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CONCEPTUAL MODEL FOR PROJECT MANAGEMENT

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ABSTRACT

When we talk about projects, we must differentiate between preparation, evaluation and project management. Depending on what is involved, the techniques and tools may be different but complementary. In this work it is about focusing with a holistic and holistic vision the world of projects in attention to their management and development. Specifically, the notion of projects, the concept of project management, the functions of project management and the structural bases to focus on this discipline are specified; which are developed explaining and exemplifying with its essential characteristics. The idea is to motivate public and private organizations to give a little more attention to the planning and monitoring of projects in the understanding that the good implementation of these are the heart of the development of the regions.

Keywords: Project, Project Management, Planning, Organization, Management, Control, Quality Management, Product, work, organization and cost decomposition structure.

INTRODUCTION

Over the past thirty years, the world is facing considerable dynamics in the internal and external development of companies; thus, organizations have faced greater emphasis on flexibility and customer service capacity. As a priority to this need, companies and organizations have been concerned with growing and generating new projects and opportunities by taking advantage of synergistic factors and thus being more competitive, differentiating in the market, creating a competitive distinction against competition.

This panorama faces a scenario of business development in order to manage the concept of project management and management in the best possible way and considering a professional and ingenious attitude to plan and control the opportunities generated. This process involves efficiently managing

resources with flexible work teams, efforts aimed at the primary needs of the organization and an attitude based on the planning and management of the projects generated.

The area of project management is one of the areas of knowledge that grows the most and has grown in its practical use in many parts of the planet; it is the subject of investment in training and development of methodologies in most companies and also constitutes an important tool used by the state. It is in these circumstances that there is a growing demand in the market for professionals who can act in this discipline.

When projects are being implemented, developed and operating, one of the main difficulties is in the measurement and evaluation of the results obtained; in obtaining partial and final results that allow estimating and comparing terms, costs, quality, objectives, risks and others. It is precisely these conditions and parameters that can be met by the concepts and techniques of project management.

Then, there is a clear need to establish reliable forecasts, as realistic as possible to measure the performance and results of the projects. The management and due attention of these factors and variables can be the clear difference between well or poorly executed projects. Precisely, project management is the appropriate discipline that will allow planning, organizing, directing, controlling and verifying the quality of project development in the business, organizational and state level.

The technique of project management and management, is today known as "added value" and was introduced by the United States government through the Department of the Air Force in the 60s; thus, this technique was used by the Department of Defense and became one of the most important management techniques in defense contracts.

1. CONCEPTUAL FRAMEWORK

1.1. The concept of projects

From a daily point of view, a project is associated with an idea, an opportunity, an investment that must be developed in a context of entrepreneurship and risk. This means that the notion of projects is the development of a series of planned activities that tend to the optimal use of resources in order to achieve an objective.

From a technical-economic point of view, a project has three fundamental characteristics:

- It has a specific objective or purpose, which must have the character of uniqueness and measure.
- It has a specific deadline that means considering in the time scale an implementation period associated with the project.
- It has a budget that must be defined a priori in order to plan the financial resources necessary for the development of the project.
- The complementary characteristics that a project must have are:
 - A project is not repetitive, since it is done only once,
 - It is homogeneous, because all the areas involved concur to the objective,
 - It is complex, because of the relationships and restrictions that are generated,
 - It is human, because it involves putting into play and leading a whole human organization.

According to VARGAS (2008: 3), a project is defined:

"Project is a non-repetitive venture, characterized by a clear and logical sequence of events, with beginning, middle and end, which is intended to achieve a clear and defined objective, being conducted by people within the defined parameters of time, cost, resources involved and quality".

1.2. Project management concept

Project management aims to consider management tools, which must be focused so that the company or organization is able to develop a set of skills both individually and in teamwork. The purpose of achieving this activity is to plan, organize, direct and control the events associated with the project, within a scenario of predetermined time, cost and quality. In other words, it is about verifying the specific and effective fulfilment of the activities, cost and qualities planned a priori. This concept is associated with what is called project performance.

