



Sustainable innovation farm: A project built from stakeholders

Study case, Farm located in the Guavio Region

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Abstract

Working with communities implies interactions between the different stakeholders in a way that solutions to problems are created in a joint form. This makes turns system into complex system with multiple involved agents. For a proper integrations of agents involved in a particular problem, there are methodologies that help taking in to account all their opinions. The purpose of this paper is to show the importance of construct a solution to a problem with the stakeholders. For this, in this paper is analyzed a particular case in which the above was taken in to account.

The study case is based on a Farm located in the Guavio Region. This farm has $166400m^2$, although only $51000m^2$ are been exploited. Since its foundation, the farm has being a boarding school that today only receives boys with home problems (Enciso, 2005). Nevertheless, a new perspective wants to be given to the farm, by wanting to give a place where they can have tools for their personal and intellectual growth and also to be sustainable. The farm consumes a lot of water, which is expensive and not always available. In consequence, the farm residents' health is reduced. For this reason, the income obtained from farm activities wants to be increased and also for donation dependency reasons.

Considering the situation described above and the number of the stakeholders, the Interactive Planning methodology was used. According to Michael Jackson (Jackson, 2003), this is appropriate to solve situations in a pluralist complex system with various stakeholders. The Interactive Planning helps coordinating the stakeholders in a common goal to achieve an ideal future for the system and allows to establish the gaps between the current system and its ideal future, and the resources required to minimize them (Jackson, 2003). In this way, a porfolio of projects to achieve the desired objectives was proposed.

In the application the interactive planning methodology many meetings with the decision making agents were made, in them, each one of them gave their understanding of what the farm is today and what they expect it can become in the future, this helped the construction of a shared vision of the farm. In a similar way, involvement of the boys in the project was encouraged and their opinion about the farm, past and future projects were taken into account. On the other hand, plans were brought down to earth into tangible results through field visits and the information provided by the stakeholders.

Finally, it can be said that to solve problems involving many diverse stakeholders all interest of all of them should be considered in a participative way in order to achieve a systemic decision process. In this way, it is possible to obtain a favourable solution that all agents agree with. Systemic methodologies such as the interactive planning and others such as the Decision Theory was a tool that let us achieve the study goal. Results obtained from their application, considered mechanism to let the organization survive by adapting to the ongoing changes.

Keywords

Systemic, Methodology, Farm, Sustainable, Stakeholders, Innovation.



1. Introduction

Padre Lunas’s Farm actually has 166400m² of land, although only 51000 m² have been exploited. Since its beginnings, the farm has been a boarding school that today only receives boys with problems in there home (Enciso, 2005). Nevertheless, a new perspective wants to be given to the farm. To do this, stakeholders drafted a proposal for the farm. For this, all of them presented their points of view. Through this process, the stakeholders coincided that the most important goal was the involvement of the children living on the farm but also to ensure that the project would be self-sustainable. To achieve this, there are different stakeholders that are involved in the project. Below, in Figure 1, it is possible to see the stakeholders of the Farm and there particular interests.

Table 1. Stakeholders’ interests.

Stakeholders	Description
Siemens	Want to help Granja del Padre Luna as its corporate social responsibility.
Fundación Siemens	Want to ensure a food future to children living in the farm thought donations and through implementation of projects that contribute with the self-sustainability.
Facatativa Diocese	It is the Farm’s owner and wants children welfare.
Ingenieros sin Fronteras	Seek that university students participate in projects that involve vulnerable communities.
Farm’s psychologist	Seeks that children resolve their personal problems and be integral people.
Farm’s worker	Seeks increase Farm’s incomes with milk production.

2. Literature Review

The Interactive Planning was proposed by Rusell Ackoff. He said that to evaluate a particular situation, the people should change their way to think and considerate that are a part of everything, in which a lot of stakeholders interact. Having different interests, highlight the importance to emphasize in a future constructed since the actual situation, in which not only the problems are resolved, but also that the problems been dissolved (Jackson, 2003).

The Interactive planning is constituted by different phases that are described below:

Phase 1: Idealization: Formulating the Mess (Pachón, 2010).

