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Proposal of a Framework for the Application of PMI, COBIT and ISO/IEC 38500 Good Practices, for the Governance and Management of IT Projects

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The research "Proposal for a framework for the application of good practices PMI, COBIT and ISO / IEC 38500, for the governance and management of information technology projects" was developed with the purpose of recognizing how the application of these good practices in the success of information technology projects and for this, a framework was structured with an important focus on IT governance, structured, methodical, agile in nature, with a level of accessibility and understanding, in such a way that allows its easy customization and adoption in companies that undertake information technology projects and seek to increase the possibility of success in the execution of said projects. To achieve the general purpose of this research, associated with understanding the way in which the application of an integrative framework of these good practices impacts the management of information technology projects, a local diagnosis was first carried out with a small number of companies. with evidence of failure in their IT projects; Next, the most recognized methods in the sector for project management were analyzed; The integration references for these good practices were identified; subsequently the integration framework of ISO/IEC 38500, COBIT and PMI was developed; Finally, a pilot test was applied in a company with execution problems in its IT projects. As the main conclusion of the research, it was obtained that the implementation of an integrative framework of PMI, COBIT and ISO / IEC 38500 in an information technology project positively impacts project management and contributes to increasing its possibility of success. It is expected as a prospective that this framework of application of good practices PMI, COBIT and ISO / IEC 38500, will assist companies that use it in their adequate management of information technology projects, and that it will generate value at a business and economic level. and social, being susceptible to being used in the world, thanks to globalization and the massive use of information and communication technologies.

Keywords: Information and communication technologies; COBIT; Framework; Standards; Project management; Bets practices; ISO; PMI; Methodology; IT governance.

1. Introduction

In the framework of project management, there are high failure rates in the execution of Information Technology (IT) projects, this is observed in the most relevant studies that show that around 50% of IT projects fail. Specifically, software projects have high failure rates, according to the PMI Global Project Management Survey 2017 only 15% of software projects are delivered as planned, as 14% are canceled without achieving the objectives and between 43% and 49% have failures in their budget and schedule. respectively. In another study, MacNeil states that according to a survey by the Project Management Institute conducted in 2021, 12% of his projects failed. Although the discipline of project management is fine-tuned with methodological frameworks and best practices, IT projects present complexities and high failure rates. Among the factors that contribute to the success or failure of IT projects, according to IT, the governance or governance implemented for their execution stands out, as it includes policies, procedures, stakeholder management, application of standards, among other aspects, which, together with the skills that project management may have, are the necessary influencers for the management of authorities. deliverables, work equipment, communications, irrigation and other processes necessary to achieve the requirements of the project.(Avendata, 2023)(MacNeil, 2024)(Díaz Piraquive, Medina García, González Crespo, & Pérez Castillo, 2015)

An article on computing and systems records that, according to studies carried out in different countries around the world, the change of requirements, that is, the change in scope, as well as the lack of commitment of management, represent 66% of the causes for which projects fail. Lam and Rivas identify in their research other important factors as key aspects in project failure, such as not having management skills, that is, implementing inadequate governance for project management; presence of higher than estimated costs and lack of the technical skills required for the implementation of the project. Taking into account that achieving the commitment of senior management is a responsibility of project management, it is observed according to this study, that at least 61% of the responsibility for the success or failure of a project falls on the project's governance model.(Lam & Rivas Peña, 2023)

Faced with this difficulty, the IT sector, including other fields such as industrial production and construction, has already designed and integrated different types of methodologies that aim to reduce failure rates in project management, so this type of integration of standards and methods is natural and has been tried and documented from the perspective of different researchers. The number of standards, models, methodologies for project management is extensive and the technology sector has also been in charge of making combinations of these methods to adapt them to its needs. By observing this panorama, the need arises to identify whether integrating good practices for the governance and management of IT projects in a unified framework, can have a positive impact and increase the possibility of success in the execution of this type of projects, so to achieve this, a framework for the application of PMI good practices was proposed in this research. COBIT and ISO/IEC 38500, for the governance and management of information technology projects, which would land the best practices of the industry and offer in a practical way a set of processes, techniques and artifacts applicable to the needs of organizations for the execution of projects.

