MANAGEMENT MODEL BASED ON THE GUIDELINES OF THE PROJECT MANAGEMENT INSTITUTE FOR THE CONSTRUCTION OF CONCRETE PLANTS IN THE CITY OF BOGOTA: CASE STUDY CONCRETE PLANT ARGOS CALLE 80.

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Abstract—The present work is based on an investigation according to the guidelines of the PMI in which the greater emphasis was sought in the direction of the projects of the companies that provide the production of the concrete as raw material of their works. For this purpose, proper planning and management was highlighted, making them an important step to achieve success in the project starting from its constitution minutes until the project's closure, without neglecting the quality and optimization of time. All these guidelines are consigned in the PMBOK, which for its progress is ordered through a methodology starting from a simple idea until the materialization of the project.

The expert and expert judgment was used as a methodological approach, opinions and experiences were collected. The results revealed that the development in the assembly process of the concrete plants is not taken into account in the industrial processes, since economic processes tend to be more important. Based on the above, it was concluded that strengthening this dimension in the aforementioned areas through joint work will favor the integral development of the concrete industry.

Keywords—PMI, Methodology, PMBOK, Concrete, Investigation, Development, Mounting

I. INTRODUCTION

The present work has as purpose the realization of a management model based on the guidelines of the Project Management Institute for the construction of concrete plants in the city of Bogotá: case study of the Argos Street 80 concrete plant. This model seeks to consolidate good administration, better management of time, cost and quality in processes and greater participation in the design and construction stages. This management model includes the steps for the development of the project, whose visible head is the Project Manager, which considers the development of the project in the stages of conception, design, tender, construction and delivery. Taking into account a management, which maintains the sequence design-tender-construction-delivery based on competitive offers, promoting the presence of a project manager, for a greater participation in the design and construction stages. This model also has some limitations when it comes to implementing it because there is not much information and although it is not something new it has not been put into practice in Bogota without mentioning that there are not many expert agents in the subject and companies do not see it as important for its functioning.

II. JUSTIFICATION AND OBJECTIONS

Bogotá has had a broad development during the last decade in the construction sector, which implies a positive trend, although the first half of the year was not good, especially due to the fall in sales of the upper middle strata (Camacol, 2017)\(^1\). Currently the mega works that surround the City, resume acts of a lack of control in which the growth of the city is not planned, the non-planning exercises a dominance highlighting the lack of management increasing an imbalance between cost, quality and time.

Additionally, the non-optimization of resources in the construction of concrete plants in Bogotá, and the lack of organization in a more efficient manner, generates economic overruns, constructive misdemeanors and administrative sanctions, as well as creating a series of uncontrollable contingencies in which time and quality is the hardest hit and therefore can lead to material losses, economic and extemporaneous deliveries that show the non-planning of the project and the lack of a management that mitigates all these faults. Studies have shown that planning represents approximately only 10% of the total cost of a project; however, it regulates the overall execution of the project. Raisa emphasizes that "Planning is based on the experience of professionals". The control is based in general, on the exchange of verbal information, resulting in inefficiency in the use of resources\(^2\).

Although it is true that in Bogotá, construction represents 6.7% of the Gross Domestic Product (GDP) (Andrés Mantilla, 2017), an increasing and excessive demand in which urban planning in the city is not taken into account, side a detailed space for the assembly of concrete plants in Bogotá, since these are the supply of this material which is used in multiple facets and stages of a project, analyzing all these proceeds to perform a more detailed study that involves from the environmental part to the start-up, since what is desired in all this is the most efficient search for time, cost and quality, optimizing resources and minimizing the unforeseen events that may arise during the process.

