

Building Housing Projects Considering Environmental Issues

Support and technical assistance for self-construction projects

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Summary

This paper describes self help housing projects developed with an emphasis on environmental issues. The projects analysed were developed by the Housing Promotion Foundation during the past year. FUPROVI is an institution interested in supporting the poor and disadvantaged people of Costa Rica. By the case study of the previous projects, this paper aims to describe how the communities develop the projects. The people of the community are involved in the management, quality assurance, cost estimation, and time planning of the projects.

The community through the Environmental Committee, with FUPROVI's help plans the activities of the project, divided in four parts: urban reforestation, solid waste, water liquid and environmentally correct urbanisation and house.

The Foundation has implemented environmental policies, in three different levels: Construction process, Institutional operation, and design stage, such as minimising the soil moving volume, trying to maintain trees, finding good disposal water solutions, conformation green areas, reuse and recycle material, use reforestation spaces, used friendly material, reduce use of timber and metals and increasing natural light and insulation used. In addition FUPROVI have designed and developed training programmes, it has agreement with a University to fills the training needs in ecological knowledge, called THE SUSTAINABLE DEVELOPMENT SCHOOL

The housing community's projects have been aided through two sources of financing: Loan from FUPROVI for developing the project as a bridge credit, and bonus granted from the National Financial system for Housing (SFNV). Furthermore the foundation gives to the people loans and training to create microenterprises in environmental issues.

The community along with the Directing Board of the Housing Association manages the production stage with FUPROVI's helping and monitoring, and they build the project with supporting and technical assistance, by self-

construction process and mutual help methodology. They are able to develop these processes, since it has an organised and continue training program, assistance, quality system control and administrative monitoring, during the life cycle of the project.

The training process during the before and during the construction stage is very important to improve skills, knowledge, and abilities of the people, in order to obtain social development and high quality houses.

The first activity to improve the environment is creative and understands the Environmental Institutional Policies, and translates that to the community. Also the design stage is very important, because it can minimise the ecological damage and to make compensation measuring. Another important step is the purchasing process, because it could contribute to reduce the waste amount.

The community in the construction stage should take care to fulfil the developed design of the project, specially the environmental aspects; lest, it can produce negative impact are not expected.

In these projects for the community's private housing property management including operation are manage by the house owner himself, because they are the owner and the user of the possessions. The property management must include training for people in relation to using the infrastructure and houses, organisation maintenance process, cares of the works and good attitudes to improve the project every day.

Introduction

Aim of the paper

The Housing Promotion Foundation, called FUPROVI is a private development organisation, it has been working model based on assumption that lowest-income sectors can and should participate, organised way in the identification and solution of their housing, community and employment problems. For this purpose,

methodologies based on self-help and assisted self-help building through personal effort and mutual help.

This model seeks to mobilise resources at local level and potentialise the abilities of families being assisted. In addition, it seeks to break with the existing way of relating and attitudes that are passive, centralised and paternalistic, which have the full development of this kind of communities.

Housing building process can be successful, it achieves the goal, in three dimensions: Cost, Time and Quality, considering socials, technical and environmental issues, because those are involved as fundamental elements of the human settlements.

Beforehand, construction and building process cause damage in the environment, Nevertheless this paper intends to describe FUPROVI's experiences about self-building projects considering environmental aspects by minimising negative impacts and carrying out compensation measurement to improve the environment.

In addition this paper includes discussion on how to manage the building get process to achieve results in the quality, cost and time of the projects developed by the communities from an environmental point of view.

The Actors and the Project

The Client	Community Pro-Housing Association.
Financing	FUPROVI; National Financial System for Housing, could be also.
Supporting and Technical Asistancing.	FUPROVI through Housing Direction's team and Environmental Improvement Programme.
Builder	Community Pro-Housing Association's Families.
Development	Community Pro-Housing Association
Supervision	FUPROVI.
Control Bureau	Community Pro-Housing Association and FUPROVI.

Community Pro-Housing Association

The community is the owner of the project. The structures required for project development are supplied by the community, whose members get organised in to contribute their labour (30 hours per family per week), in order to plan, to manage and to carry out the whole socio-constructional process with the Foundation's support.

FUPROVI:

This NGO (Non Governmental Organisation) supports families with the financing through credits, the methodology of assited self-help construction, intervening, two areas of the foundation: Housing Direction, and Local Development and Environmental Direction.

The Housing Direction is responsible for giving to the community social management and technical assistance and supporting, until the project's team is appointed, which is made up of an engineer, a social co-ordinator, a technical instructor, and an administrative instructor. This may vary depending on the project's size.

The engineer is responsible for the construction's quality; the technical instructor is incharge of the supervision of the work, the social co-ordinator gives support about community organisation process to build the project, by mutual help methodology.

The Local Deviltment and Environmental Direction gives support to the Housing Direction's Team about environmental and training aspects, as urban reforestation, solid waste, water and liquid water, environmental correct urbanitations and house. In addition this direction is responsible to develop the training stage directly the families through the Training Centre of FUPROVI.