During the research, different references that have sought the integration of the most important

standards of IT governance and IT management were analyzed, namely: the ISO/IEC 38500 standard and the COBIT framework. This research analyzed the models proposed by Fernández Sánchez and Piattini Velthuis, Corre y Parra, Salazar and Vera Londoño, Merchán y Rodriguez, Vivas Martin, among others, who studied and presented models to optimize processes and generate value in IT. Also cited in this research are those that propose integrations between COBIT and PMI, important references that propose everything from the alignment of objectives to indicators, but that, unlike this research, did not delve into the structuring of templates with deliverables and concrete artifacts for the use of project managers. With these references and observing the shortcomings, with the intention of making a difference, during the research a proposal for an integrating framework of the PMI, COBIT and ISO/IEC 38500 references was developed and a test pilot was executed with the application of this model in a computer technology project of a company with difficulties in its IT projects; with relevant results related to the way in which the application of these good practices impacted the execution of an information technology project of the pilot test company.

2. Methodology

The research was carried out through a qualitative methodological approach, with a descriptive research scope, in a Research/action type design, since a proposal was made based on the analysis of existing methodologies and an interpretation was constructed referring particularly to the governance and management of information technology projects. the research was oriented to the solution of the problem raised regarding the absence of an integrated framework for the governance and successful management of IT projects, a test pilot was applied and the results derived from the pilot test were described.

Through the qualitative approach and the type of research-action design, a set of interpretative practices was carried out and a transformation was proposed in the way in which the governance and management of IT projects is approached, proposing precisely the application of three references known as best practices: ISO/IEC 38500, PMI and COBIT. The research-action design was selected since it was intended to propose an alternative to solve a problem of the community of project managers or IT directors and achieve a change in the way IT governance projects are faced, being the selected design the one that best adapted to the need raised, since the purpose of action research is, among others, to improve concrete practices through a participatory process.

At the beginning of the research, it was assumed that companies that develop information technology projects fail in them because they do not have or do not implement integrated methodologies of IT governance and management, linked to specialized project management techniques, so the following research hypotheses were proposed: The implementation of a proposal for an integrating framework of PMI, COBIT and ISO/IEC 38500 in an IT project positively impacts the management of the project and contributes to the increase of its possibility of success.

The following were defined as a research-dependent variable: the success or failure in the execution of information technology projects in terms of: time, cost and scope established for

the IT project. On the other hand, as independent variables, the references or methodologies applied in project management by a group of companies that undertake IT projects; and the level of application of the proposal for an integrative framework of PMI, COBIT and ISO/IEC 38500, in the execution of an information technology project. The level of knowledge and willingness of the human resource that participated in the pilot application of the framework proposal was selected as a mediating or intervening variable. The variables were analyzed, the second independent variable was controlled, because the instruments (artifacts of the proposed framework) were delivered and with respect to the intervening variable, the executors of the application of the framework were advised during the pilot.

The data collection also involved a documentary review of the ISO 38500 standard, the PMBOK in its seventh edition, the processes, techniques and methods of the PMBOK in its sixth edition, and the COBIT Guide 2019 because they are the references on which the proposal was based. Subsequently, during the diagnostic activity, the mechanism of analyzing the previous results of success or failure of IT projects was used in a sample of four companies to which interviews were conducted, observation and documentary review were also used as data collection instruments. (ISO, 2015)(Project Management Institute, 2017)(Project Management Institute, 2021)

Next, a pilot test of the proposed integrated framework of ISO/IEC 38500, PMI and COBIT was applied in one of the companies that were part of the diagnosis, in order to determine the level of improvement in project management results (success or failure), in terms of scope, time and cost.

During the implementation phase of the pilot framework, the response of the pilot project to the implementation of the proposed framework was verified. The analysis of the data was based on the behavior of the focus group and the pilot case, that is, on the observation of the case and its manifestations. Data were presented in images, conceptual models, matrices, tables, checklists, narratives, and descriptions of focus group and pilot behavior.

The results were presented through the qualitative report as a descriptive narrative in natural language with the personal imprint of the researcher, supported by citations and references and exchanging the narrative between graphs and texts to present coherent conclusions, an analysis of the hypothesis of the events of the pilot test, concluding with the evidence of the results and presenting prospects or derivations resulting from the research.