The concept of project management consists in committing the necessary actions to bring a project to its completion or completion, this means:

- Achieve the objective of the project,
- Within the deadline,
- And within budget limits,
- All of this respecting the associated quality standards.
- The result of a project consists in determining the situation of a project at the end of the project, measuring:
 - The degree of scope of the objective,
 - The difference between the actual term and the initially fixed term,
 - The difference between the actual cost and the planned budget.

From an integral and holistic point, we will define project management as:

"Project Management is the discipline that has the ability to systematically integrate planning, organization, management, control and quality in the management of activities associated with a project."

Project management is such an integral activity that it therefore involves various areas of competence in project management; These areas are shown in Figure 1.



Figure 1: Areas of project management

1.3. Phases of a project and time scale

A project can be analyzed in the light of its life cycle, that is, to analyze its evolution within a time scale, from birth to death. This analysis perspective allows to denote in time a series of phases in a natural way and through which the project will necessarily pass. This concept and this analysis optics can be applied to different situations or cases that are found, for example, in industrial reality, such as:

- Development of a new product;
- Automation of a production line;
- Construction of a new production plant;
- Transfer and study of new locations;
- Reorganization of a company or part of it;
- Making both qualitative and quantitative adjustments in organizations;
- Carrying out cost reduction studies, etc.

The phases that a project must follow in the analysis of its life cycle are: definition, conception, construction, commissioning, operation and assignment. This terminology may vary considering the domain of the project: it can be construction, financial, industrial, commercial, IT, social, etc. Figure 2 shows the phases of a project (Cfr. TERRAZAS, 2006).

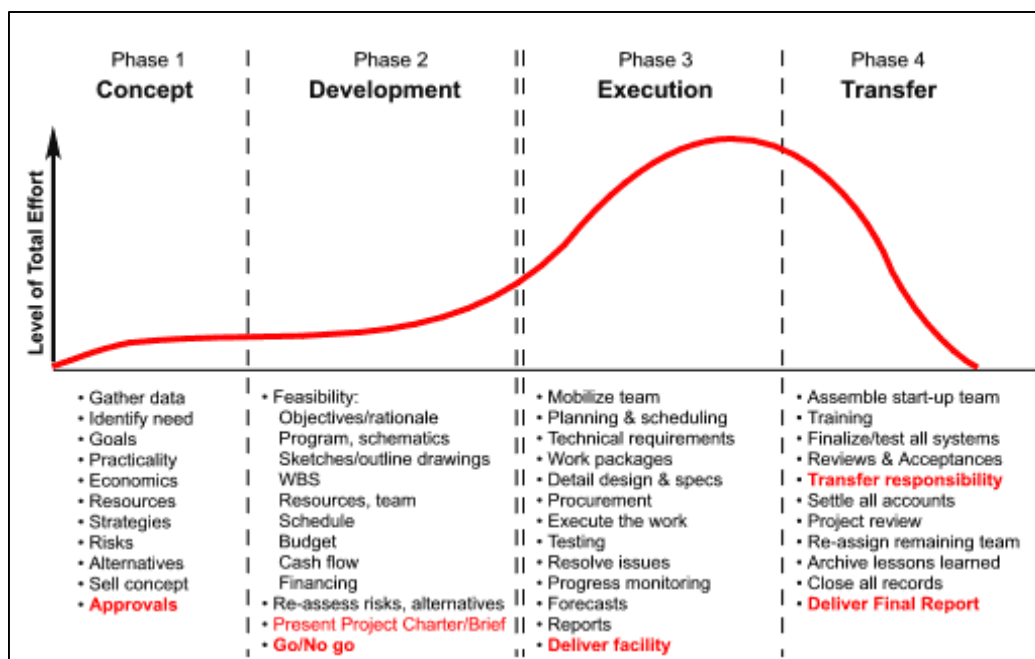


Figure 2: Phases and life cycle of a project

a) Definition phase: This is the phase of strategic reflection; it consists in defining the objective of a project or a set of projects. Here the idea is concretized and preliminary studies and evaluations are made; the environment is analyzed, forecasts are prepared, objectives and alternatives are evaluated, performing a first review of the mission, vision, objectives, costs and program; budgets are justified and it is about setting deadlines; It is basically a phase of a master and profile scheme. This phase of definition answers the Why? The project is developed. In other words, it can be said that in this phase the basic strategy, the organization and the resource needs to carry out the project are determined.

