

CONCEPT OF PROJECT: LEARNING LESSONS

Francisco Javier Morales Martín

Fundación General de la Universidad Politécnica de Madrid

Ignacio Trueba

Universidad Politécnica de Madrid

Abstract:

The concept of Project encompasses a semantic disparity that involves all areas of professional and non-professional activity. In the engineering projects domain, and starting by the etymological roots of the terms, a review of the definitions given by different authors and their relation with sociological trends of the last decades is carried out. The engineering projects began as a tool for the development of technological ideas and have been improved with legal, economic and management parameters and recently with environmental aspects. However, the engineering projects involve people, groups, agents, organizations, companies and institutions. Nowadays, the social implications of projects are taken into consideration but the technology for social integration is not consolidated. This communication provides a new framework based on the experience for the development of engineering projects in the context of "human development", placing people in the center of the project.

Keywords: *Project; Human development; Engineering project.*

1. Introduction

"Alea iacta est" (the die is cast) is the well-known sentence pronounced by Julio Cesar when he was about to cross the Rubicon river and to start a long civil war against Pompeyo. We could wonder which was his plan? That is, pro-iacta, from latin "pro" (forward) and the verb "iacere" (throw). The answer would be the project. The prefix "pro" and the verb "iacere" are the etymological roots of the words project, projectile, projector, etc.

The concept of Project encompasses a semantic disparity that involves all areas of professional and non-professional activity: project of law, project of life, company management projects, project of engineering, etc. In general the use of the word project is linked to the mental abstraction of the needed plan to implement a concrete action.

In this paper, the conceptual framework of Engineering Project and its evolution since the end of the Second World War until present are analyzed. Professors Cleland and King in their book "System Analysis and Project Management" define project as the combination of human resources and materials, temporary joined in an organization to achieve a particular purpose. In this sense, the project involves many disciplines, other than technological, including economic development, social policy, environment, etc. At the same time, the project involves people, companies, institutions, governments and public administrations. It modifies their life. It can modify their work and, sometimes, even their habits. It affects to users and costumers of the goods and services it generates. To sum up, it could be said that the project is designed, executed and developed for and by persons, adding knowledge, experience, capacities, social learning, human capital, innovation and consequently the project consolidates and strengthens human development.

2. Conceptual framework of project: The morphology of the project

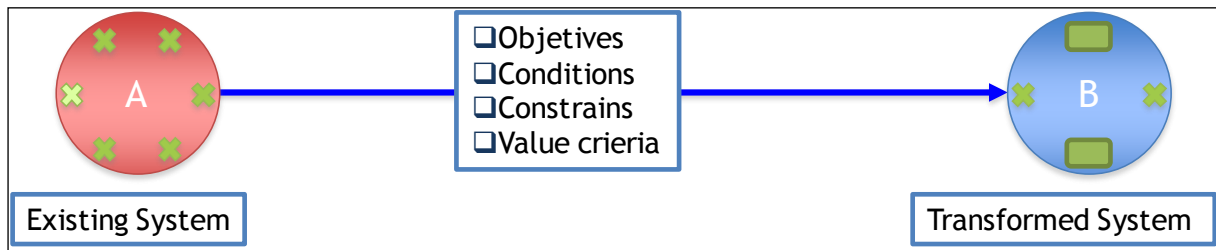
2.1. The project outline

It could be said that the project is the established plan to transform reality. It spends a set of existing resources to create a source from which a flow of goods and services is obtained.

From this point of view, the idea of the project emerges to face the challenge of satisfying particular needs felt by a group of people in a given place and moment. Consequently, such reality can be

described as problematic, given its inability to produce needed goods and services, and must be overcome by the Project.