The research report included a final product: a framework for the application of PMI, COBIT and ISO/IEC 38500 good practices for the governance and management of IT projects that can become a best practice or reference, with practical application and that is implementable in companies that face IT projects but face costly implementation methodologies. excessive rigor, complex adaptation or specific destination for large sectors, or that are oriented to large projects, difficult to apply on a smaller scale and that require personnel with extensive experience and certification, a resource that cannot always be counted on.

Finally, the research presented its results through socialization in the company that participated in the pilot, in the research report and in this article.

3. Results

Diagnostic Report on Methodologies in IT Project Management

The first research activity corresponded to a local diagnosis on the execution of information technology projects in a selected business sample. For the diagnostic activity, four companies were selected as the focus group, it is a convenient sample scheme due to the proximity to the authorship of the research; a group of companies that facilitated the collection of data and corresponded to the researcher's interest in current commercial relations.

The four companies in the focus group responded to a survey on project management methodologies and the following conclusions were drawn from the analysis of the results:

- Most companies understand and apply the concept of corporate governance, even if it is not in a structured way, they understand the importance of defining the institutional strategy and it is disseminated within organizations.

- All the companies surveyed understand the relevance of information and communication technologies today; In most companies, there is a technology management structure. Likewise, the majority of the surveyed companies carry out strategic IT planning and understand the difference between IT governance and IT management.

- In relation to the evaluation of the level of maturity, both of business processes and IT processes, it was identified that although companies consider the evaluation of their business processes important, they still do not register formal activities for the evaluation of IT processes, which is consistent with the fact that only half of the companies surveyed have information technology projects registered in the strategic plan institutional, which led to the conclusion, when analyzing the other responses of the survey related to this aspect, that although they know the term IT governance, their level of maturity accepted in this regard, is in the order of information technology management, not in that of IT governance implementation processes, except in one of the companies.

- With respect to the use of information technology management frameworks, the companies surveyed demonstrated a maturity level number 2, that is, they know the term, have policies, projects and reactive decisions in IT management, have implemented IT offices and management processes and procedures but not under a "management framework" type methodology.

- Within IT management, it is strongly focused on service and support delivery, as well as IT construction and procurement. It is therefore denoted that there are shortcomings in the companies in the sample in the implementation of integrated management of information technology and a concentration of efforts on acquiring IT and delivering services, efforts that could not be efficient due to the lack of basic decision elements such as: project planning, investment management, monitoring of IT indicators and prospects. This is consistent with the fact that only 50% of companies have an annual investment plan, the rest invest as needs emerge in the year.

- In accordance with the above, related to a poor structuring in terms of IT management frameworks and a partial implementation of processes, it is therefore observed that only 25% of companies have a project management office that follows a methodology in an organized

way, even if required, since 100% stated that they do use a method to manage projects (PMBOK half of them are ISO21500 the other half).

- The state found regarding the lack of implementation of key processes in IT management and the absence of a structured application for project management, are factors that can be determinants in the success rates found in the execution of IT projects, the survey revealed for example, that 50% of companies had a success rate in the fulfillment of projects of between 10% and 30%, a low level, which contrasts with the fact that only one said it was successful in fulfilling 80% of its projects.

In conclusion, the diagnosis carried out on the business sample revealed for these case studies, a relationship between: the governance of information technology at the organizational level, the implementation of IT policies and processes, the structure in the management of IT projects, and the results of compliance in these, observing greater success the greater the methodological structure is applied.

Sample analysis of the most accepted methods of project management articulated to IT management and governance models

There are different categories and methods accepted for project management worldwide, however, information technology projects have special characteristics that involve management risks, due to the needs of articulating corporate governance, IT governance, IT management carried out by technology areas or "systems" and the application of effective project management practices to areas of knowledge that are complex per se, such as the management and integration of technology services or software engineering, disciplines for which specific management methodologies are even generated, such as ITIL in the case of services; the extension of software to the PMI project guide; the SWEBOK, which is the knowledge guide for software engineering; or the SBOK which is the Scrum knowledge guide, a method for agile product development.

According to an article in ADEN Business Magazine, there are different categories of methodologies for project management, among which are: traditional methodologies, agile methodology, Change Management, Project Management Institute, and process-based methodologies. On the other hand, blogger Ben Aston, who writes for the site (ADEN Business Magazine, 2019)The digital Project manager, makes another categorization by finding that project management methodologies can be classified into those that are guided by principles, themes, processes, and standards. (Aston, 2019)

Different authors agree that among the most common methodologies are: Waterfall, Critical Path Method (CPM), Critical Chain Project Management (CCPM), Rational Unified Process (RUP), Agile, Scrum, Kanban, Extreme Programming (XP), Adaptive Project Framework (APF), Event Chain Methodology (ECM), Project Management Institute (PMI's PMBOK® Guide), Lean manufacturing, Six Sigma, Process-Based Project Management, PRISM, PRINCE2, among others.