In the 60s the concepts of: Project Life Cycle, Disintegrated Structure of the Project and Disaggregated Work Structure, the techniques that were being used to manage building or construction works in general, single-character projects, began to be used in factories with non-constructive or mass-produced elements, projects of a continuous nature. This fact allowed a
greater development in management techniques. From 1960 and especially in the 70's, within the process industries, construction and especially in the Department of Defense of the United States, and especially in the aerospace sectors, was where it started to Developing the concept of management, although quickly, was extended to other official organizations such as Word Bank or the Canadian International Development Agency, encompassing the set of techniques used under the name of "Project Management". The first formulations consisted of a set of policies, procedures and useful practices to achieve higher yields in the fulfillment of certain objectives. In particular, the initial cost-benefit analysis was distinguished during the first phases of the project when the socio-economic scope was studied. This vision was overcome when in 1969 the Project Management Institute - PMI was founded in Philadelphia Pennsylvania, in order to meet the needs of Project Managers around the world. PMI professionals cover the largest industries, including aerospace, automotive, business administration, construction, engineering, financial services, information technology, pharmaceutical, health and telecommunications. The PMI developed standards for the practice of modern project management, which are reviewed and updated periodically by experts from all disciplines in the world and whose guidelines are condensed in the PMBOK Guide, which is a Standard (PMI, 2008; Crowe, 2006; Johnson, 2007 & Mulcahy, 2009). Taking into account the options available in terms of project management methods, the lack of a logical and sequential methodology for planning in the management and allocation of resources during the design stage in the projects, can generate unforeseen changes in the stage of construction, generating deviations in the initially projected in relation to the scope, time and cost of the project, affecting the productivity, profitability of the project and generating changes in the requirements, times and risks not contemplated by it. Currently, the level of growth indicates that Bogota is going through a period of great changes which represent a great economic, social and environmental impact, this economic development that presents the city has increased the progress of construction projects and these to its Once they have echoed in the economy of the country increasing investment in them, so each builder wants to implement technology first hand, but their excessive desire can bring errors and problems of the same processes of development of the project achieving unano planning processes of construction of concrete plants in the city of Bogotá: case study of the plant at Concreto Argos Calle 80, is new in its methodology, which implies a study that takes the experience lived in the field as part of the development of the model. Disposition of the organisms: In the compilation of the information since this entity is suspicious in the consignment of the same.

III. DESCRIPTION OF THE MANAGEMENT METHODS

The case study is called "MANAGEMENT MODEL BASED ON THE GUIDELINES OF THE PROJECT MANAGEMENT INSTITUTE FOR THE CONSTRUCTION OF CONCRETE PLANTS IN THE CITY OF BOGOTA: STUDY CASE CONCRETO PLANT ARGOS CALLE 80", The plant of Concretos de Argos calle 80 It is located in a complex industrial area, besides it enjoys a privileged location since from this point it dispatches a large volume of concrete within a wide area of operation. Under this context it is important to plan the activities that lead to the achievement of an efficient concrete industry from the conception of the project, to the final production of the product with the quality standards required by the end user. The proposal of this work is oriented towards the integral management and dynamics of the concrete organizations, that is, within the framework of the improvement of the organizations where the development of performance is sought in the fields that surround them as time, cost and quality, this is how through the projects the organizations are directed to the fulfillment of the strategic plans and the objectives of the same, within the strategy of improvement, the management of projects has become a tool of vital importance that it allows to fulfill the objectives of the organizations, satisfying the restrictions of the same as well as it allows a transversal knowledge of these. Managing a project is not a matter of a short time ago, because the human being from the beginning of his existence has carried out activities with some parameters, which due to failure has been perfecting (Barbero, 2007). A project is an instrument to generate unique changes. For example, a project to build a house is created from the transformation of different resources (bricks, cement, technical capacity of workers, etc.). Once the house is finished, the project will also end. Another example would be a training project to improve the skill of the employees. In both cases, the changes are intended to be permanent. The most outstanding characteristic of a project is that it is carried out only once. (Guide to the fundamentals of project management (PMBOK Guide), 2018, 5th Ed) The most common projects that can be found in organizations where mass or batch production predominates are usually aimed at improving the competitive position of the organization and making it more efficient or more efficient. For example, the final result of a project to develop a new product should increase the efficiency of sales and marketing efforts. Projects such as changing the distribution of manufacturing facilities or other facilities, or improving
personnel capacity, should generate permanent increases in the productivity or efficiency of these resources.