In this phase is established the state of the organization studied. Also the set of opportunities, the nature of threats. This formulation needs different types of studies:

- i) Systems analysis: is described the situation of the organization and its environment.
- ii) Obstruction analysis: is determined the obstacles to organizational development. Exist two types of obstructions: discrepancies and conflicts. The discrepancies are the differences between the ones that the organization be and the thing that it think that it be. The conflicts are presenting when exist more of one interest and to achieve one prevent achieve the other one.
- iii) Projections and reference scenario: are extrapolations of the future of the organization, taking in to account the recent past behavior. It is propose scenarios to avoid this situation.

Phase 2: Ends Planning (Pachón, 2010).

In this phase, are specified the ends to be pursued. In this ways, is designing the desirable future. The purposes are of three types:

- i) Idealized design: are the purposes that are supposed like unattainable, but that is possible to walk to it.
- ii) The objectives: are purposes that want to achieve after planning period, but that are possible to advance in this period.
- iii) The goals: are the purposes that are achieved during the planning period.



Phase 3: Means planning (Pachón, 2010).

In this phase, are selected means that are going to use to achieve the purposes, this means, to achieve the desirable future, taking in to account that exist a reference scenery. The goals are:

- i) Acts: are actions that need few time.
- ii) Actions, procedures and processes: acts that are directed to produce the desirables result.
- iii) Practices: acts that are repeated frequently.
- iv) Projects: simultaneous and sequential actions' systems, directed to the desirable results.
- v) Programs: Projects systems directed to the desirables results.

Phase 4: Resource planning (Pachón, 2010).

For the resources planning is important evaluate the type of resources or inputs that the project need, how many resources are need and the available of these, and the way to finish the gaps. The resources are suppliers, workers, equipment and money.

Phase 5: Implementation design and control (Pachón, 2010).

This last phase is concerned with the execution of the decisions made in the other phases. In this phase is important to define the activity that each stakeholders is going a do, when and where.

3. Methodology

As above was mentioned, the Interactive Planning is constituted by different phases. Below it's described the way that each phase was developed in the Silvana Vargas and María Paula Flórez grade project (Vargas & Flórez, 2013).

Phase 1: Idealization: Formulating the Mess

In this phase was established the state of the organization studied. Also the set of opportunities, threats, the nature of these ones. This formulation needed different types of studies:

- i) System Analysis:
The farm works like a home for children in which it is promoted the study and facilitated the education in a school. The production and sale of milk is a unique activity that is developing Granja del Padre Luna and is providing income apart from donations. This activity represents 20% of their income. Joint with stakeholders was established that a new perspective wants to be given to the farm. To do this, stakeholders drafted a proposal for the farm. For this, all of them presented their points of view. Through this process, the stakeholders coincided that the most important goal was the involvement of the children living on the farm but also to ensure that the project would be self-sustainable. Every activity that its development in the farm, needed to pass before for the Siemens junta and for the Siemens foundation, whose are the ones that take the decisions. They have help from Ingenieros sin Fronteras Colombia, in which some of its members are professors and students of the Universidad de los Andes and the Corporación Universitaria Minuto de Dios. This group evaluates problems and propose solutions.
- ii) Obstruction analysis:
Taking in to account the things that were founded in the system, was made a comparison between the ones that the organization be and the thing that it think that it be. Below it is possible to see an analysis of the discrepancies proposed by Ackoff (Pachón, 2010).