b) Conception phase: If the project has passed the first phase, it goes to the general conception phase. The purpose is to determine, as soon as possible and with the greatest precision, the specifications, costs, programs, resource needs, task blocks and subsystems that will be part of the project in a technical

and economic way. This phase of conceptual study and evaluation has the purpose of studying the characteristics of the work and the procedure that will achieve the expected result.

It can also be mentioned that the conception phase can enter into a more exhaustive analysis in the detailed conception phase of the project and that it refers to the decomposition of tasks into subprojects or microactivities in order to establish a deeper activity allocation process.

The purpose of the conception phase is to define the what? (what to produce), the who? (who will produce, who will distribute), where? (where will the project be located), when? (ie the term) and how much? (how much will the project cost and generate).

The analysis of this phase should culminate with a concrete and coherent proposition of the main technical characteristics, calendars, cost estimates, etc. In this phase the decision can be taken to continue or not with the project.

c) Construction phase: It is the so-called engineering phase. This phase is the longest and most expensive in most cases and it is about realizing what has been defined above. It is not a phase of study, but of management (planning, organization, direction and control). This construction phase includes tasks such as the manufacture or acquisition of "hardware", the establishment of lines of authority and responsibility, the drafting of procedure manuals, the construction of installation and physical works and the finalization of the supporting documentation.

The purpose of this phase focuses on the how? carry out the project, defining the following activities:

- Update detailed plans;
- Identify and manage the required resources, to facilitate the construction process (supplies and "stocks");
- Verify system construction specifications;
- Detailed design of the components;
- Start of manufacturing, construction and installation;
- Final preparation and distribution of documents;
- Realization of final tests;
- Development of technical manuals and documentation;
- Development of support plans for commissioning.

d) Start-up phase: Reaching this phase means judging that the project is technically and economically feasible and that it will be carried out to achieve the desired objectives. In this phase the following activities are carried out:

- Carrying out the tests and final tests of the system;
- Use of the system for the purposes provided by the user or client;
- Evaluation of the sufficient benefits of the system in the technical, economic and social aspects, so that the real operating conditions can be achieved;
- Provide planners with feedback information;
- Evaluation of the adequacy of support systems.

e) Operation and transfer phase

In this phase, the project abandons the idea with which it began in the definition phase, because the system has been integrated into the regular organizational structure or because the product or service has been delivered to the client that requested it.

In this phase the productive operation of the project begins and its useful life begins; You can also have the situation that the project has ended in failure and must be canceled. This phase includes the preparation of final documents, document files, financial balances, microfilms, "diskettes", databases, etc.

Within a temporal perspective and to which the phases of the project are associated, figure 3 can be shown that denotes and visualizes the evolution of a project in relation to its life cycle and the intensity and effort that must be devoted to each of them.