A. Characteristics of the projects

A project can be defined generally by the following characteristics:

- It includes a single objective, product or result that can be clearly defined.
- It usually has restrictions or defined objectives in terms of cost, program (time) and objective scope requirements.
- Employ the skills and talents of multiple professions and organizations. Often projects are related to advanced technologies and depend on interdependent tasks that can cause new and unique problems.
- It's unique. In general, a project is a unique activity that never repeats exactly.
- It is a temporary activity. It is undertaken to achieve an objective in a certain period of time and once achieved, the project ceases to exist.

Projects as it is a dynamic system also has a dynamic life cycle, the greater the complexity of a system, the more difficult it will be to distribute the phases of your life so that they appear clearly differentiated (Guide to the fundamentals of project management (PMBOK Guide), 2018, 5th Ed.)

There is no one way, which is the best, to define the ideal life cycle of a project. Some organizations have established policies that standardize all projects with a unique life cycle, while others allow the project management team to choose the most appropriate life cycle for the team project. Also, common industry practices often lead to using a preferred life cycle within that industry.

B. What is project management?

Project management is the application of knowledge, skills, tools and techniques to the activities of a project to meet the requirements of the project. Project management is achieved through the application and integration of the project management processes of initiation, planning, execution, monitoring and control, and closure. The project director is the person responsible for achieving the project's objectives (Management Strategies, 2011).

The management of a project includes:

- Identify the requirements.
- Establish clear and possible objectives to perform.
- Balance competing demands for quality, scope, time and costs.
- Adapt the specifications, plans and approach to the diverse concerns and expectations of the different stakeholders

It is important to note that many of the processes included in project management are repetitive due to the existence or the need to gradually develop the project during the life cycle of the project. This means that, as a project management team knows more about a project, the team can then direct it with a greater level of detail.

Projects are a way of organizing activities that can not be dealt with within the normal operating limits of the organization. Therefore, projects are often used as a means of achieving the strategic plan of the organization, whether the project team is employed by the organization or a contracted service provider.

All this is developed under a methodology, which provides, a series of tools for the direction of projects is the PMBOK Guide.

The PMBOK is a guide used by project managers to direct the process of a successful project, and is characterized by the definition of the processes and areas of knowledge from which practices are generated. The advantage of using this guide for projects is that it is of general application, the practices and knowledge described can be adapted to many organizational realities (Institute, 2004). The Project Management Institute (PMI), was the one who in 1996 published the Project Management Body of Knowledge (PMBOK), which is a term that describes the sum of knowledge acquired in the profession of project management. This guide is structured by processes of project management and knowledge areas.

The guide is divided into groups of processes and areas of knowledge:

The groups of processes are:
This research is classified as a comparative type, since it consists mainly of establishing a comparison between two project management methodologies based on the advantages and disadvantages of each of them, and in this way being able to give conclusions and recommendations that may be useful for the formulation of future engineering projects in the public sector.

The following is a description of the methodology to be used in this project, which is based on the Logical Framework methodology, the guide to the fundamentals for project management "A Guide to the Project Management Body of Knowledge (PMBOK Guide)", in its fifth edition, offered by the Project Management Institute (PMI) and the subsequent comparative analysis of the results obtained when evaluating the case study using these two methodologies.

According to the scope and the project plan, you must define what you want to hire and what this service includes, so it is important to consider at least the objectives or causes of development planning, finally expressing:

- What the service includes.
- What excludes the service.
- What are the deliverables.
- Restrictions on the service.
- The assumptions that are made when defining the scope.
- Physical limits of the project.
- Judgment of acceptability on the part of the principal.