National Financial System for Housing (SFNV):

This is a public sector structure, whose objective is to mobilise financial resources to channel to low income's families towards housing project. A nuclear family is eligible for the family bonus if its monthly income does not exceed the equivalent of four minimum salaries (about US\$ 700) and if the family does not own house. These economics resources could be used for pay the debt from the FUPROVI's bridge credit awarded to the families.

Geographical, Economic, Cultural and Political Conditions



Costa Rica is located in Central America, It is situated in tropical area, between 8° and 11° north latitude, 83° and 86° west longitude; six hour west from the Greenwich parallel, the temperature varied between 18°C and 30°C, in summer and winter, from May until November almost rains every day.

The population is about 3.46 million of inhabitant, and the area covers 51.100 square kilometres, it is divided in seven provinces. In fact the density of population is 64 habitans per square kilometres.

The country has an irregular topography, and the central area is a valley rounded by mountains in which living 1.5 million of costarrican people lives. The third

part of the territory is an environmental protected area, with full rain forest.

Costa Rica has an acceptable level of education and health, which permits it to have good conditions for developing capability, knowledge, and skill.

The economy is small and open; it has traditionally exported both bananas and its world famous coffee. In the last decades the nation has also earned international recognition for non-traditional exports, such as textiles, pineapple, flowers, ornamental plants, vegetables and electronic microcomponents. The IBP per capita is around US\$ 2.666, and the average macroeconomics are the following:

Table 1: Economics and social statistics of Costa Rica

Item	Average Percentage
Inflation	14.0%
Poverty	20.0%
Labour productivity growing	4.0%
Devaluation	11.0%
Open Unemployment	5.5%
Life expectancy birth	77 years
Homes with drinking water	96%
Population covered by health services	96%
Ranking on the Human Development Index. (1995)	34 th in the World 3rd in Latin America

The culture of the country has involves peace. Since 50 years ago Costa Rica abolished its army, because it wanted to improve social aspects. One of the main values of the population is the family, as the base of society. By religion 90% of people are Catholics.

Political System is democracy. Since more than 100 years ago, its political structure is based on a three-power system in which the Executive, Legislative and Judicial Branches operate independently. In addition, the Supreme Electoral Tribunal regulates all matters related to public elections.

From an environmental point of view, it has a lot of natural resources, like rain forest and beautiful beaches, where you can find at least 5% biodiversity of all world. The total number of species is estimated around 505.700. Therefore caring the environmental system is important to improve the building and construction's systems.

Design Stage

Project Organisation

Beforehand, self-construction's model was defined in the initial contact with the community; FUPROVI and the Community Pro-Housing Association should have clear responsibilities. Chart # 1 and Chart # 2 show the structural organisation of the FUPROVI and the Community Association.

FUPROVI's responsibilities:

- To design the project, through participated process with the community.

- To plan the project through participated process with the community.
- To support the Client (community) in building, administrative, organisation, and environmental aspects.
- To be the client's adviser in building, administrative, organisation, and environmental aspects.
- To be responsible for the Quality of the project.
- To resource budget control.
- To Train community people in building, administrative, organisation, and environmental aspects.

Association's responsibilities:

- To build the project with the FUPROVI's supporting and technical assistance.
- Be responsible for control of the budget.
- Participated systems control of the families.
- To carry out the contract conditions.
- Administrate the project: Purchasing, tendering, treasuring, and materials control.
- To develop environmental Program.

The Directing Board is the head of the group, and it is responsible for carrying out project development, for that they need to have some leadership and organising abilities, which they don't usually have. Before hand FUPROVI knows that, and therefore it has prepared one program training, on three aspects: Leadership, organising and environmental. The stage has developed by the training centre of FUPROVI's training program.

About environmental issues, the directing board receives information and after that, they make an election of the environmental committee. The committee plans the activities through the project, divided in four parts: urban reforestation, solid waste, waters and waters liquid and environmentally correct urbanisation and house.