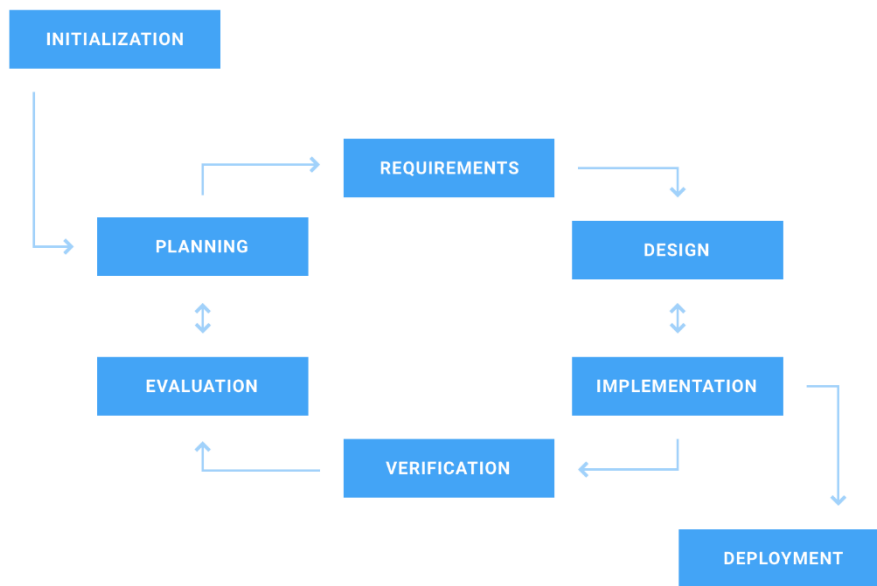


Figure 3: Phases, time scale and effort in a project

1.4. Project management functions

Project management actions are associated with a set of specialized functions, as shown in Figure 4.

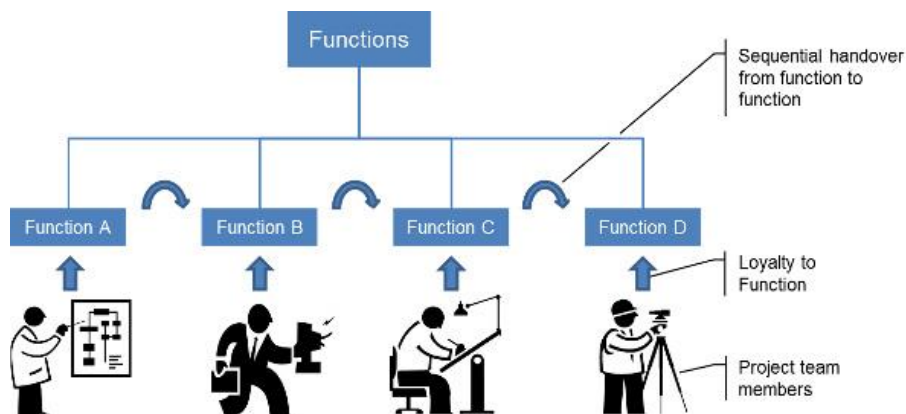


Figure 4: Project management functions

A. The Planning function

Which deals with two fundamental aspects:

- The ordering in logical and chronological order of the tasks with the purpose of optimizing the use of available resources and in this way try to respect the deadlines.

- The staggering of financial flows with a view to defining a budget of income and expenses in such a way that the occurrence of positive flows can be foreseen throughout the entire development of the project.

B. The Organization function

It has to do specifically with the composition of the team, the distribution of tasks, the method of work and the constitution of an adequate environment ensuring maximum productivity and safety.

C. The Direction function

Directing a project consists of:

- Make good decisions,
- Get the best performance from the personnel involved,
- Make the energies converge towards the ends and objectives,
- Know how to take the project to a good end
- Establish good leadership.

The actions of the management function require human relations skills, motivation, team spirit, delegation, etc.

D. The control function

Controlling a project consists of periodically comparing, for example every month, the real and predictable development against the planned development, in order to take corrective actions that may arise. Control can be done in two ways:

- Control of physical progress that aims to detect existing differences in relation to planning,
- Budget control, which tries to relieve existing differences in relation to the budget and thus estimate the financial result of the project.

E. The role of Quality Management

This function has the essential objective of monitoring the quality of the goods and services generated by the project. This function should ensure quality management tasks are vital in the sense of error detection, since the costs associated with them progress exponentially, then they must be avoided.

In this process the relationship must be monitored: Quality Assurance or Quality Assurance (QA) / Quality Control or Quality Control (QC); which consists in defining the requirements related to the goods and services to be distributed; taking into account the prescriptions of the established quality standards, as well as the technical imperatives and functional needs, in order to control the application of the defined requirements and proceed to the technical reviews.

1.5. Bases of project management

So that project management can become an effective tool in its application to project management in public and private organizations; It is necessary to lay the foundations of its development based on four important structures that relate to the previously defined functions. These structures are as detailed below and are shown in Figure 5.