Among the wide methodological offer, it was convenient for the case that occupied this research, to identify which of the existing methodologies, popularized and with greater acceptance, present a scheme of articulation with models of IT governance and management. Traditional methodologies completely approach project management through sequential

phases or stages, although parallel activities can be carried out, the phases or stages require the completion of the predecessors to be executed and are subject to strict control that is aligned with hierarchical structures.

Standards for project management that have to do with information technologies abound in the market, according to IEDGE there are hundreds that make it difficult to guarantee the success of IT projects, due to the wide variety of standards, norms, documents, process controls and protocols. In the research, the best-known references for this project management were presented, in the end they stand out among all the standards, ITGI's VALIT and ISO/IEC 38500:2008, as the most significant in the field of IT governance.

In terms of information systems management and information technologies, COBIT stands out. In terms of IT service management, ITIL stands out as the best-positioned standard in terms of ensuring service availability and high customer satisfaction.

Finally, in terms of standards for project management, PMBOK is highlighted as a guide for project management in an integral way and CMMI specifically for software development.(IEDGE, 2024)

In summary, when carrying out an analysis of the categories of popularized project management methodologies, it was concluded by citing different references in the field, that there is a wide set of standards and that the selection of one or the other for the administration of a particular project, depends on the characteristics of both the type of project and the product that is intended to be obtained. as well as the organization and stakeholders of the project, among different aspects, including the environment in which it will be developed, additionally, to a greater or lesser extent, the different methodologies are adaptable to IT governance and IT management schemes.

Notwithstanding the wide range of methodologies for project management, special attention should be paid to the fact that the methodology of the Project Management Institute (PMI), the PMBOK guide, offers a scheme that compiles best practices and techniques for management at all levels, strategic, tactical and operational, and that can be aligned, as mentioned, to standards such as ISO and COBIT. methods that promote the effective implementation of IT governance and IT management in organizations.

Sample analysis of the maturity level of documented integrations of PMI, COBIT, and ISO/IEC 38500 standards

The integration of IT governance and management standards to improve project management is observed as a purpose in different initiatives, according to Vargas Bermúdez, what is relevant in the selection of the appropriate standards for the organization or the integration of them is that it meets the focal areas of carrying out strategic alignment. deliver value, manage risks, resources and measure performance. Specifically, Vargas Bermúdez mentions in his article that the most relevant frameworks for this purpose of achieving integration are COBIT, ISO 38500, CMMI, PMBOK and ITIL. (Vargas, 2017)

At this stage, the research analyzed four documented integrations of the most representative standards of IT governance, IT management, and project management:

1. Framework based on the integration of methodologies and standards at different

organizational levels for the optimization of management of Hernández's complex ICT projects. Presents a proposal that links to the PMI standard for project management activities associated with planning, stakeholder management, risk and performance management; and use of SCRUM for technical activities for the development of the product or service derived from the project. At the level of integration and alignment, Hernández proposes the articulation of COBIT and ITIL for the governance and provision of IT services. .(Hérnandez, 2017)

2. Design of a model for the governance and management of IT projects in territorial headquarters of Colombian public entities: national statistical entity, by Martínez and Sepúlveda. In this regard, the authors proposed an integration of COBIT with PMBOK that includes IT project management, aligning the 5 PMBOK processes, with their 9 areas of knowledge, but only with the BAI classification projects that for COBIT are in charge of acquisitions, constructions or implementations, key activities in project management for the development of products or services. .(Martínez & Sepúlveda, 2018)

3. Analytical study of the compatibility between ISO 38500 and COBIT regarding IT governance by Razo Tapia. This referent presented a model in which the principles of ISO 38500 were compared with COBIT to integrate a framework for IT governance and decision-making. In addition, the study proposes the top-down scheme from government to IT management, establishing the concrete relationships between the principles of responsibility, strategy, acquisition, performance, compliance and human behavior of ISO 38500, with the EDM, APO, BAI, DSS and MEA processes. .(Razo Tapia, 2015)