Figure 1: Reality transformation

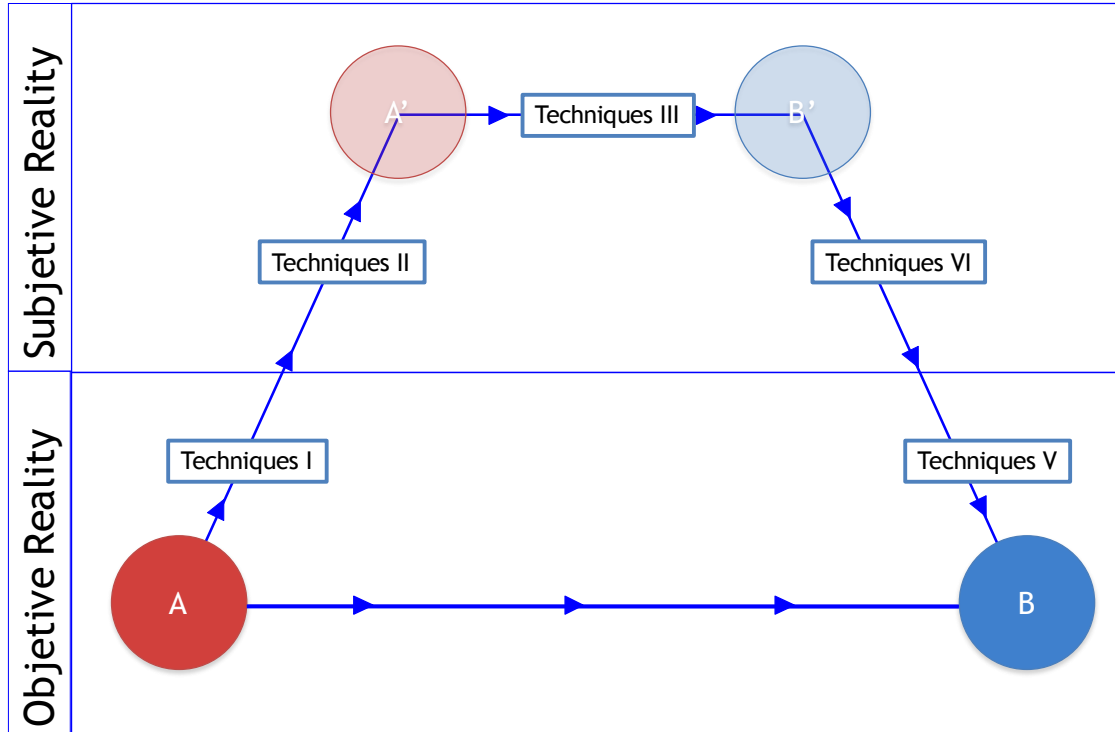


Every project implies the passage from a current existing situation – situation “without” Project – situation A, towards a new transformed reality – situation “with” Project – situation B, in which the limitation will have been overcome with regard to the demands that were present in the starting situation. Figure 1.

The identification of the idea is the starting point and triggers the whole rich and complex process of study, creation, design, elaboration, resources assignment, evaluation, implementation and exploitation that every project involves. But for a correct identification, it is not enough the mere sense of lack of the person, group of persons or entity that detects such lack. The existence of a positive will to overcome it, is essential and has to be materialized in a decision in which the specific objectives that are intended to achieve with the project, as well as the limitations and value criteria of the promoters that have to be taken into account in the decision making process, both technical and economical, must be identified.

The passage from the situation A – “without project” – to the B – “with” project does not happen in a casual way but, on the contrary, requires a complex process of definition and a formal proposal of the future situation, where every forecasted demands are reflected allowing to issue an opinion regarding the advisability of its implementation (Figure 2).