- The delimitation of suppliers or product decomposition structure (PDS, which responds to WHAT?)
- The decomposition into tasks or work breakdown structure (WBS, which responds to HOW?)

- The attribution of responsibilities or decomposition structure of the organization (DSO, which responds to WHO?)
- The cost assessment or cost decomposition structure (CDS, which responds to HOW MUCH?)

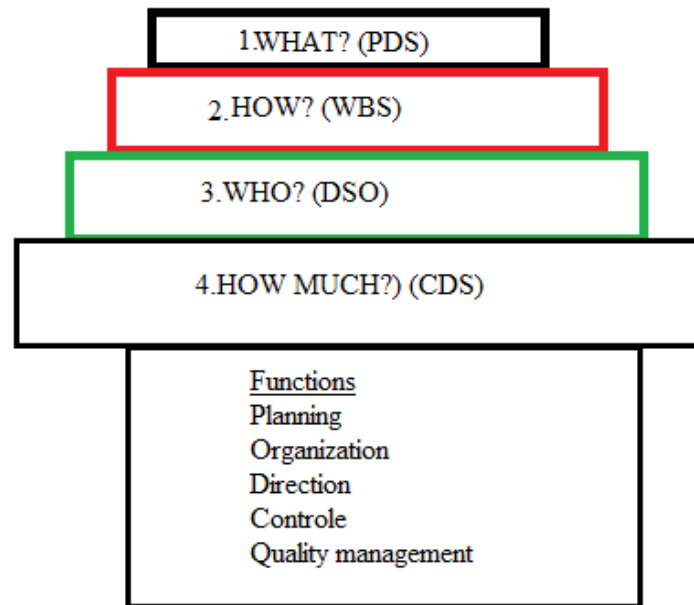


Figure 5: The basis of project management TERRAZAS (2005)

2. CONCEPTUAL PROJECT MANAGEMENT MODEL

2.1. Project management model approach

Once the conceptual bases of what project management is characterized, we will develop each of the structures in order to propose an analysis methodology in the subject of project management. The objective is to systematize and organize the theoretical and practical basis that allows these tools to be applied in project management, taking into account both structures and functions and their integration between them.

2.2. Development of model structures

2.2.1. Product Breakdown Structure (PBS): The decomposition structure of the product is equivalent to a technical decomposition and a definition of nomenclature; It is the structured representation of the constituents of the project. A representation by levels and of arborescent type is used, where "descending" means "is composed of" and "rising" means "is part of".

2.2.2. Work Breakdown Structure (WBS): It is the structured representation of all activities. A work-breakdown structure (WBS) in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The Project Management Body of Knowledge (PMBOK 5) defines the work-breakdown structure "A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables."

2.2.3. Organization Breakdown Structure: The structure of decomposition of the organization is the representation of the respective roles and responsibilities of the actors of a project, this means the identification of responsibilities for each of the tasks of the WBS. There are three possible ways of organizing the responsibilities of a project, each with its advantages and disadvantages according to the type of project and company involved.

A. "LINE & STAFF" Organization: Call functional organization. A person is placed in a "staff" position and is designated to coordinate the project. Its mission is to coordinate, plan and verify the progress of the project. The coordinator has no authority, it depends on the address. This type of organization of responsibilities is adapted only to small projects.

B. Organization "TASK FORCE": Called divisional organization. All the people in the company working on a given project are regrouped under the exclusive authority of the project manager for the entire duration of the project. This way is the previous one, in which the boss directs, organizes, plans and controls the activities. The efficiency is maximum. The drawbacks that can be observed in this form of organization, is that you have to duplicate specialists and can be applied to a single large project being unenforceable to handle several projects at once.

C. "MATRIX" Organization: The "Staff & Line" organization is more efficient than the "Task Force", in terms of the use of resources and is less efficient as regards the direction and attention of the project itself. It is in this understanding that a form of organization has been sought that eclectically combines the advantages of the two previous forms of organization; This organization corresponds to the "Matrix". The matrix organization has the characteristic that every person who works on a project has a functional (hierarchical) manager, in addition to the project manager, where the authority is distributed between these two bosses. This organization maintains a unique functional decomposition in the company and allows the development of experts. This form of organization predominates in engineering firms.