Dealby, 3 candidate companies should be considered to perform the service. Additionally, a best practice to be executed by the development team is to perform an evaluation of the provider's performance while performing the service.

When receiving the offers, the project team must evaluate the different proposals in order to choose the most suitable one. A common practice is to qualify the different proposals according to a pattern previously defined by the project team and in this way to be able to choose the best option. To carry out the evaluation, the provisions established by the "Technical Bases" and "Administrative Bases" must be compared with the proposal delivered by the supplier in such a way as to ensure that the previously defined requirements are met. On the other hand, the economic offer must be evaluated, that is, analyze the price offered, payment conditions, possible guarantees in case of services or defective products, among others. Among the aspects to be verified in the evaluation towards the provider are:

- Compliance with the scope.
- Compliance with technical specifications.
- Supplier compliance capacity in terms of technical resources, production resources and financial resources.
- Verify if the company has a quality management system.
- Verify the personnel that will be assigned to the execution of the product or service.
- Analyze the experience of the company in similar jobs.
- Analyze the security statistics presented by the provider.
- Compliance with environmental regulations.

In relation to the criteria previously defined in the evaluation, you must choose and inform the provider that presents the best offer. Therefore, it is the task of the project team to inform the bidder that has been awarded the completion of the service. In general, this is reported through formal means, for example in public contracts an award letter is sent.

After the supplier is considered to have been chosen in the adjudication process, comes the signing stage of the contract (for services) or signature of the purchase order (for materials or equipment). This document shows the conditions under
which both parties (buyer and offeror) undertake to fulfill the rights and duties of each one.

It is the function of the project team to manage and control the processes related to the products and services awarded. A constant quality control of the product or service must be carried out in such a way that it complies with the requirements established in the bases. Within the administrative control, the fulfillment of the duties of the company in relation to the stipulated in the contract or purchase order must be verified. Once the product or service has been finalized by the supplier, the "Reception" is given. The product is received by the buyer and the final verification of quality compliance is carried out. If there is complete compliance on the part of the recipient, the "Settlement" or "Contract closure" is carried out. After this, it is the task of the development team to make the corresponding global evaluation about the work of the provider and keep it in its database.

Later already described the process of management of the project proceeds to mention the steps to step of the assembly where the clarity of the process and the management of the resources will be reflected. Likewise all this process of resource management will be reflected in a timely manner in the assembly process inducing a high quality standard, such is the total relationship that occurs between resources and quality that if one of these is not it is likely that at least one other resource will be affected by altering the scope of the project generating additional risk.

For this, a good practice is that the procurement management team can pose the following questions to find the best alternative and evaluate whether the need will be resolved by an external team or through its own resources:

- What should be bought or hired?
- The purchase or contracting of the product or service is necessary?
- At what time should these deadlines be prevented from spreading further due to manufacturing or other errors?
- How should the purchase or contracting be made?
- What strategy is related to the purchase or contracting?
- Who are responsible for approving the purchase or contracting within the direction of procurement?
- What are the procedures to follow in the procurement process?
- What assumptions and restrictions does the purchase or contracting present?

Due to the advancement of technology has allowed executing projects through different execution strategies, known as Project Delivery Systems, and is defined as: "Strategy selected to carry out the Engineering and Construction phases of a project where the roles, responsibilities of the different teams are established, detailing their form of relating and the moment in which the participants join the project" (CMAA, 2013).

The way in which Engineering and Construction projects are executed, and the relationship between the Computer, design team, construction equipment, different specialties, subcontracts, and others, has had an important evolution over the years. The Project Execution Plan (PEP) corresponds to a document that contains a series of plans to coordinate the stages of the project that advance the phases of study. Every assembly project of the concrete plants can be divided into 2 stages:

- Pre-investment (organization, study and preparation of the project)
- Investment (execution of the project and construction of the work).