Figure 2: Project conceptual outline

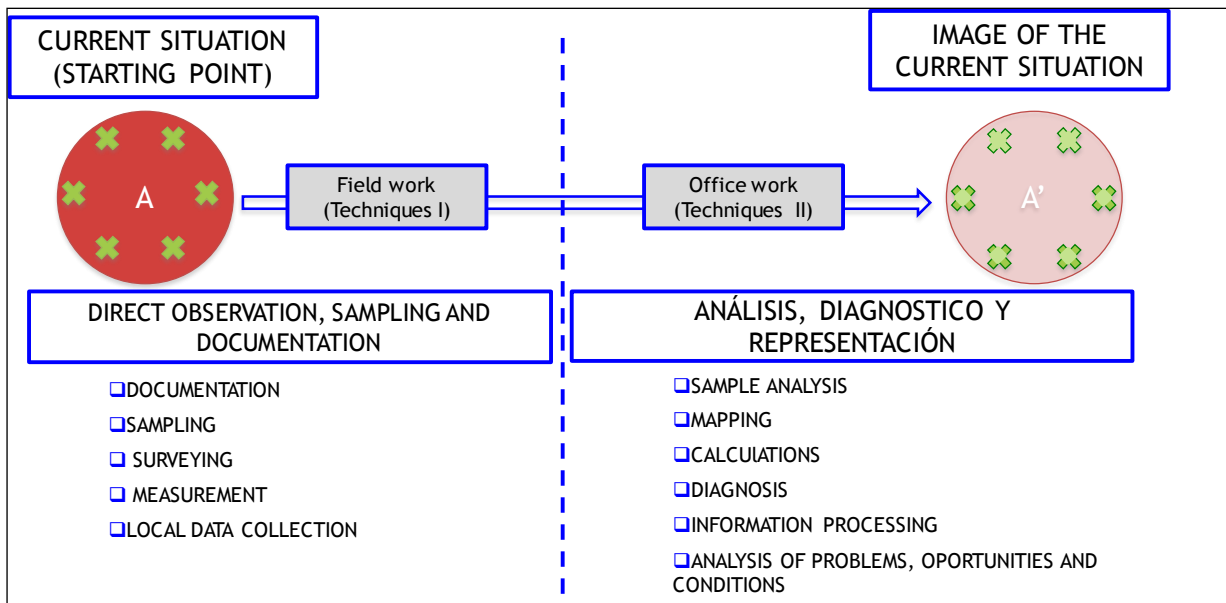


The first stage is the knowledge, understanding and analysis of the current situation, and the background that have conditioned it. A documentary and legal review and an inventory of the resources needed to its realization are an essential requirement.

At the end of the first step it is possible to document the A situation obtaining an image A' that defines and explains in black over white the A situation. From a methodological point of view, this stage includes

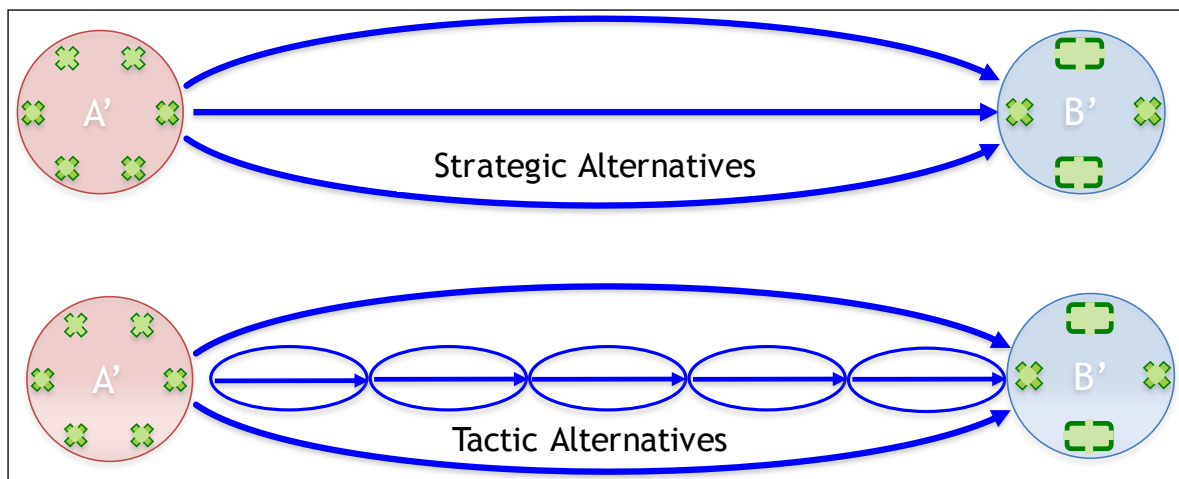
two different steps: the first step or fieldwork (techniques I) consists in a direct observation of the current reality, collection of data and previous documentation; the second step or office work (techniques II) consists in the study an analysis of the background and the information obtained in the first step (Figure 3).