An important function associated with the OBS is the project management. This function is the engine of project management. Directing a project consists not only in making decisions; but also in obtaining the best performance of the staff and converging all efforts towards the achievement of the goals and objectives. The major role of management is to make arrangements to solve problems, increase staff productivity and continually improve project quality. So, the importance lies in having a good project manager who becomes a leader.

- The management principles for a project team are:
- Raise and generate motivation in order to achieve maximum productivity.
- Play the role of coaching, that is, the project manager must be an instructor and establish a helping relationship so that people can develop their work more effectively.
- Use and develop in the best possible way the experience and potential of people in the development of their tasks.
- Evaluate the degree of responsibility of people and thus generate a commitment.
- Adapt the leadership style according to people. The project manager can exercise a managerial, managerial and compelling style, styles depending on the characteristics of the people who are acting within the project.
- Provide adequate feedback to people about their behavior and how to do things in order to improve performance.

2.2.3. Cost Breakdown Structure (CBS)

The cost decomposition structure is the structured representation of the budget. This decomposition is closely linked to activity planning (WBS) and must be done in coordination with that as shown in Figure 6.

SAMPLE BUDGET FOR AN ONLINE BOOKSTORE

TOPIC	TIME (weeks)	MONEY
Shopping cart	4-8	\$100k-200k
Browse books	1-2	25k-50k
Search books	6-26	150k-450k
Manage inventory	12-96	300k-2.4M
Preview inside of book	8-48	200k-1.2M
TOTAL	31-180	\$775k-4.3M

Figure 6: Cost budget to edit a book

When talking about and referring to the CBS, it is necessary to emphasize that this representation is concretized by the determination and definition of Cost Centres and by an analytical coding plan (Cost Coding System). In this understanding, each budget post or cost centre, is the element of detail that allows adequate financial monitoring. To concretize this idea, we can understand a project as a set of cost centres, which in turn are composed of several work packages or work packages, as illustrated in Figure 7.

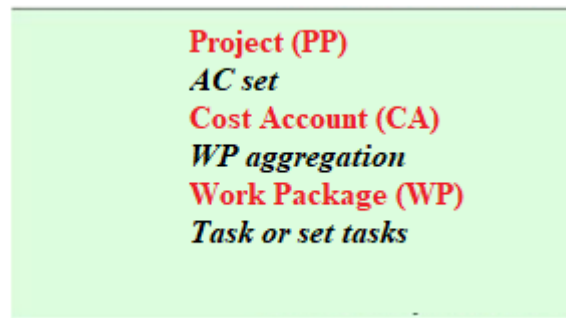


Figure 7: Budget decomposition structure of a project

One of the functions of the project function that is most associated with the CBS is that of control. This function aims to develop the two most specific forms of monitoring:

- The physical control that tends to estimate the partial and global physical advances of any task and activity that is presented in the financial management process. The technical management of the physical control must be carried out through the calculation of the Global Physical Advance (GPA) of all the activities involved. These estimates respond to the following relationships:

$$\% \text{ Advance Task } (ti) = \frac{Q \text{ executed}}{\text{Total } Q \text{ to execute}}$$

$$\text{GLOBAL WORK:T} = \text{Sti}$$

GLOBAL PHYSICAL ADVANCE (GPA):

$$\text{GPA} = \text{Work done} / \text{Total work to be done}$$

$$\text{GPA} = \sum ai pi;$$

Where:

ai = Physical progress of the task i

pi = Relative weight of the task i

An example of a physical control applied to a project and next to the development of its load histogram is the one shown in Figure 8, 9 and 10.