CHART # 1
Organisation of the Community Association

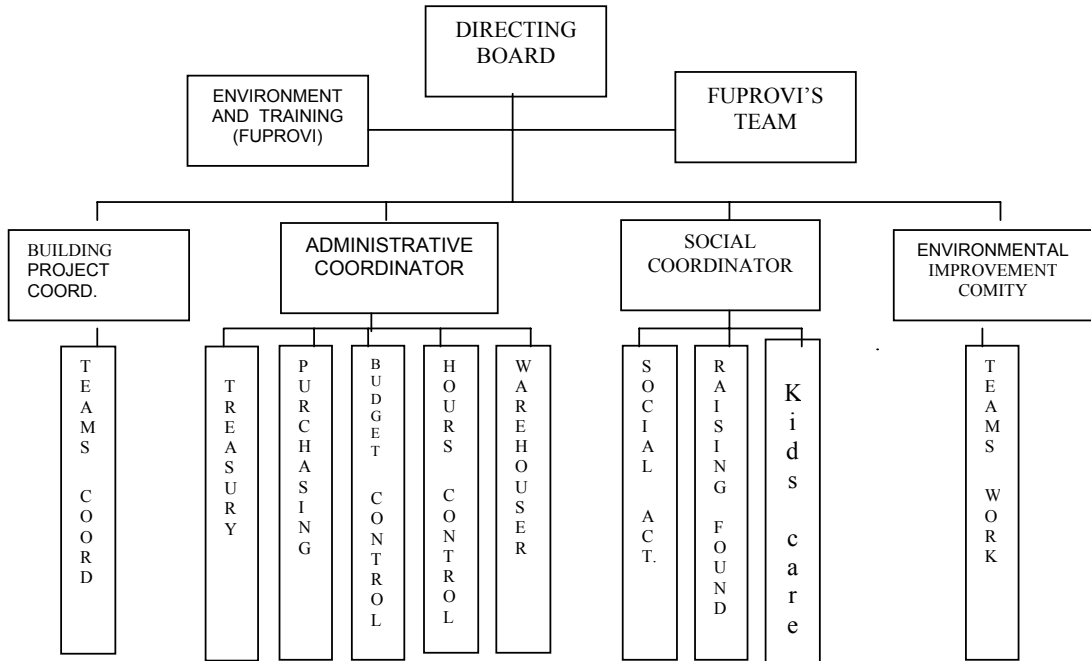
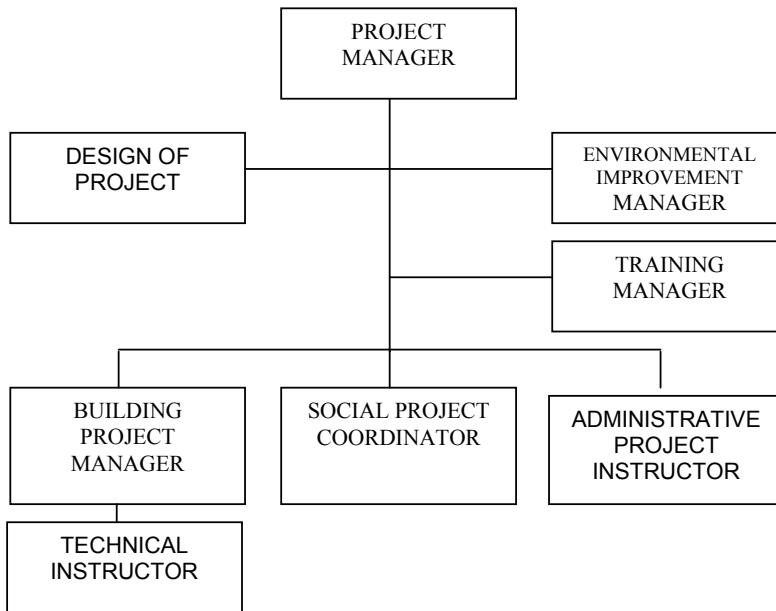


CHART # 2
Organisation of FUPROVI's Team to supporting and assisting the project



Purchasing – Procurement – Contracting.

After the initial contact between FUPROVI and the Association, they execute an agreement by a legal contract, which explains the responsibilities mainly in two parts. This Contract is signed and the same time to award finance to the group, and they give to FUPROVI their guarantee (mortgage). In addition both sign a contract-form applies for CFIA (Costarican Federated Engineers and Architects Association).

The Association with the technical assistance and support, and control of FUPROVI (through Administrative Instructor) carries out the Purchasing process. The group’s directing board choose one person within the community to do this job. This is trained by the Instructor of FUPROVI to get knowledge and abilities in this aspect.

The Association must fulfil the standard approach established by FUPROVI in this process: policies, procedures, budget and technical specifications.

About the policies, there are two different kinds, Purchasing policies and environmental policies. The first describes the general orientation, how the community must fulfil to do this activity. For example, all purchase need three offers before to buy the material, and if not it the treasurers task to buy all the materials. Furthermore FUPROVI has established environmental policies to orientation the friendly material used and how to do to reduce solid and liquid waste, and services use as water and electricity in the construction process.

The Budget is based in the plans and the technical specifications, which it has written for the Housing Direction previously.

The FUPROVI’s Design Office prepared the budget of the project, and the engineer and project manager reviewed this. And after that the directing board of the Association approves the detailed budget. This is integrated in a computer system with purchasing-orders, budget control and houseware control. This software was developed by FUPROVI to obtain one integral control system. Thus the group can buy materials included in the budget, at the same price or less.

The client (The Association) can apply his “purchasing power”, which means that the buyer can decide to buy or not one material, because it has a free market, and it can choose the supplier. In this case the client can ask the supplier to change the order: different sizes, different specifications, different packing, different prices, and different payback conditions.

In fact, if the community carry out the purchasing process successfully, it can save at least 20% of the material cost of the project compared with the market prices, thus they can reduce the project’s cost, and minimise the resources used.