Figure 3: Analysis of the current situation



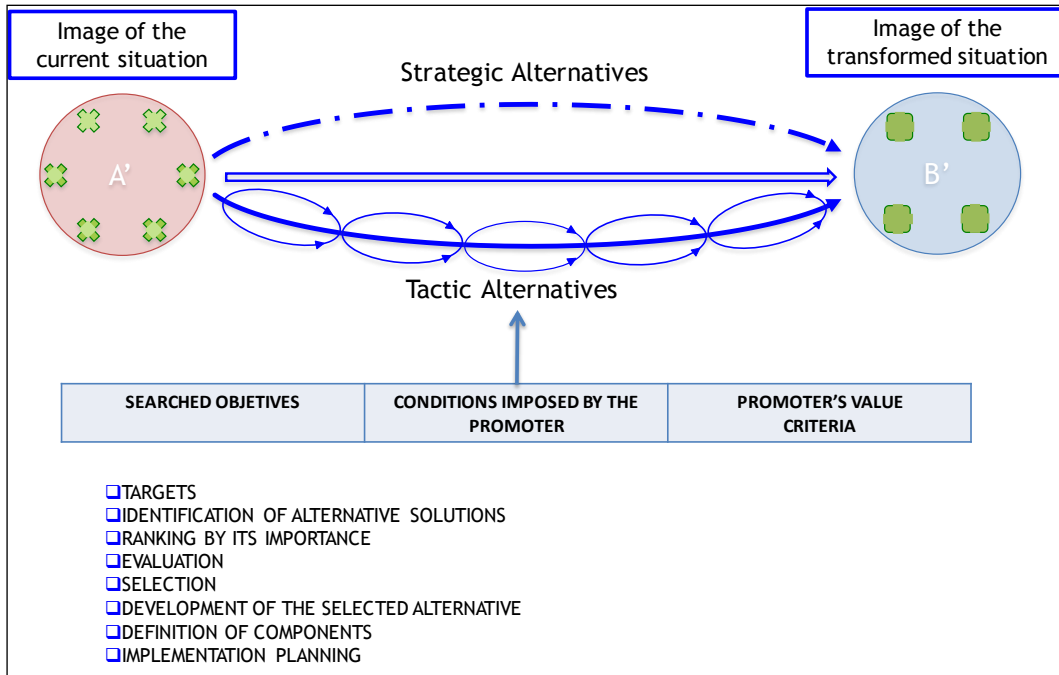
The second stage is a stage of synthesis and concludes with the documentary definition of the new reality B' generated in the light of: the objectives, limitations of the environment, conditions of the promoters, and value criteria that have to be taken into account. In this creative stage it is essential the approach to different alternatives because it is not about solving a mathematical problem with an unique solution but deciding which is the best alternative among different options generated by means of a multi-criteria evaluation process. The approach of generating alternatives implies previous identification, classification as strategic or merely tactical, evaluation, selection of most appropriate and development of the selected ones. The process requires a continuous decision making with regard to lower ranked alternatives that are called tactic alternatives (Figure 4).

Figure 4: Multi-criteria Evaluation



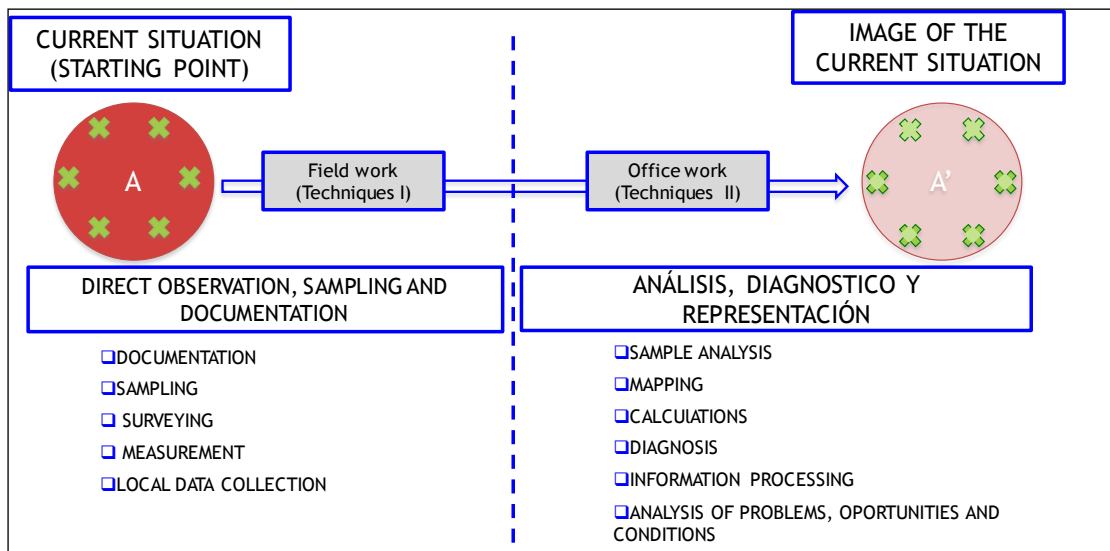
In short, this stage constitutes the nucleus of the Project in which the passage from A' to B' situation takes place with the help of "Techniques III": design, calculations and evaluation resulting the formal document "Project". This new situation implies the design of an implementation program, the terms of reference of the work team and the guidelines regarding its operation. Figure 5.