4. Proposal for a simplified reference framework for the implementation of an IT governance in service SMEs in Colombia by Madrid Maya. This proposal makes an identification of the areas of process such as planning and strategy; financial management; continuity, safety and risk management; vendor and procurement management; and the management of the operation and support service, with the most representative standards of IT management, IT project management and specifically, software project management, for this it relates these process areas mentioned with COBIT, ITIL, ISO 20000, ISO 27000, PMBOK and CMMI. .(Madrid Maya, 2016)

At the conclusion of the sample analysis of some of the integrations that have been selected and that propose the alignment of IT governance, IT management and project management standards applicable to IT, the following summary is obtained: Three of the integrations analyzed are at a conceptualization and definition level, this means that they propose an alignment scheme between IT governance frameworks or standards, IT management and project management applicable to IT, in which the processes are standardized and documented, the activities of each process and the roles that perform them are identified; on the other hand, one of the integrations analyzed is at maturity level 4, as it proposes an alignment scheme between frameworks or standards of IT governance, IT management and project management applicable to IT, which includes the activities, tools and techniques, roles, and indicators for the quantitative measurement of the performance and success of the implementation of the framework.

These references were important for the research that aimed to obtain a maturity level 4, that is, to propose an alignment of IT governance, IT management and IT project management standards that can be used as a standardized, documented toolbox with quantification of results

so that it can be used by IT managers in the search for better indicators of success in IT projects.

Proposal for an integrated framework of PMI, COBIT, and ISO/IEC 38500 standards for IT project management

The model of the integrated framework of the ISO 38500, COBIT and PMP benchmarks that was proposed to recognize the impact of the application of these best practices in IT project management, is process-based and includes the alignment of objectives in a downward cascade, starting from the IT governance for which the ISO38500 and COBIT benchmarks are used. continuing with IT management for which the COBIT objectives and processes that are considered necessary for project management were selected, and concluding with IT project management making use of the PMBOK referent. Additionally, in an ascending cascade, the identification of objective indicators and performance indicators was proposed from the field of IT project management to IT management, and from there to the search for compliance with the aligned indicators of IT governance:

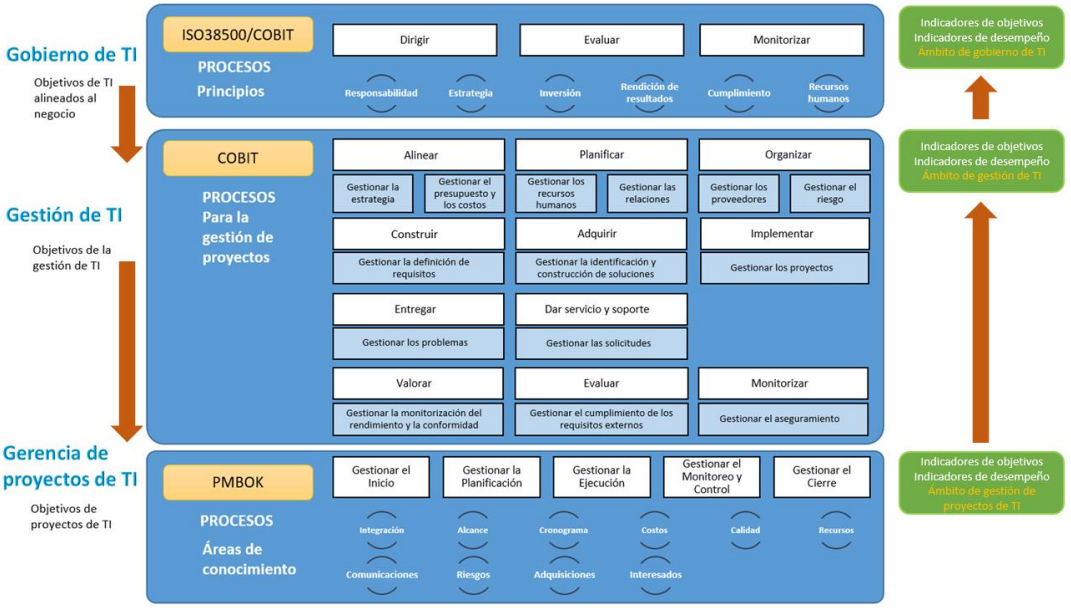

Figure 1 Integrated framework model of PMI, COBIT and ISO/IEC 38500 standards proposed in the research. Own source. In original language Spanish