Considering the FUPROVI’s policies and experiences, and lack environment friendly material, these are some import aspects to approach purchasing process:

Table # 2
Environmental Purchasing Aspects

Aspect	Effects
<ul style="list-style-type: none"> Use prefabricated housing systems (walls): 	<ul style="list-style-type: none"> Reduce solid wastes. Reduce labours. Reduce times. Improve the clean areas of the work. Reduce excavation volume
<ul style="list-style-type: none"> Minimise use of timber in the roof structural, using metal joint, instead of nails. 	<ul style="list-style-type: none"> Reduce 30% of timber volume.
<ul style="list-style-type: none"> Do not use asbestos sheet. 	<ul style="list-style-type: none"> Reduce the possibility to obtain cancer.
<ul style="list-style-type: none"> Do not Use Polysterene. 	<ul style="list-style-type: none"> Reduce damage of ozone cover.
<ul style="list-style-type: none"> Use whole roof sheet 	<ul style="list-style-type: none"> Reduce solids waste.
<ul style="list-style-type: none"> Use local material as where is possible. 	<ul style="list-style-type: none"> Reduce transportation and energy.
<ul style="list-style-type: none"> Reuse formwork 	<ul style="list-style-type: none"> Reduce timber volume.
<ul style="list-style-type: none"> Prefabricate the roof structure doors and windows. 	<ul style="list-style-type: none"> Reduce solid wastes. Reduce labours. Reduce times. Improve the clean of the work.
<ul style="list-style-type: none"> Use septic tank prefabricated. 	<ul style="list-style-type: none"> Reduce solid wastes. Reduce labours. Reduce times. Improve the clean of the work. Reduce excavation volume.

Source: Environmental Policies of FUPROVI

Project Planning

FUPROVI has an office for design and budget. It is integrated by one architect (as manager) two CAD’s drafters and engineering’s assistance. This office is incharge of the design and the budget of the projects.

The design process is based on a participated process, with the community’s participants; furthermore the manager of design office in co-ordination with the project’s engineer carry out three workshop to obtain the main idea of the project:

Table # 3
Steps of Participated Design

Workshop	Objective	Participants
First	<ul style="list-style-type: none"> • Explain why the design process is important. • Requirement of the design. • To know about the community wishes. 	General Assemble.
Second	<ul style="list-style-type: none"> • To get preliminary idea of the design. 	Community representative.
Third	Explain to the community the preliminary idea.	General Assemble.

Source: Design Unit of FUPROVI

After the three workshops, the design office develops the preliminary idea, and it is showed to the directing board of the group to approve that. The drawing process and model building have made in CAD and 3D systems.

Since FUPROVI has been interested in the environmental aspects, it has implemented environmental policies, in three different levels: Construction process, Institutional operation, and design process. Respect with last point the followings are the most important aspect:

- Minimise the soil moving volume.
- Trying to maintain trees as much as possible.
- Try to test for decides disposal water. Solution: septic tank, treatment plant, and recollection general system.

- Try to Conformate green areas.
- Reuse and recycling material.
- Use Home waters collection systems.
- Use urban reforestation space.
- Create vegetable gardens space.
- Used friendly material.
- Reduce use of timber and metals
- Increasing natural light and insulation used.

In addition to the policies, the foundation have designed and developed training programmes to improve the knowledge, skill and attitudes of the people, about legal aspects, maintenance, sustainable development, social aspects credit aspects, and saving and payments.

Concernig to environmental issues it has a joint agreement with a University, called UNED (“Universidad Estatal a Distancia”), and both created The Sustainable Development School, to fills the training needs in ecological knowledge. This University provides technical assistance for groups and people in the communities. It has become a personalised training and technical assistance, and trains persons working in sustainable development activities in communities.

The Sustainable Development School was born in 1995, and until now has have an important achievements: Creates unity for the participating communities, it has strengthened the social work in FUPROVI, excellent assistance to lessons, community motivation, formation of leaders, and income generation. It has integrated children in a program called green patrols (“Patrullas Verdes”) developed in the communities and their elementary schools.