Figure 5: Elaboration of alternative transformation solutions



Once the negative and positive aspects of the Project have been identified, a comparison to analyze advantages and disadvantages of the proposal has to be realized. These include "Techniques IV" which are encompassed within the concept of "Evaluation". Innovation, creativity, dialogue and discussion are essential in the process.

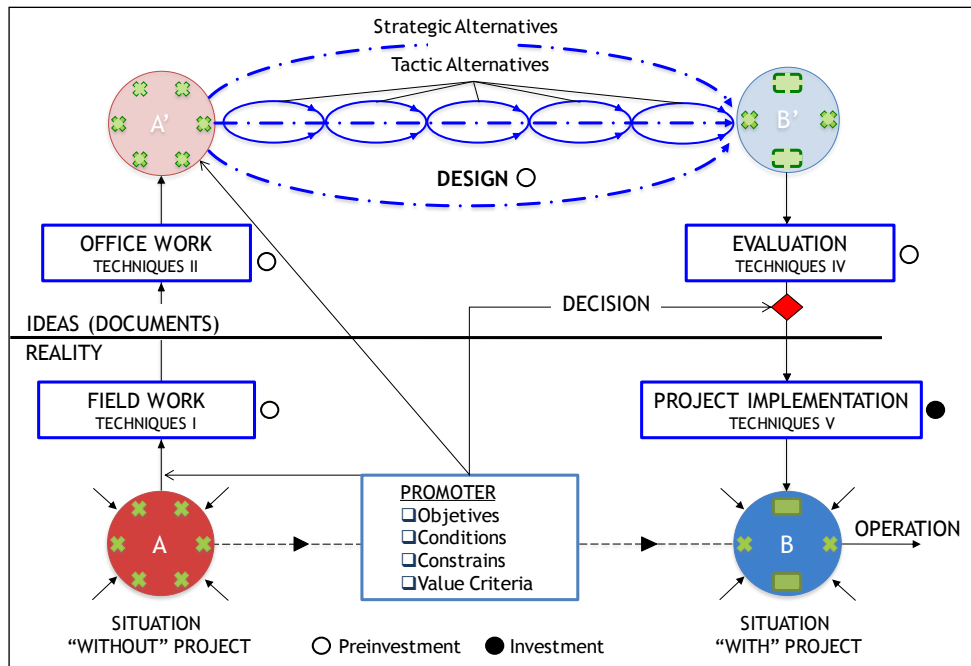
Figure 6: Implementation of the transformation



The process that starts with the definition of the new B' situation and aims the analysis of the economic feasibility, is the first phase of the stage and intends to move from the documentary described B' situation to the future B situation that has to be implemented in reality. Once the corresponding evaluation techniques are used to analyze the feasibility of the global change, and the investing decision is made, the execution phase starts using "Techniques V". These techniques are related to organization, execution control, human relations, promotion of the improvement that the change involves, etc. After a short period of initialization the operation of the project starts. This last stage is shown in a Figure 6.

Figure 7 illustrates the global change process from the situation A "without" Project to situation B "with" Project.

Figure 7: Scheme of the Project



2.2. Basic features of the Project

Five characteristics of the Project can be listed:

- It searches an objective. Without an objective the plan would be meaningless.
- It consumes resources. The author-designer must be aware of it and take into account the alternative uses of such resources, analyzing the convenience of its use considering the benefits arising from other uses.
- It requires a plan. The employment of different resources requires a rational organization indicating its destination and informing about its use. The plan implies constant decision making between alternative options. Most of the times there is no a unique solution to the problems stated in the Project. The decision process encompasses the whole conception of the Project, appearing at different levels of importance – strategic and tactic alternatives – that are always unavoidable.
- It is for the future. The fruits generated by the Project are obtained after its execution and remain while the Project keeps its functionality. The future approach of the Project has a big economic importance because the fruit of the always scarce available resources is postponed to a more or less far future and subject to some uncertainty.
- The plan must be subject to evaluation. The Project highlights the disadvantages – costs – and advantages – benefits – derived of its execution. Both – benefits and costs – have to be weighed to get the conclusion that benefits overcome costs and the implementation of the project is worthwhile.