	E	F	M	A	M	J	LYD
<i>Particular Rules</i>	100%						100
<i>Installation plans</i>		40%	60%	80%	100%		200
<i>Grounding plans</i>			30%	70%	100%		200
<i>Stock Footage</i>			30%	70%	100%		300
<i>Benefits in ing</i>				40%	80%	100%	100
<i>Performance in comparison</i>				40%	80%	100%	100
							1000
TOTAL ING. CIVIL	10%	18%	37%	69%	96%	100%	
HOURS TO FORECAST	100	80	190	320	270	40	
Men-MONTH	0,6	0,5	1,2	2,0	1,7	0,3	

Figure 8: Monthly physical control of a project

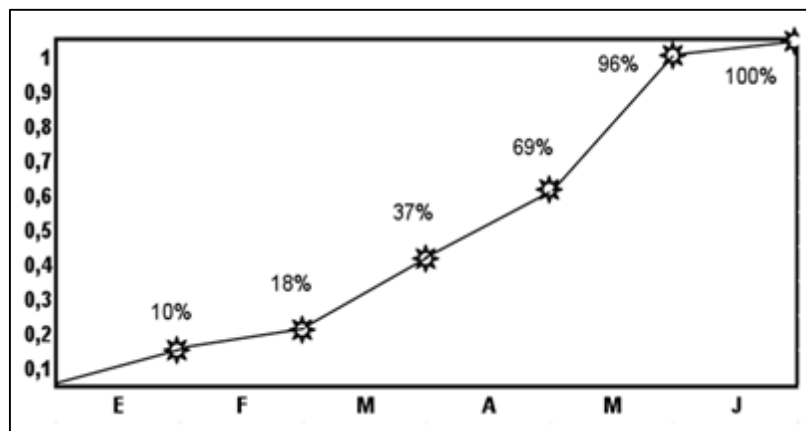


Figure 9: Cumulative percentage physical control of a project

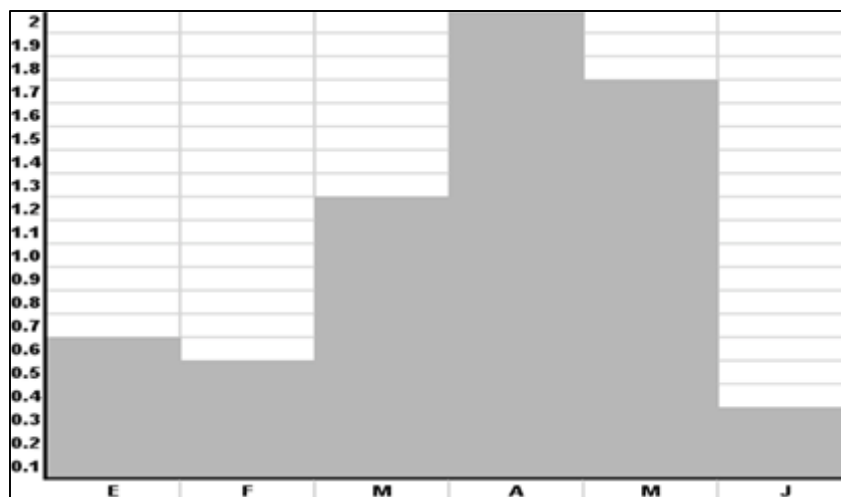


Figure 10: Monthly load histogram of the project

- Budget control and performance analysis, in order to estimate deviations and monitor the following:
 - a. Last Period Expenses

- b. Estimate of expenses to commit
- c. Estimation of the probable situation
- d. The comparison and the performance analysis

This last process is carried out taking into account the initial forecast (IP) that has been budgeted; if this forecast undergoes adjustments with the increase or decrease of additional (AD), it is called corrected initial forecast (PIC). For follow-up and control purposes, what has been done (R) is recorded, it is about estimating the remaining to be done (RH) and what has been done likely (RP), which refers to the scope of what has to be accomplished in the general context of The activities analyzed. In terms of relationships this amounts to:

$$PIC = PI + AD \quad RP = R + RH$$

The difference and deviation between planned and executed will be: $d = RP - PIC$

These initial concepts can be contextualized within the performance analysis, which refers to the estimation of performance ratios and indicators and progress in terms of the programmed budgets and those that remain to be executed. We will define the following terms:

BCWS = Budgeted Cost of Work Schedule. "Forecast" is equivalent to the PIC

BCWP = Budgeted Cost for Work Performed. "Consumed", consumed from the PIC

ACWP = Current Cost of Work Performed. "Done" is equivalent to R ETC = Estimate to Complete. "Subtract to Do" is equivalent to RH

EAC = Estimate At Completion [Final Forecast]. "Probable Result", RP

BAC = Budgeted At Completion.