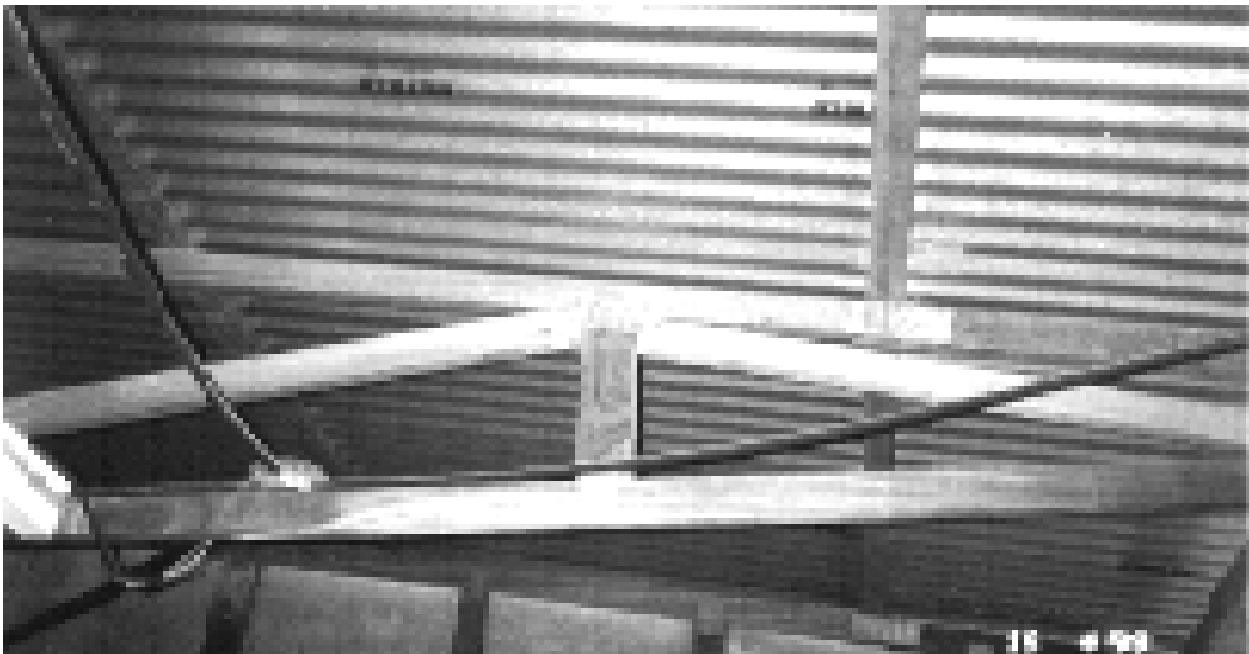


Figure # 1, Whole roof sheet and roof structural.

The Planning process is carried out by teamwork between the FUPROVI's Team, the manager of the design and budget's office, and the directing board of the Association. They prepare a diagnostic and the planning process and present it to the Directors's Committee of FUPROVI, who will approve the project start.

FUPROVI's Responsibilities in the design process:

- To design the project, through participated process with the community.
- To draw the plans.
- To get permissions from authorities.
- To prepare the budget

Project Financing

The housing community's projects have been aided by FUPROVI through two sources of financing:

- Loan From FUPROVI:

This is a credit award given by the foundation for developing the project function as a bridge loan, because it is given to the community, while each family get from SFNV (National Financial System for Housing) the bonus (subsidy granted). These are a mechanism used for paying back the loan awarded. If the family couldn't award the subsidy, it will pay back the loan by monthly payment until 15 years.

- SFNV Bonus granted.

It is a subsidy award by the government but some time the money may have arrived before the project is finished, and it could be used as financing resources in the building process.

Furthermore, FUPROVI gives to the people loans and training to create microenterprises in environmental issues, as instrument for development the activities in these aspects, through the Programme of Support to the Popular Production Sector. Thus it achieve fulfil at the same time: to improve the environment and increase the income of the people. In addition people obtain more knowledge, better abilities and skills.

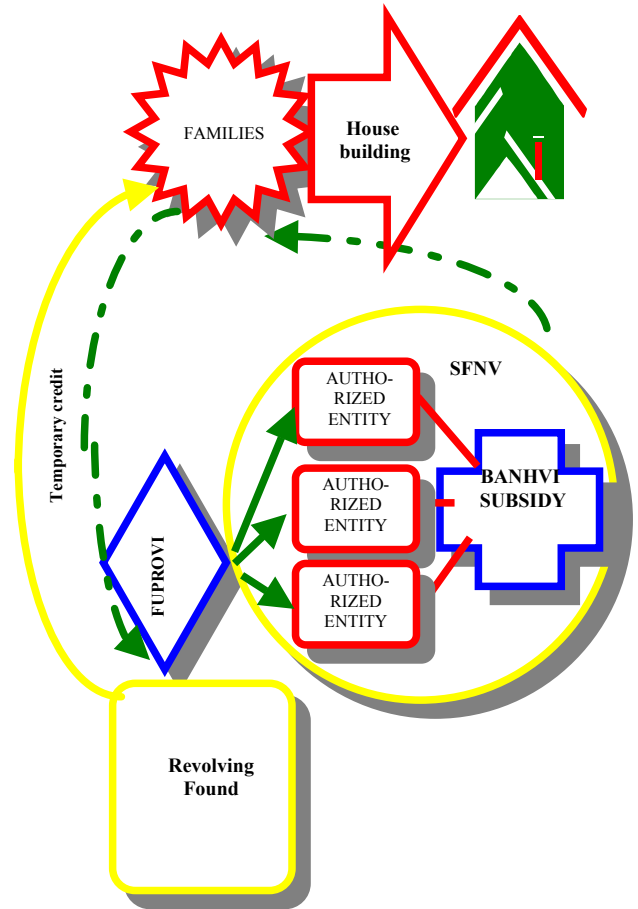
The Chart # 3 shows the FUPROVI's financial system in combination with the National Financing System for Housing (SFNV).

Budget and Budget Control

The budget of the project depends of the amount of the loan. The office of the design and budget makes a budget based in reference data current system, with market prices obtained from possible supplies. This draft budget is reviewed by the engineer and project manager and after that, they present it to the housing Director for obtain approval. In addition later the Association's directing board reviews and approves it.