These two stages together correspond to the life cycle of the project. It is important to make a difference with stages such as Operational and Closing of the Work that come after the Investment stage and correspond to the life cycle of the work (useful life) of the project, which has the purpose of fulfilling the objectives of the company that gave rise to the project.

According to the PMBOK® guide, 2013, it is important to point out that one of the great characteristics of the Engineering and Construction projects is that the highest expenses are made in the Investment stage. This is due to the high value of materials and operational equipment as well as the high staffing level involved in this phase. Therefore, any unidentified risk or any contingency that occurs in this phase of the project, affects the total cost of the project considerably and directly. It is concluded that to carry out a good planning and a good study of the work that will be built, it is fundamental to comply with the estimate.
When planning a management model for the concrete sector, the perspective will be opened to be able to take a better position to evaluate the risk and uncertainty in the projects, to have information that can be collected, verified, evaluated and communicated in a constant and efficient manner to all people involved in the project, minimizing this form the errors.

For the assembly process, this is executed through different phases, among which are:

- The study of the project,
- Architectural design, which gives rise to the design of each of the specialties of Engineering,
- The manufacturing phase of large equipment,
- The phase of construction and assembly of elements.

The named stages are carried out according to the scope of the project. The Expense Computer must decide how to execute the project through the Engineering and Construction phases of the work. For this, it contracts different companies for the realization of said stages and works. On the other hand, each Engineering and Construction project is developed under a particular environment, where not only internal aspects such as its work culture, organization and regulations determine its good development, but also external aspects such as the social, business environment, environmental, governmental and financial are highly relevant and decisive in meeting deadlines, agreed costs, requirements and objectives that were previously defined in the planning. Therefore, it is fundamental to consider the environment in which the project is to be executed and thus anticipate negative influences on it.

Although many assemblies are carried out under a very similar process, in planning and development different aspects can be seen that produce great differences in relation to the way they are executed. No matter the characteristics of the project and how different they are, each one can be separated into a series of common phases from its beginning until its closure. These phases allow to have a greater control of the processes and to evaluate eventual circumstances that could be problematic in the future according to the duration of the project.

IV. FRAMEWORKS AND APLICABLE THEORETICAL FUNDAMENTALS OF THE PMBOK

This project is oriented towards the groups of processes described in the PMBOK which are based on an initiation, planning, execution, control and closure; which we will describe below:

- Manage cost management: "The detailed management of Project Costs includes the processes related to planning, estimating, budgeting, financing, obtaining financing, managing and controlling costs so that the project is completed within the approved budget." (PMBOK Guide Project Management with foundations -PMI 5ed.)

These activities are implicit in the processes, that is to say, they have interactions with each other and with repercussions in other areas outside the project, especially in those of shorter scope, the estimation of costs and the preparation of the budget must be considered as a single process, which can be carried out a single person in a relatively short period of time. The project costs are mainly concerned with the absolute determination of all the resources necessary to satisfactorily complete the project activities and comply with the objectives of the product, which were recorded in the Incorporation Act, as well as taking into account the effect of the decisions taken in the assembly process, on the subsequent recurring costs of using, maintaining and supporting the product, service or result of the project and finally the after-sales service.

- Plan the activities of the execution schedule: Planning the activities and putting them into a chronogram is the process of establishing the rules, policies, procedures and documentation necessary to plan, develop, manage, execute and control the project schedule, this will be a scheme where the whole project will be detailed, as well it will provide a benefit which will be key in this process since it provides a guide and direction on how the project will be developed along the same path.
According to Parodi (2001), a project consists of a set of activities that are intertwined and coordinated; The raison d'être of a project is to achieve specific objectives within the limits imposed by a previously defined budget and time frame. A differentiating criterion among projects is, without a doubt, their life cycle since, even though the phases through which each project must pass through during its existence are similar, the duration of these is directly associated with the project type; therefore, the configuration of the life cycle between one project and another depends on its own nature.


