required the participation of the Judiciary Power to solve it. Despite the conflict, the

road (about 4 km) Allowed children from Serra Negra for the schools in Serra Negra could not provide education in all levels. The same road has made possible a greater economic integration between the two regionsas well as the creation of touristic product known in the region as Volta dos 80, that is a circuit (tour) of about 80 km where the tourists can travel on foot, horse, by bike or car, and get to know and enjoy the nature of the region.

Another very important dimension to be taken into consideration to understand the socio-political dynamics in the region is the land dimension. Some areas have been demarcated as National Park without the due reparation from the Government. In this case, a constitutional land conflict is generated. On one hand we have the Brazilian Government bearing constitutional powers to define areas of public interest (National Park) for environmental preservation purposes, and on the other the constitutional rights to own private property. The conflict happens because of a not comprehensive expropriation where the decree to create the Park is approved, but the land owners are never indemnified.

Thus, we can summarize the conditions of that community prior to the project, with the following elements:

1- The community starts having access to electric energy (between 1980 and 1999)
2- Land productivity decreases and old sources of income get thinner
3- Tourist flow grows significantly
4- Old dwellers sell their land and some can no longer live in the region.
5- New generations have social and economical interests other than those of their parents and grandparents
6- A conflict for land ownership makes many dwellers afraid of losing their land on behalf of the State
7- The National Park neighbor to the region is a source of resources because of tourist activity and a source of conflicts because of the use and ownership of land.
8- Population growth generates environmental impacts, mainly regarding garbage production and water contamination.

The Project's Context

Before the execution of the project, the community had already taken measures aiming to organize themselves and to seek resources to support their social, economical and environmental development. As an example, we can cite initiatives brought about by the Serra Negra and Campo Redondo Dwellers Association. Besides that the community had already been mobilized towards environmental issues as well as economic initiatives. We can point out the activities of Grupo Semente on Environmental education whose main target is the community as a whole, more specifically in the Campo Redondo Borrough. Another important initiative is the Association of Rural Producers of Campo Redondo and the Apirists' Association. As to private economic activity we highlight the activities carried out by Mandal Mel which sells honey and apiarian products. This company is of major importance for it stimulates honey production among local producers, once it bought all the honey produced in the region.

By analyzing the community's history, the University seeked to develop a set of plan of actions that would estimulate the already existing activities as an alternative for the weakening of the old local economy. Based on the carachteristics of the new activities of the local economy and its environmental challenges, the University considered the following objectives:

1. Improvements on the garbage collection in the region
2. Foster the development of environmental awareness of the dwellers
3. Building up of Serra Negra Dwellers and Friends Association head office
4. Capacitate dwellers on Organic Agriculture and other sustainable cultures
5. Develop Ecotourism and Rural Tourism in the region

While developing the project, however, the University was faced with financing drawbacks. Public Organisms had no interest or legal features to support such initiative.

Then, an opportunity for financing is provided by PETROBRAS.

PETROBRAS & Project Financing

PETROBRAS is a big oil company of mixed economy (open capital in Stock Markets whose major shareholder is the Brazilian Goveernment). For many years the company had been financing projects in several areas concerning the Environment, Culture and Social Development. From the beginning of the first decade of the XXI century, the company standardizes financing resource access processes adopting the Public Bidding system.

In 2003 PETROBRAS AMBIENTAL issues an edict whose main goal was to preserve water resources.

The University, with the Edict in hand, improves the previously developed project by adding new objectives to the original one in order to meet the requirements posed by the Edict. Thus, two more objectives are added:

1. Recovery of the vegetation around the water springs and water streams
2. Building up septic tanks in the dwellings of those who participated in the project

A new negotiation with the community is carried out, in particular with the one from Serra Negra – the community that was most commited to the project when it started off. It is decided that the territorial scope of the project should be expanded in order to comtemplate the neighboring borroughs of Vargem Grande, Campo Redondo and Capivara.