The budget is made and included in a computer system called community management system. It has four integrated areas: Budget - material control - cost control - and provision.

Chart # 3
FUPROVI's Financial System



The community does the control process by the following system: Control commission (committee), storage (material control), provision commission and treasurer are encharge of controlling the rational use and management of materials and financial resources.

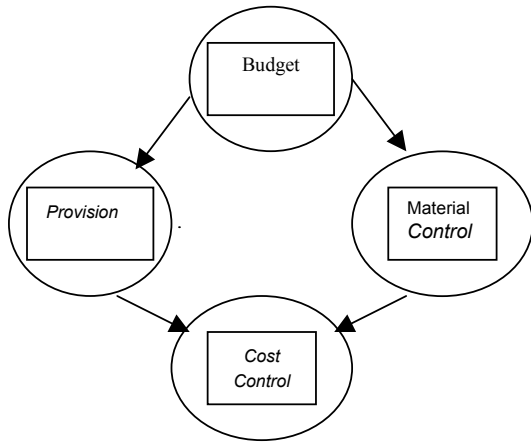
In this stage FUPROVI through administrave instructor carry out the monitoring function, both helping with the control computer system. See chart # 4.

Information Technology

The planning process in the Foundation is assisted by four-computer system:

System	Used for
CAD	For Drawing and calculation of the project.
3D	To Show and image the project design.
Integral administrative system	Controlling the budget used of material, and cost.
Microsoft project.	Time scheduling and project planing.

Chart # 4
Integral Administrative Computer System of
FUPROVI



Experiences to Use in Future

After learning some issues about International Construction Management, these are practical ideas to do in future:

- Selecting materials systems and design, which have low embodied energy: for example using concrete tiles as roof material.
- Increasing use of secondary species of timber.
- Using actual data to cost estimating in early stages.
- Creating institutional design committee to integrated all the parts engage in the planning process to improve the analysis of the designs.

Conclusions:

- The First activity to improve the environment is creative and understand the environmental institutional policies, and translate that to the community through training program.
- The design stage is very important to improve environment, because it can minimise the ecological damage and to make compensation measuring.
- Another important step to improve environment is the purchasing process, because it can contribute to reduce the waste amount
- The community is able to manage the project, if it has an organised and systematic training program, and technical assistance, during the building process.
- The information technology and computer programmes are useful instruments to achieve a good management of the project. It can aid the community to be responsible at this stage, and is also a very good tool to monitor the process.

Production Stage

Tendering and contract

The community through the Directing Board manages the production stage with FUPROVI's helping and monitoring. The community people provide the labour, and they must buy materials and hire the equipment and special services needed.

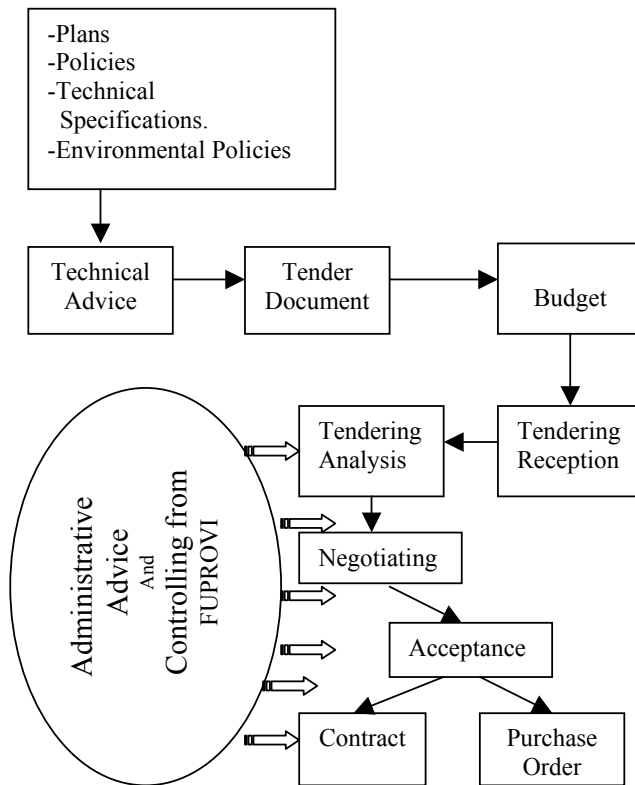
The materials needed had been established in the budget, technical specification and the plans of the project, this job is assigned to the Administrative Co-ordinator of the Association, who is named by Directing Board.

The tendering system is based in the following aspects:

- To buy materials and hire services, before that, the responsible (Administrative Co-ordinator), must ask at least three tender to the supplier.
- To looking for better prices and good professional services.
- To prepare contract for the bigger services and equipment, as soil moving, electrical general system, topography, and others especial works, elaborated by the legal department of FUPROVI.
- To pay for material of services that are done as they are established in the tender and the contract.
- The prices of the material and contract are fixed in the budget; the computer system is designed to avoid buy price more expensive (called barrier of price).
- Also there are quality barriers, established by the technical specifications.
- In the case of the prefabricated walls, which is most expensive material of the houses, that decision must be made in General Assemble, because this is an important decision for the people, and should not be made only by the Directing Board of the housing association.