Table 2. System discrepancies

DISCREPANCIES	DESCRIPTION
<p>About Organizational ends</p>	<p>Reality:</p> <ol style="list-style-type: none"> 1. Want to shelter children and young men with problematic homes and to give education in agricultural, academic, ethic topics. 2. Development projects that permit increase incomes and decrease Siemens donations. <p>Perception:</p> <ol style="list-style-type: none"> 1. Teaching to children about countryside activities to achieve that them could administrate one in the future. 2. Be a self-sustainable farm.
<p>About the means employed to pursue these ends</p>	<p>Reality:</p> <ol style="list-style-type: none"> 1. Children are enrolled in Domingo Savio School and farm has people with the capacity to proportionate integral formation to children and a psychological support. 2. Are development projects without the basic phases of a life project. This is reflected in the joint planning lack. <p>Perception:</p> <ol style="list-style-type: none"> 1. Equal to reality 2. Joint planning with the farm and the documentation are not necessary because haven't be exit process.
<p>About the resources available for such pursuits</p>	<p>Reality:</p> <ol style="list-style-type: none"> 1. Farm has the necessary resources to ensure children welfare. The resources becomes from donations and volunteering. 2. Farm has some of the resources to initiate the execution of some projects, however, these are note enough and for that reason it is necessary doing an initial inversion. <p>Perception:</p> <ol style="list-style-type: none"> 1. Equal to the reality 2. Although the farm has useful resources to initiate execution of some projects, anyone of the activities that actually are generating or are going to generate important incomes.
<p>The way pursuits are organized</p>	<p>Reality:</p> <ol style="list-style-type: none"> 1. The way of administrate the farm changes constantly. 2. The activities that are executing, normally are not in charge of a person with knowledge to direct projects to apply in the countryside and obtained a good performance. <p>Perception:</p> <ol style="list-style-type: none"> 1. It not considere as a problem, the constantly administration changes. 2. Everyone that propose a Project is going to carry out it.
<p>External stakeholders and other aspects of the environment</p>	<p>Reality:</p> <ol style="list-style-type: none"> 1. Children's farm interact in tree environments; in Domingo Savio School, in where they are relating with Guavio Region population; in the Farm, where they are relating with workers and volunteers; and in their homes, where they are related with their family and close friends. The Family Welfare intervenes. 2. Farm receives donations for the sustainable and to development projects that generate incomes. An organization calling Corpoguavio intervenes is some project involves the natural resources exploitation. <p>Perception:</p> <ol style="list-style-type: none"> 1. It is not so clear the way that the Family Welfare intervenes. 2. It is considering that Siemens Foundation is the only farm sponsor. It is thinking that it can exploit the water sources of the farm without necessity of transact a permission.



Ackoff also say that can exist conflicts between stakeholders interests because are different. Conflicts that are presenting in the organization can see in the table below.

Table 3. Conflicts in the system

CONFLICTOS	DESCRIPCIÓN
Conflicts within individuals individuals who are part of the organization	Can be detected that exist intern conflict between children because most of them have problems in their homes, they don't have a coherent education with the things that are taught in the farm.
Conflict between units at the same level of the organization	It is possible see that exist a conflict with children because not everyone have the same interests and not everyone want to know things about countryside.
Conflict between organization and external groups.	In occasions it is observed a conflict between Granja del Padre Luna of Guasca and the Family Welfare because the people think that the last one could change the way that farm Works.

iii) reference scenario and projections:

Granja Padre Luna's projections were made with the purpose to doing extrapolations of the organization actuation, since its recent past to its future, to evaluate implications of continue with the same model and project development that have follow last years. In Table 4 was development projection based in farm's resources.

Table 4. Referece scenario and projections

REFERENCE	PROJECTIONS
The farm did an investment in: <ul style="list-style-type: none"> • Arequipe pot • 12 milk cows • Channels that collate rain water • Deep well construction • Machine for pumping water. • Animal, fruits and vegetables for cultivation Only the 12 milk cows are using <ul style="list-style-type: none"> • Children are disinterest in projects related with countryside. 	<ul style="list-style-type: none"> • Wastage of resources. • Milk sale will represent the same and unique income. • Same spending in water. • Investment in new resources and projects that don't going to help with the Farm's self-sustainability neither the learning. • The disinterest in projects will continuous.

Phase 2: Ends Planning

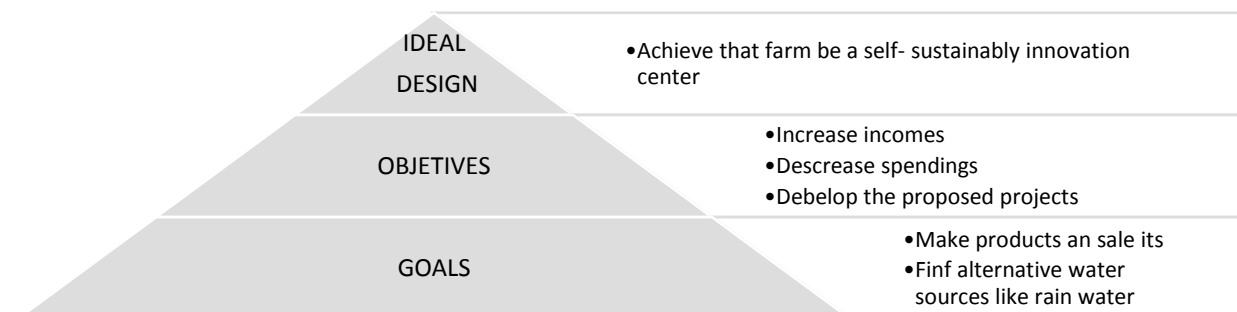


Figure 1. Ends Planning



Phase 3: Means planning

Comparing the ends planning with the reference scenario and projections, was founded some gaps:

- A. The ideal design is that Granja del Padre Luna be self-sustainably but the reference scenario shows that if nothing changes, is going to exist a lot of wastage of resources, Investment in new resources and projects that don't going to help with the Farm's self-sustainability, also milk sale will represent the same and unique income and the water spending will be the same.
- B. The ideal design also mention that Granja del Padre Luna be an innovation center but the reference scenario shows that if nothing changes, projects are not going to help with learning and children are going to continue with disinterest in projects related with countryside.

To close each above gaps, it is necessary achieve objectives and goals and for this it is important carry out acts, procedures or process, practices, projects and programs.

GAP A

Acts

- Take a sampling of Granja del Padre Luna's well water.
- Try the probe in the farm.
- Learn to cook arequipe and evaluate the utility of the plot that is in the farm
- Install a milking machine

Procedures

- Determine the product that is going to produce with the farm's milk.
- Take a sampling of Granja del Padre Luna's well to analyze its condition.
- Quote the filter system that is necessary to be potable water

Practices

- Daily cow milking
- Weekly arequipe production

GAP B

Acts

- Design workshops to involve children with projects

Procedures

- Development a wokshop in which children's farm learn how prepare the selected product.
- Development a workshop in which children living in the farm learn how works the probe designed to evaluate land properties.
- Development a workshop in which children living in the farm learn the importance of a filter and how it works.

Practices

- Documentation of process results
- Join planning
- Make workshops with children to explain the projects that are developing in the farm by Ingenieros sin Fronteras members.

Below are presenting the projects and the program that were proposed to close the two gaps:

Projects

Project 1: Treatment of water well and rainwater for its potabilization.

Project 2: Strengthening of milk production and arequipe production with this milk.



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Project 3: Innovation and investigation in agricultural production.

Programs

The program consist in the portfolio of the tree projects mentioned before to implemneted during a collage semester by Ingenieros sin Fronteras members. In this way achieve that Granja del Padre Luna will a self-sustainable center. This portfolio is divided in the educational part that consist in workshops and in the innovation part that consist in development of proposed grade projects of college students.

Phase 4: Resource planning

Necessary Resources for Strenghtening of milk production and arequipe production with this milk

Actually, Granja del Padre Luna has the arequipe pot and 12 cows that are milking dialy. To development the projects it is necessary buy arequipe inputs and a milking machine to increase production. For this it is necessary a financial support.

Necessary Resources for tratement of water well and rainwater for its potabilization

For this Project, it is necessary the investment in a rainwater .Like part of the system, its necessary installed a filter like the Siemens' SkyHydrant filter.

Necessary resources for Innovation and investigation in agricultural production

Actually a student and a teacher of electronic engineer from Universidad de los Andes are working in the probe construction.

Phase 5: Implementation design and control

For the continuity of the projects was proposed a leader in each one of the projects. It is important that each leader transmit the information between levels.

4. Principal Findings

Was proposed a projects portfolio that can carry ouy in the farm in one semester. Each Project is going to have parallel workshops in which children living in the farm have opportunity to learn more about them. In this way it is possible to achieve that farm will be an innovation center. Projects that were proposed are:

Project 1: Treatment of water well and rainwater for its potabilization.

Together with the children living on the farm, a team of students and teachers of environmental engineering (María Paula Flórez and Juan Pablo Rodríguez), worked on the design of a rainwater collection system. They saw that this system could attack the problem of aqueduct water spending and also the problem of water shortage. Actually, half of the water is consumed by the cows, this represents an average of 27 m^3 per a month. This has a significant influence in the farm's monthly spending because it represents approximately 330.000,00 pesos (170 dollars). For the design was used the Analytic Hierarchic process, which is a decision making methology, that uses a multicriteria model that allows the decomposition of a problem by hierarchy analysing qualitative and cuantitative aspects of the problem by obtaninig importance weights from the stakeholders (Castillo, 2008). This methodology help to conclude that the collector should be a surface tank and not an underground tank. Figure 2 shows the system that was designed (Flórez, 2014).