2.3. The project life cycle

A model that explains an enables to make decisions in a systemic way is the so called “Project life cycle”. Projects are born, grow, develop, fructify and dye. They have a vital cycle (Trueba; 1985, 1992). Four phases are identified.

The first part is constituted by the identification and formulation of the project. That is, what economist call pre-investment. A group of documents (idea, feasibility study, financing study, final draft) are involved. The documents are gradually realized with more and more detail, effort and cost and decisions of the promoter have to be made at the end of each of them. The objective of this phase is to set aside what is inconvenient as soon as possible and minimizing the costs.

The second phase focuses in the materialization of the investments. The documents of the first phase turn into specific actions that modify reality. Scarce resources are immobilized intending future benefits. Only costs appear in this phase.

The third phase is the Project Management, also known as the administration and operation of the project. The positive aspects of the change appear in this phase. It is the period of fructification, time of harvest. Human aspects and participation of agents – what the Nobel Prize winner Amartya Sen called “the agency” – are essential (Sen, 1998). It is the phase of planning based on social learning (Friedman 1993). It is the moment of truth (Cicourel 1986). This phase requires a balance between knowledge, experience and participation. The fourth phase consists in the evaluation of results when the project dies. The learning lessons from the past constitute the basic source for future actions.

3. Review and evolution of the concept of project

3.1. Classical concept of project: The project document

The fifth definition of the word Project that offers the Dictionary of Spanish Real Academia de la Lengua is the following: "Group of writings, calculations and drawings that are made in order to give an idea of how should be and what should have a work of architecture or engineering". According to this definition a Project consists in a collection of documents usually grouped into four blocks (memory, plans, specifications and budget), with an independent content of the future materialization in a reality of what is represented in the documents. Such definition has been traditionally used by organizations, departments and public and private companies. The project, conceived in this way, is a set of information necessary for subsequent execution of the works, but detached from the concrete problems that implementation can provide.

But the change searches a target. The designer plans the change and takes into account the circumstances and the expected results. In this sense, the third definition offered by the dictionary of the Spanish Real Academia de la Lengua is broader: “Plant and provision formed for a treaty or for the implementation of a thing of importance, taking note and detailing all the principal circumstances to be satisfied by its achievement.” From this point of view, the Project is the reunion of systematized, sufficient and coherent information to move from ideas to facts.

3.2. The project of engineering

Art, knowledge and experience are needed to execute a project. From an industrial perspective its material objective is identified with the concept of artefact (J Blasco, 1988). The Project needs both, an idea and an effective change.

The holistic perspective is essential. It aims to solve problems. The nature and complexity of change obliges to a proper management of scarce resources in a frame of planning, organization, management, participation and multi-criteria evaluation.

In this contest, the project constitutes a system of interrelated variables. It is an instrumental mechanism to reach an objective.

As it has been stated above, in 1975, professors Cleland and King in their work “System Analysis and Project Management” defined the project as a combination of human and material resources temporary reunited in an organization to achieve a proposal. Project Management Institute (1996) defines the project as a temporal effort addressed to create a unique product or service. International Project Management Association (1999) includes in its certification program ICB (International Competence Baseline) that the project is an operation in which human, financing and material resources are organized in a novel way to organize a set of tasks, according to defined specifications, with costs and time restrictions, following an standard cycle of life, to obtain beneficial changes defined through quantitative and qualitative objectives.

3.3. The project and the economy

In a socio-economical context, the project can be consider as a technical economic instrument which aim is to contribute to the production of goods and/or services, to satisfy human individual or collective needs.

Moreover, the production of such goods or services must be realized through the best possible combination of the available resources in a defined temporal and spatial coordinates, out of which would be meaningless.