Chart # 5 shows a brief summary of the tendering and contracting process in the self-building projects.

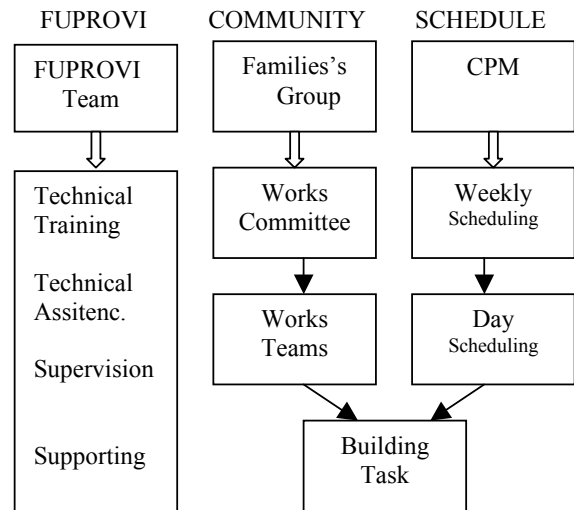
Chart # 5
Tendering and Contract Process



- Organising work teams for self-building and mutual help efforts.

The chart # 6 try to explain the construction planing system used in the self-building projects, involving the community and FUPROVI together to obtain a common achievement.

Chart # 6
Planing system in the self-building projects.



In parallel form to the usual building process, also the community trough the environmental committee is also carrying out the establishment the design and planing process, for the following:

- Tree Planting
- Vegetable gardens
- Parks and recreational spaces
- Recollecting trash visible, every week or monthly.
- Treatment of organic waste, by compost system.
- Recycling activities.
- Reuse and consumption education.
- Education campaign

The scheduling process is made and controlled by a computer program called Microsoft project, which is used to obtain information in making the weekly report. It is presented to the Directing Board and analysed with FUPROVI's Team.

Production planing

In self-building projects, FUPROVI's Team and the Work Committee, which is integrated by one member of the Directing Board, the general co-ordinator and the sector co-ordinators, develop production planning.

Responsibilities of FUPROVI in the production planning stage:

- Planing the production stage together with the Community.
- Giving to the people technical training, about the building activities.
- Supervising the materials and the quality of the work.
- Advising to the Works Committee about the Organising mutual help assistance efforts.
- Giving to the Works Committee and the people, about the environmental care in the building process.
- Carrying out the quality daily report (called "bitacora")

Responsibilities of Works Committee in the production planning stage:

- Supervising and insuring completion of the scheduling building.
- Co-ordinating human resources (form the community) in building labours.

Quality assurance

This aspect can be analysed from three points of the view: supporting, technical assistance and training gives to the client (community) by FUPROVI, quality of the construction process and environmental improvement.

Respect to FUPROVI's quality services, this is oriented by the ISO 9000 standard. Since 1998 (last year) the institution has started the implementation of that international system. The foundation makes integral evaluations every four months and monitors the quality services given to the people every month.

The quality of the construction process is made in site. This is supported by the standard form developed by FUPROVI, for carry out this activity, in following order:

- One self-quality assurance.
- Sector co-ordinator insures that the sector
- General co-ordinator insures that the group completes works assigned to the sector and monitors the quality of these activities.
- FUPROVI's Technical Instructor controls quality of the materials, and work.
- Project's Engineer control quality of the general project, with base in the Technical specifications. This FUPROVI's employee is the civil responsible of the housing project.

Concerning environmental quality control, this is carried out by the Local Development and Environment Direction of the Institution, specifically by the Environment Improvement Programme according to institutional policies (mentioned in this paper), which makes evaluation of the main planed aspects in the project. This supervision activity has developed each four months.

After the supervision the every Project Managers together with the Directors analyse the results and seek advice for the future.

Economic Control – Budget review and reconciliation

The economic and budget controls are done by the integrated computer system. In order to receive the loan, the Association has to open a bank account. Once this operation is made the Administrative Co-ordinator requests FUPROVI, through a letter the deposit of the

amount of money needed in order to pay the receipts of the suppliers and work services done through the previous week. The amount is accounted on FUPROVI's CONTROL (This activity is carries out by the Administrative Instructor and after the by the Accounting Department). After this information is presented the Directing Board, who shows the control budget information to the families by monthly report, in the General Assembly meeting.

In addition the community receives a monthly budget report from FUPROVI to check the accounting of both parties. If they find differences in the report from FUPROVI, they ask a meeting with the Credit Department of the foundation, and check the amounts.

Experiences to use in future project

The following aspects are some ideas to implement in the construction process:

- ISO 1082 about Project Management: The institution has experience in ISO 9000 standard. In fact since 1998 has been working in this quality systems, but it can complement that, starting a new process to obtain good quality in the project management process follow the standard ISO 1082.
- In addition the Foundation can use the standard ISO 14000 (about environmental aspect) and develop environmental action system (EAS), to find better result in this area.
- The time chainage chart system (showed in ICM course) can be used as a time control system. And it may be easier to understand by the community's people.