The University operates along with the Friends, Neighbors and Dwellers Association of Serra Negra, in order to regulate its fiscal and tributary situation which, prior to the Edict, had some problems owing to its demobilization. Having had its problems solved, the Association became eligible to the Edict.

The 2003 PETROBRAS AMBIENTAL Edict released 30 million reais (about 10 million Euros) in that edition. This Edict has been reapeating itself every two years with growing volume of resources.

The situation seems to be different from that considered by Etzkowitz & Zhou (2006) which places the Triple Helix Twin as a structure where the public and the University support the positions that allow a reduction of environmental impact. In this case, a Company – PETROBRAS, that owing to internal objectives and goals, finances sustainability and preservation projects on behalf of the public (community)

Hence, the University along with the Friends, Neighbors and Dwellers Association of Serra Negra de Itamonte, listening to other borroughs involved, develops and presents the project upon PETROBRAS AMBIENTAL 2003 Edict. The project is accepted and it is given the resources requested. It is worth mentioning that other 1600 projects were presented upon the same Edict. Another piece of relevant information is that one of the borroughs involved in this project was participating in another project carried out by another University that had its project submitted to the same Edict was not granted any financing.

The financing project contract was signed between PETROBRAS and the Friends, Neighbors and Dwellers Association of Serra Negra (AAVMSN). In this contract the University was entitled as the project's technical manager.

The Project and its Execution

Its important to highlight that, in spite of finacing a project that meets the demands of a community, the company sticks to its "entrepreneurial" logics, that is, the resources applied must bring results within the scheduled dimension and time. This logic is different from the self-organized and socially mobilized processes, where democratic debates can and must take more time than that for entrepreneurial financing. Thus, the perception that the project could mismatch the discussions held in the community was a risk that was present during the project's execution.

The role of the University, in this case, should be, and really was, that of seeking middle ground between the two time perspectives in order to apply the resources within proposed and planned schedules, minimizing conflicts within the community. The University had a technical role, responsible for the project's technical conveyance, yet opened for listening and absorbing, as far as possible, the community's claims and suggestions.

In order to have the project's approval, the University had to paly a lot of roles, without which, its approval would not be reached.

According to Mello, Ferraz & Hecksher (2010) some of these criteria and their respective action taken by the University in order to assure the accordance to the program norms are:

- Community participation (mobilization and protagonism of the community, giving legitimacy to the project) – NEICT arranged for the Communitary Association of Friends, Neighbors and Dwellers of Serra Negra (ACAVMSN) to be the proponent of the project and the Euclides da Cunha Foundation represented by NEICT/UFF to be in charge of coordinating the project;
- Articulation (disposition and cooperation capacity among entities through networks)– During the Project's conception interactions were made necessary in order to get commitments, materialized in letters written by several local organisms such as Itamonte's City Hall, IBAMA, EMATER MG to give support to the project;
- The proponent's institutional capacity (proven technical expertise of the team) – On the onset of the project, a multidisciplinary team was gathered (tourism, production, agricultural, chemical and civil engineering). The team was made up of professors, researchers and UFF's allumini. Cooperation agreements with SENAR (National Service for Rural Teaching) for holding courses and EMATER-MG (Technical Assistance Company and Rural Extension of Minas Gerais) due to its expertise on reforestation projects. During the execution of the project, we seeked interaction with EMBRAPA for guidance on optional domestic technology for septic tanks;
- Socio-environmental impact (measurable result, in qualitative and quantitative terms, of the changes established by the project) – In the project's framework the general objectives unfolded into the specific ones already mentioned.

During the execution of the project the techo-scientific dimension was once again necessary and fundamental for the necessary adjustments to execution reality.
This time, the soil conditions were different from what was expected in the making of the project. Permeability studies showed that the waste (sewer) treatment previously forecast would not be feasible. So the University carried out research in which it was identified a sanitation technology developed by EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA (EMBRAPA) that would suit the soil features as it helped improve rural productivity in the region.