In the seventies, the project goes entirely into the economic sphere. In general, projects are considered to be investment activities employing financing resources to create productive active expecting benefits for a long period:

- Projects are the tool through which the general process of capital formation and assignation of resources takes place (G. B. Baldwin, 1969).
- The solution of the problem with a cost coherent to the expected benefits can be found through a Project (W. C. Bram, 1970).
- The project encompasses different activities to be develop using resources to obtain benefits (J.P. Gittinger, 1972).
- "Projects are the building blocks of an investment plan". A project can be an outline or part of an outline to invest resources, that can be analyze and evaluate as an independent unit (JMD. Little and J.A. Mirrlees, 1974).

Time is an essential variable. The project has a specific duration. It starts and ends. It requires a time for its development and a concrete action program. The variables of the system have a temporal reference within the life of the project. The project is not made to analyze its past and history but, on the contrary, to modify future circumstances and realities.

3.4. The project and the environment

The projects have an impact in the natural environment. They use, consume, invade and occupy natural resources such as air, water, vegetation, fauna and unique spaces. Because they are transformation instrument modify and can also damage nature if they are not well conceived, implemented and managed. Owing to their artificial character projects can generate an impact in the climate change, but they can also promote restoration and conservation of nature (A. Ramos, 1950). Preservation of natural resources is an avoidable item in the formulation and development of the project in the XXI century.

3.5. The engineering project as "Social Organization"

The project can be considered as a socioeconomic organization that develops a set of activities aiming a common end. It involves the inter-relation of a set of groups, companies, institutions and technical interdisciplinary teams. There are therefore natural and legal persons affected and involved. There is a human component, that can be called the social network of the project and that has to be taken into account by the designer. The beneficiaries of the more sophisticated current technologies and of the engineering projects are the inhabitants of the planet either individually, in groups, companies, institutions or countries. It would be a grave mistake to consider the project as a set of engineering calculations, drawings, documents, and capital back to human reality.

The social evaluation of projects has an increasing interest. While the economic financial evaluation of project started at the seventies, social evaluation and environmental evaluation are something more than quotations and illustrated references from the eighties when they constitute body of knowledge. Social evaluation started later but is firmly progressing. When a project is assessed, people must be considered in the first place. As M. Cernea (1985) said "Putting People First" should be something more than a simple slogan. Projects in general and rural development projects in particular have to include as design parameters not only technical, economic, financial and environmental aspects but also social aspects (A. Cazorla, 2004).

3.6. The project and human development

The project intends an end. It incorporates objectives and targets that can express policies, economical achievements, enterprise results, social commitments, answers to humanitarian conflicts, respect for nature and, above all, human development.

When a change is intended as, for example, a development project, every important actor has to be taken into account. The main factor of resilience to the change is the imposition to other people's will. An adversary that considers the change as a challenge to his power, his position or satisfaction, appears. If the adversary loses the battle, he will become a victim of the project and will show his disappointment to the civil society, especially if he has power and access to the media.

Among the objectives with a social character of projects the following can be identified: satisfying individual needs, attending genuine demands of organizations and groups; taking advantage of opportunities and physical, territorial, environmental conditions; solve problems of the affected population; generating income and employment; correcting injustice, eliminating inequities; and finally and more important, contributing to the development of human capacities of people and consequently to their quality of life (Sen, 1998).

A project cannot be conceived without its relation with the people. The implication, welfare and freedom of the affected population are inherent at the nature of the project. Therefore the human side gives the real meaning to the project. Public awareness, respect, professionalism, ethic and responsibility constitute the axis of the projects. The big problems of humanity in the XXI century such as hunger, poverty, violence, lack of culture and lack of freedom require awareness, sensitiveness, commitment, action and participation of everybody.

4. Conclusions

To sum up it can be said that the basic features of a Project are the following:

- It searches an objective.
- It consumes resources.
- It requires a plan to employ the involved resources.
- The plan implies a constant decision making between alternative options.
- It is for the future.
- The plan has to be evaluated.

In addition, it has to be taken into account that the formulation of a project requires:

- To know the preferences, priorities and system of values of the promoter.
- To know the intended objective.
- To know the available resources.
- To know the environment.
- To identify the conditions, limitations and constraints.
- To define means and technologies.
- To know the times of execution of investments.
- To establish the plan for the use of means and resources.
- To evaluate the degree of consecution of the objective as well as the degree of expended means and efforts.
- Identify winners and losers agents.