"Equivalent to the TOTAL PIC"

The performance indicators for different cost centers or Cost Account (CA),

As an example, we will analyze the following example: the engineering phase of a project includes the following work packages:

WP1, engineering tasks, design, calculations, WP2 specifications, design tasks, 20 plans of the same complexity WP3, management tasks, insured by the project manager

The initial monthly forecasts in hours and their benefits already made are:

Pi

MES		1	2	3	4	5	6
WP1	Pi	500	1000	1200	1200	900	500
	R	505	980	1080			
WP2	Pi	-	160	500	600	600	340
	R	-	175	550			
WP3	Pi	160	160	160	160	160	160
	R	150	150	150			

On the other hand an additional 200 hours is given for the examination of an alternative, in the form of a WP4 and must be done the fifth month. At the end of the third month the progress is made: a) on the 6 plans that had been planned to be made at month 2 and 3; 1 plan is finished and 5 plans are at 90% progress; b) all engineering tasks planned at 3 months have been carried out, except for the verification

task of the 6 plans that represents 5% of the work in the first 3 months, what is the budgetary situation at the end of month 3? .

the budgetary situation at the end of month 3

WP	[1] BAC Σ PI	[2] BCWS PIC	[3] BCWP [8]*[2]	[4] ACWP R	[5] CV [3] - [4]	[6] SV [3] - [2]	[7] CPI [3]/[4]	[8] SPI A	[9] ETC ([1]-[3])/[7]	[10] EAC [1]/[7]	[11] VAR [10]-[1]
WP ₁	5300	2700	2565	2565	0,00	-135,00	1,00	0,95	2735,00	5300,00	0,00
WP ₂	2200	660	605,22	725	-119,78	-54,78	0,83	0,92	1910,41	2635,41	435,41
WP ₃	960	480	480	450	30,00	0,00	1,07	1,00	450,00	900,00	-60,00
WP ₄	200	0	0	0	0,00	0,00	0,00	0,00	0,00	0,00	-200,00
TOTAL	8660	3840	3650,22	3740	-89,78	-189,78	0,98	0,95	5133,00	8873,00	213,00

SPI [WP₁] = 0.95
 SPI [WP₂] = (1*100+5*0.90)/6 = 0.917
 SPI [WP₃] = 1.0

CONCLUSIONS

- Project management is a powerful tool to help manage public and private projects that are presented in different types of organizations.
- This discipline must be addressed systemically, comprehensively and holistically to achieve the desired effectiveness. The proposed structural methodology is widely disseminated and used in many successful companies in the world.
- The idea of applying this methodology is to reconcile the functions and structures of decomposition that make the activities of a project.
- The use of the tools allows you to take a "picture" of the status of a project in an instant of time and thus compare with what was initially planned. It allows a comparison of a situation a priori with a situation a posteriori in the planning and execution of projects.

Bibliography

1. SMEERS, Y .; DECOSTRE, J.P. (2000); "Project Management"; Cours's notes; Leuven-Belgium
2. TERRAZAS PASTOR, Rafael (2006); "Preparation and Evaluation of Projects: a systemic and integral approach"; Ed. Etreus; Cochabamba - Bolivia
3. TERRAZAS PASTOR, Rafael (2008); Course on "Finance in the Company"; Master in Business Technical Management; UMSS - Cochabamba
4. VARGAS, Ricardo (2008); "Analysis of ADDED VALUE in Projects"; BRASPORT; 4th Ed .; Brazil.
5. Spanish dictionary. (2008). Spanish dictionary. Bogotá: Norma Publishing Group.
6. Estrada, J. (2015). Analysis of the most used international standards in project management. In J. Estrada, Analysis of the most used international standards in project management. Buenos Aires: UP.