According to Gray and Larson (2009), the project leader should consider the following premises in the estimation processes of resources, times and costs, so that the estimates are useful and contribute to the successful completion of the project:

- Responsibility
- Use of different people to make the estimate
- Normal conditions
- Time units
- Independence

There are different types of methods that allow estimating times in the administration of a project. It is essential to consider: the total duration of the project, the start and end date of each of the activities, as well as the knowledge that the delay or lag will have in carrying out the individual tasks that are part of the project. Delays in individual project activities have direct on budgeted costs.

Time-Cost Tradeoff

It is appreciated that the total cost is the sum of the direct and indirect costs; the latter continue during the life of the project, that is, to the extent that the duration of the project decreases, indirect costs will also be reduced; On the other hand, direct costs increase each time the project execution time is reduced with respect to the original planning.

All this definition of the process of the methodology for the assembly of the concrete plants is based on the way of managing the project based on the PMI guidelines, forming an integral, renewed and effective link of the set of tools necessary to carry out the group of processes described by the PMBOK Methodology, forging the gestation of the project until its free growth. The current study made it possible to draw a state in terms of Project Management processes, re-evaluating each of the areas of knowledge, notoriously highlighting their strengths and weaknesses. The implementation of this methodology should be carried out gradually, and in a phased manner, since the different projects should be introduced in the processes conceptualized according to the stage of development in which each of them is located.

The research that was carried out in this work is of a descriptive type since it seeks to give character to the form by putting into practice the guidelines described in the PMBOK detailing the groups of processes through a definition of each one, and as part final this methodology is applied for the management of projects of companies dedicated to the concrete industry. The problem in the management of projects will be analyzed, reviewing the start of the project through a documentary review in parallel with the PMI guidelines.

To achieve the objectives set, the following steps are carried out:

- Analysis of project management problems.
- Documentary review of processes, input, output, deliverables and tools proposed by different authors according to the PMI guidelines.
- Review of the environment in which electricity distribution and commercialization companies perform. Definition of knowledge areas, groups of
processes and processes to be included in project management.
- Selection and development of the tools to be used in the methodology.
- Application of the methodology to a practical case.

V. SELECTION OF ALTERNATIVES ACCORDING TO THE MANAGEMENT MODEL

- The application of a methodology based on an information system that is part and serves as support for the optimization of processes is fundamental since usually the execution of the projects involves the handling of a lot of information and it is important that it be updated as possible and be of easy access. In this part of the project, only the processes involved in which an initial scope is defined are authorized, the use of financial resources is authorized, those involved are identified and the project manager is selected (PMBOK Guide Project Management with foundations -PMI 5ed, )

- Start of the project : This part of the project is divided into two parts, the first in which the initial requirements are made describing their needs and the perspective of those directly involved in which the Project Manager is appointed (PMBOK Guide Project Management with foundations -PMI 5ed, )

- Previously, the viability of the project has been analyzed according to the economic evaluation tools presented by the organization. (Baca, 1995). In this first part the name of the project must be made clear arguing a brief outline of the project, leaving the start and delivery times specified. A fundamental part of this project start-up is to mention the PMI processes to be taken into account in the management without leaving aside the human and logistical resources assigned to be able to exercise scope management. The second part of this methodology is to establish the people or organizations that have a direct and relevant relationship about their interests and commitments, with the success of the project (PMBOK Guide Project Management with foundations -PMI 5ed, )

- It is essential from the beginning of the project to identify, document and reconcile the expectations of those involved, since it is the responsibility of the team, from the outset to clarify which expectations can be met and which can not.