The Project consumes scarce, natural, technical, economic, financial, human, expertise and ITC resources. It generates goods, services and capacities in the future at the disposal of the promoter, the agents, the beneficiaries and the affected population, with no exclusions. In the case of public actuations, it has a perspective of general interest and human development of people.

5. References

- AEIPRO (Asociación Española de Ingeniería de Proyectos) (2009). NCB Bases para la Competencia en Dirección de Proyectos (versión 3.1). Valencia: Editorial UPV.
- Asimow, M. (1976). Introducción al Proyecto. México: Herrero Hermano, S.A.
- Baum, W. (1978). The Project Cycle. Washington: Finance and Development. Vol 15.

- Blasco, J. (1989). *Comentarios al Proyecto*. Barcelona: Escuela Técnica Superior de Ingenieros Industriales. UPC
- Cazorla, A. (2004). *Trabajando con la gente*. Madrid: Editorial Mundiprensa.
- Cleland, D. I. and King, W. R. (1975). *System Analysis and Project Management*. New York: McGraw-Hill Book Company.
- Dasgupta, F. and Marglin, A. (1972). *Guidelines for Projects Evaluation*. New York: United Nations.
- Davis, F.W. (1983). *Project Management. Techniques, Applications and Managerial Issues*. Norcross, GA (USA): Industrial Engineering and Management Press.
- De Cos Castillo, M. Trueba, I. (1990). *Definición de Proyectos de Ingeniería*. Almagro (España): VI Congreso Nacional de Proyectos de Ingeniería.
- De Cos Castillo, M. (1985). *Dirección de Proyectos*. Madrid: Escuela Técnica Superior de Ingenieros Industriales. Universidad Politécnica de Madrid.
- De Cos Castillo, M. (1986). *Ingeniería de Proyectos*. Madrid: Escuela Técnica Superior de Ingenieros Industriales. Universidad Politécnica de Madrid.
- García, M.; Evans, M.; Trueba, I.; Fabre, P.; Cross, S. (1986). *Guide for Training in the Formulation of Agricultural Projects*. Roma: FAO.
- Gómez-Senent, E. Capuz, S. (1999) *El Proyecto y su Dirección y Gestión*. Valencia: Editorial UPV.
- IPMA (International Project Management Association) *Competence Baseline*. (1999). Zurich: Ed. IPMA.
- Lethem, F. and Cooper, L. (1983). *Managing Project Related Technical Assistance: The Lessons of Success*. Washington, D.C.: World Bank Staff Working Paper no. 586.
- Little, I.M. and Mirlocc, J.A. (1976). *Project Appraisal and Planning for Developing Countries*. New York: Basic Books.
- Fouliguen, L.Y. (1970). *Risk Analysis in Project Appraisal*. Baltimore: The Johns Hopkins University Press.
- PMI (Project Management Institute). (1996). *A guide to the project management body of knowledge*. Upper Darby, DE (USA): Ed. PMI.
- Prest, A. R. and Turkey, R. (1964). *Cost Benefit Analysis a Survey*. New York: *Surveys of Economic Theory*. Vol. 3.
- Sriram. D. et al (1989). *Knowledge-Bases Systems. Applications in Engineering Design*: Palo Alto: Research at MIT. *Artificial Intelligence* Vol. 10. No. 3 pp. 76-96.
- Taylor W.A. (1988). *What every engineer should know about Artificial Intelligence* Cambridge: Massachusetts Institute of Technology. The MIT Press.
- Trueba, I. et al. (1982). *Teoría de Proyectos: Morfología*. Madrid: Escuela Técnica Superior de Ingenieros Agrónomos de Madrid. Universidad Politécnica de Madrid.
- Trueba, I. and Marco, J.L. (1985). *Proyectos Agrarios y de Desarrollo Rural: Formulación*. Madrid: Escuela Técnica Superior de Ingenieros Agrónomos de Madrid. Universidad Politécnica de Madrid.
- World Bank. Operations. Evaluation Department. (1985). *Tenth Annual Review of Project Performance Audit Results*. Washington D.C.

Contact details (For further information, please contact)

Fax: +34915336708

E-mail : javier.morales@fgupm.es

URL : www.fgupm.es

URL_2 : www.grupogesplan.es