Conclusion

University has played a central role all over the process. Gathering information on dwellers needs was the first activity. As a result of this it was possible developing an initial project using University's technical and financial resources.

With a project initial version in hands University found the sponsor in the PETROBRAS AMBIENTAL PROGRAM. A new version of the project was workout in order to adjust it to the PROGRAM criteria and goals, since the PROGRAM was focused on environmental preservation. This new version of the project was submitted to a Call for Proposals of the PROGRAM and has been selected among others 29 projects on a total of 1,600 applications.

The moderator role was perceived as being the main role of the University. Some situations can illustrate this. Producing seedlings was an issue negotiated when the community starts planning the reforesting activity. It was decided that the dwellers themselves would produce seedlings instead of other institutions, as initially planned. This was decided in order to allow dwellers to earn some money out of this activity.

Other important finding was the role of choosing adequate technology. The choosing of the septic tank technology illustrate quite well this. At first time in the initial project a more common septic tank technology was planned, after making soil tests this first one proved no being adequate for technical and economic reasons. So the University has searched for a better option and found it in EMBRAPA. This technology allows not only to treat the human feces but also to produce a good fertilizer for crops dwellers grow.

Notwithstanding, it was perceived that the project had brought about major advances for the community as a whole such as selective garbage system collect, the septic tanks themselves, training sessions on sustainable production techniques, knowledge on tourism practices, and most importantly, the project has encouraged the community to organize itself by participating more effectively in their civil associations.

By applying the extended model for the Triple Helix of innovation and sustainability on the project's assessment, it was possible to ratify the importance of the balancing dynamics among the different logics of the two helixes for a sustainable regional development. Nevertheless, in this project the sponsor company was mainly interested in the long term environmental preservation and the community was also motivated by short terms opportunity of earn money. The university had to adjust de expectations and find ways of attend both of them.

References

CORRÊA, E. J.(2003) Extensão universitária, política institucional e inclusão social. In: *Revista Brasileira de Extensão Universitária/Fórum de Pró-Reitores de Extensão das Universidades Públicas Brasileiras*. – Vol. 1, n. 1 (2003). p.12-15 - Rio de Janeiro : UFRJ : UNIRIO.

ETZKOWITZ, H.; KLOFSTEN, M. (2005)**.** The innovating Region: Towards a theory of knowledge based regional development**.** *Research Management* 35 (3): 243-255

ETZKOWITZ, H.; ZHOU, C. (2006) Triple Helix twins: innovation and sustainability, Science and Public Policy 33 (1): 77-83(7).

FERRAZ, F.T. ; D´IPOLITTO, C. ; MARTINS, A.R.P. ; COUTO, R.E. (2005) The Brazilian University as an Actor of Local Innovation and Development: University, Government, Private Sector and Local Community Cooperative Interactions in a Preservation Area. In: 5th Triple Helix Conference, Turin.

LIMA, J.F.(2003) Extensão universitária como diálogo entre o saber acadêmico e a realidade social; In *Revista Brasileira de Extensão Universitária/Fórum de Pró-Reitores de Extensão das Universidades Públicas Brasileiras*. – Vol. 1, n. 1 (2003). p.31-34 - Rio de Janeiro : UFRJ : UNIRIO.

MELLO, J.M.C.; FERRAZ, F.T. ; HECKSHER, S.D. (2010) Avaliação de um projeto de sustentabilidade sócio-ambiental: acertos e obstáculos na articulação entre as diferentes lógicas da comunidade, do governo, da universidade e da empresa financiadora. In: *UNIVERSIDAD 2010 - 7mo. CONGRESO INTERNACIONAL DE EDUCACIÓN SUPERIOR, 2010, Havana. 7mo. Congreso Internacional de Educación Superior Universidad 2010*.