- Project planning : This part of the project presents the processes in which the input processes are identified, that is, the scope is established, the objectives are redefined, and the required course of action is taken to obtain the project's objectives. It is in this part that the manager of the project as a whole of his team carries out the Management Plan and determines which PMBOK processes are appropriate to the needs of the project. The Project Manager's department is in charge of preparing the project management plan which establishes the way the project will be planned, executed, monitored, controlled and closed, all of which will be documented to define, prepare, integrate and coordinate all the subsidiary plans; it serves as a guide for execution and control; establishes the standard on which to evaluate the success of the project; facilitates communication among those involved. The Management Plan contains:
  - Scope Management Plan: composed of: Base Line of Reach, Scope statement, WBS.

- Time management : For each of the Work Packages, the activities that comprise it are determined, so that the Structures Construction Work Package is made up of activities for requesting and approving the service interruption maneuver, making reservations, requesting and material removal, equipment scheduling, work execution and scope verification. Analyzing the sequencing of activities, durations, resource requirements and programming constraints, the Project Schedule is generated (PMBOK Guide Project Management with foundations -PMI 5ed, )

- The Start and End dates are determined for each of the activities and therefore for the project, determining the Model Schedule and on this, the project manager performs several calculations and analysis of "what if" alternatives to determine the Optimal Timeline. As a tool we have the Critical Path Method that considers the interrelationships between activities and programming of costs and resources and reflects the series of activities that determine the longest route to finish the project that is composed of critical activities since if any is delayed, the project will be delayed. Based on the works required per node and the grouping of nodes at the work package level, the Project Schedule is generated with the required detail in the information system.

- Execution of the project :Processes performed to complete the work defined in the Management Plan to meet the specifications of the project. It
involves the coordination of people and resources, as well as the integration and execution of activities in accordance with the Management Plan. During the execution of the project, the results may require updating of the planning and revision of the baselines, product of changes in the expected duration of activities, changes in productivity and availability of resources and anticipated risks. Manage personnel to carry out the work and implement the approved changes and direct the existing technical and organizational interfaces to execute the work defined in the Management Plan to obtain the project's objectives. As a tool we have the Project Management Information System: It defines how the information is distributed and stored and provides access to automated tools such as the schedule control software, the configuration management system, the system for collecting and distributing information. Of the information of the required works in detail and the programming in the information system of its execution, it allows to have the programmed works and with the information of works, materials, manpower and resources executed, the advance is obtained the programming versus the execution of works by type of activity.

- **Development of follow-up and control:**
  Management where the realized versus the planned in the Management Plan is compared (PMBOK Guide Project Management with foundations -PMI 5ed.).
  Perform the tracking, review and regulation of progress, to meet the execution objectives defined in the Management Plan. Monitoring includes collecting, measuring and distributing performance information in reports such as: status reports, progress and forecast measurements, including review of deliverables with the client, to ensure that they are satisfactory and obtain formal acceptance. It must be done every time a deliverable is delivered, where the status of the project and the scope of the product are monitored and the changes in the baseline of scope are monitored, as a tool we have the compression of the schedule, that is, reduce the duration of the schedule, without affecting the scope, to meet time constraints intensifying resources to activities of the critical route, is accompanied by increased costs; ensuring that change requirements are addressed in a timely manner and that budget disbursements do not exceed authorized funds by period or total project.

- **CLOSURE OF THE PROJECT:**
  Close Project Finish all activities throughout all groups of management processes to formally complete the project. The project must always be closed regardless of the circumstances under which it was stopped, terminated or completed. In the closing of the project it is done: 1. To release resources, 2. To document the project. It includes: Actions to satisfy work culminations or success criteria; transfer the product to the next phase or production; collect the records; audit the project; generate lessons learned and archive project information. As a tool we have: Lessons Learned: they allow us to learn both the team and the organization of their achievements and mistakes, to look for better future experiences. A verification must be done to validate that the contractual terms and conditions were satisfied. Complete and settle each contract, including the resolution of open matters and the closing of each of the project contracts. As a tool we have Acquisition Audits: a structured review of the procurement process, from Planning purchases and acquisitions to Contract Administration.

**REFERENCES**