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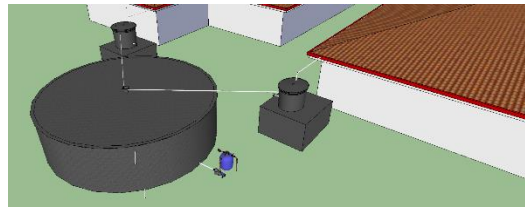


Figure 2. Proposal of the wastewater treatment system

This proposal was created after the evaluation of other options including, attaining portable water from the farm's water well. This option was discarded because the water in the well had a lot of contaminant elements that would need a hard and expensive treatment. For that reason and considering that the farm had some ceilings channels and that the Siemens Company agreed to provide the SkyHydrant filter, it was concluded that the rainwater collector was the best possibility (Vargas & Flórez, 2013)..

Project 2: Strengthening of milk production and arequipe production with this milk.

The production and sale of milk is a unique activity that is developing Granja del Padre Luna and is providing income apart from donations. This activity represents 20% of their income. Currently, there are ten cows, which produce 80 liters (21.13 gallons) daily. Milking cows is an activity that is performed two times during the day by the farm worker. The objective of this project is to sell a part of the milk, as they have been doing, and then to also use the other portion to make arequipe. The farm has some resources that haven't been used like an industrial pot for making arequipe that could be useful (Vargas & Flórez, 2013)..

Granja del Padre Luna already sells 7000 gallons of milk a year. The objective of this project, in addition to their milk sales, was to increase profit by also selling arequipe. To do this, part of the milk will still be sold as before but another portion will be used to make arequipe. Figure 3 shows the product that was proposed (Vargas & Flórez, 2013).



Figure 3. Proposal of arequipe

Project 3: Innovation and investigation in agricultural production.

Was proposed carry out an agricultural activity in the farm, taking in to account the properties if its land. For this it is necessary evaluate land properties to decide which activity is convenient. For this, Sebastian Arévalo designed a probe for the crop and land study. This project had the purpose of designing and constructing an economic, friendly and durably device that measures parameters like temperature, conductivity, moisture, and Ph. This project has also the purpose of providing this kind of technology to the little and middle farmers, involving at the same time, the children in the community, teaching them the importance of this kind of technology. Figure 4 shows the probe that was designed. (Arévalo, 2014).



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Figure 4. Probe for the crop and the land study

5. Discussion and Concluding Observations

Ingenieros sin Fronteras- Colombia is developing social innovation through workshops and projects in which all the points of view of the different stakeholders are important for the solution. A particular case is Granja del Padre Luna in which ISF has been implementing projects that involve the interests of every stakeholder.

Ingenieros sin Fronteras team wants that all of the young adults of the Guavio Region, that is considered a vulnerability zone, have the opportunity to be involved in these kinds of activities. This knowledge is going to allow the young adults in the Guavio region to have the ability to create new business ideas for the region, which will create development.

To solve problems that involve many diverse stakeholders the interests of all of them should be considered in a participative way in order to achieve a systemic decision process. In this way, it is possible to obtain a favorable solution that all agents agree with. Methodologies such as Interactive Planning give tools that let achieve the study goal. Its application permitted results that let the organization survive by adapting to the ongoing changes.

In the application of this methodology, many meetings with the decision-making agents were made. In them, each one of them gave their understanding of what the farm is today and what they expect it can become in the future, this helped in the construction of a shared vision for the farm. In a similar way, involvement of the boys in the project was encouraged and their opinion about the farm, past and future projects was taken into account.

Projects that were proposed for the Farm, not only permits the self-sustainability but also permit creation of innovation. The opportunity to participate in workshops discussed topics about engineering also permits that children living in the farm find their professional vocation. This means that the purpose is more that give to people some things that needed, because is important generate the capacity for use those in benefit of their goals and aspirations.

At this time the project has only worked with children at the farm but hopes to expand to work with young people in the region. The desire is that young people from the Guavio region will look at the farm as a place in which they can have fun and at the same time acquire knowledge. This knowledge is going to allow the young adults in the Guavio region to have the ability to create new business ideas for the region, which will create development. The idea is that this farm could be a replicative Innovation Center.



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