Figure # 2, Prefabricated House in Lagos de Lindora's Project

Conclusions

- The community in the construction stage should take care to fulfil the developed design of the project, specially the environmental aspects; lest, it can produce negative impacts that are not expected.
- Quality management is an important aspect of the project to be considered as a means of increasing effectiveness and enhancing competitive advantage of the Organisation.
- The Quality supervision is not enough to get high quality construction products, it is necessary to view this aspect since the before the beginning, during the building process and after that.
- The community is able to manage the project, if it has an organised and continue training program, technical assistance, quality system control and administrative monitoring, during the building process.
- The training process during the before and during the construction stage is very important to improve skill of the people and the knowledge level, in order to obtain high quality houses.

Property Management

Situation of housing tenancy

Table # 4: Housing tenancy in Costa Rica

Type and Area	Amount
Total of housing	711,527
Urban Area	330,833
In Settlements	4,805
Owners, totally payment	171,181
Owners, monthly payment	72,209
Rents	68,573
Others	14,065
Rural Area	380,694
In settlements	4,025
Owners, totally payment	239,190
Owners, monthly payment	56,304
Rents	32,211
Others	48,964

Source: Estado de la Nacion 1997

Life cycle economy

Before development of the project there are various ways of living by the people:

1. People live in a settlements:
 - 1.1 Government land.
 - 1.2 Private land.
 - 1.3 Own Land
2. People have an own land and they are living in other places different that.
 - 2.1 Government land, with authorities agreement.
 - 2.2 Private land.

3. People do not have land, and they must start the project buying it.

Whichever way, the community's objective is to own an individual piece of land and the house; to achieve this objective they have two possible situations:

- Individual tenancy: each family will be individual owner and responsible of the house and piece of land.
- Condominium tenancy: the project is developed as condominium property. In this cases each family acquires the ownership title in the unit together with an undivided tenancy in the common interest with the other unit owners in the common areas.

Whichever way, the most important requirement to obtain the tenancy is the registration in catastro registry, and after that, the registration in the National Property registry.

The concept of the self-construction project is to carry out at least the basic activities of the urbanisation and the house, with the available economics resources included in the budget of the project. The context of the poor people usually is the same; the financial resources are not enough to completely finish the project. Thus, the detail task of the house will be completed by step called progressive construction.

The FUPROVI's objective is done by supporting, assisting and training community process the improving their abilities, knowledge and skills; and, thus, people can improve the house sustainability, finding better results about the property management.

The Foundation has been training the people in all aspects such as maintenance, saving and payments process, horizontal property (condominus), and legal aspects. These courses are executed through the Training Centre (Local and Environmental Direction), and the Legal Assistance of the Housing Direction.

Maintenance Planning

In the FUPROVI's projects for the community's private housing property management including operation are managed by the house owner himself, because they are the owner and the user of the property. This process is executed completely by the families, in the individual tenancy each one alone, and in the condominium the community together, conducted by the directing board of the Housing Association, because the foundation's process finish when the people completed the basics activities and finish the training process about maintenance.

Concerning the maintenance training, Table 5 shows the topics included.

Table # 5
Maintenance Training Issues

Theme	Participants
Solid waste	All the Community
Water and liquid water	All the Community
Septic Tank	All the Community
Disposal Treatment plants	Water Committee
Sewer systems (housing)	All the Community
Roof sheets	All the Community
Generals pipes	Water Committee
Green areas	Environmental Committee.
Rains	All the Community

Source: Training Centre of FUPROVI

Connection to the design stage – feed back

FUPROVI have not had a formal feedback and connection to the design stage, nevertheless it has gotten important information about the life of the project after the construction process, during the payment period.

The foundation has done different kind of studies: social impact, quality of the services supplied, quality of the construction process, efficiency of the community organisations, and others studies made by FUPROVI, and other consultant companies. This information has been incorporate in the methodology of the institution, through reengineering and improvement process, developed during the last ten years.

With the implantation of ISO 9001 process, FUPROVI has been obtaining very good information from the clients about the life cycle of project, because the systems has for its requirement, monthly opinions research.

Experiences to use in the future projects

- Use technical analysis to calculate life cycle cost of the project, to obtain the dates for the future payment capacity of the people.
- During the payment process, FUPROVI can get information about the cycle cost of the project, especially, the details and maintenance cost. It is important to consider these in the future estimations.
- Use a formal system to feed back the design stage with the information from the ISO 9001 process. The Design Committee, proposed in this paper carries it out.

Conclusions

The life cycle economy is a significant aspect to know the real cost of the project, and to study the real payment possibilities of the people after the construction process.

Feed back is very important in property management as this the only way designers can confirm whether designs were a success or not. It is also meant for improving things in subsequent projects.

The property management must include training for people in relation to using the infrastructure and houses, organisation maintenance process, cares of the work and good attitudes to improve the project every day.

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