The framework includes ISO38500 and COBIT's IT governance processes of leading, evaluating, and monitoring, while promoting compliance with the principles of accountability, strategy, investment, accountability, compliance, and human resources. This group of processes was assigned the GOBTI nomenclature. Next, the framework includes COBIT's IT management processes of aligning, planning, organizing, building, procuring, implementing, delivering, servicing and supporting, assessing, evaluating, and monitoring all of which were assigned the GESTI nomenclature. Finally, the proposed framework includes the project management processes extracted from the PMI of managing the start-up, managing planning, managing the execution, managing the monitoring and control, and managing the closure of the project and will be assigned the GERPR nomenclature.

As a practical application, the framework built includes the deliverable formats proposed from the integrated framework of the ISO 38500, COBIT and PMP references, in accordance with the processes selected for this framework, proposing 48 deliverable sheets with the sections of: name; purpose; description; content; and artifacts, annexes or additional documentation.

In addition, the framework proposes 10 indicators in the field of IT project management; 5 indicators in the field of IT management; and 5 indicators in the field of IT Governance, which complete the model of alignment of IT project management objectives, with integrated technology management and bottom-up, with IT governance.

PMI, COBIT, and ISO/IEC 38500 Integrative Framework Application Results Report

In order to carry out a pilot test of the application of the integrating framework of PMI, COBIT and ISO/IEC 38500, one of the participating companies of the diagnostic exercise described in this document was selected, the selected company develops design and consulting solutions for infrastructure, education, health, basic sanitation and engineering projects.

For the pilot test, the company selected a project to develop software for the management of documents, communications, commitments, tasks, requests, technical visits and payments for an audit office in the transport sector in Colombia. The purpose of the test was to deliver the management formats of the proposed integrative framework of PMI, COBIT and ISO/IEC 38500 to the company for application in the software project from its inception, and to identify whether it was more successful in terms of achieving compliance with the scope objectives, cost, time and quality of the project, since this company had been executing IT projects with deviations from the project goals.

The selected project corresponded to an audit management software for the transport sector, had a duration of 8 months, a budget of 150 million Colombian pesos, about 30 thousand dollars. The company subject to the pilot selected the following processes from the work framework, filling in the corresponding information: From the IT governance process group: GOBTI_01 Direct; GOBTI_02 Evaluate; and GOBTI_03 Monitor. From the IT management processes group: GESTI_01_01 Manage strategy; GESTI_01_02 Manage budget and costs; GESTI_02_01 Manage human resources; GESTI_03_02 Manage risk; GESTI_04_01 Manage the definition of requirements; GESTI_05_01 Manage the identification and construction of solutions; GESTI_06_01 Manage projects; GESTI_11_01 Manage insurance. From the IT project management processes group: GERPR_01_01 Develop charter; GERPR_02_01 Project Management Plan; GERPR_02_02 Scope, Change and Configuration Management Plan; GERPR_02_03 Schedule; GERPR_02_04 Project resources; GERPR_02_05 Budget; GERPR_02_06 Quality Plan; GERPR_02_07 Communications Plan; GERPR_02_08 Risk management plan; GERPR_03_01 Manage the schedule; GERPR_03_02 Manage resources; GERPR_03_03 Manage the budget; GERPR_03_04 Manage quality; GERPR_03_06 Manage communications; GERPR_03_07 Manage risks; GERPR_04_01 Schedule control; GERPR_04_02 Resource control; GERPR_04_03 Budget control; GERPR_04_04 Quality control; GERPR_04_07 Risk monitoring; GERPR_04_10 Validation and receipt of scope deliverables; GERPR_05_02 Close Project.

Once the framework proposed in the transport sector audit management software project of the pilot company was applied, at the end of the project execution, the following indicators

were observed:

1. Requirements of the scope obtained: all the milestones of the project were achieved, the different modules of the software were received to the satisfaction of the client.

2. Deviation from the schedule: the project had a planned duration of 8 months and concluded in 8 months and 15 days. Although there was a slight deviation from the schedule, there was a significant improvement, when applying the pilot, the gap between the planned and executed time of its IT projects decreased, since the company subject to the pilot came from the following state of compliance with project deadlines, in the last two years:

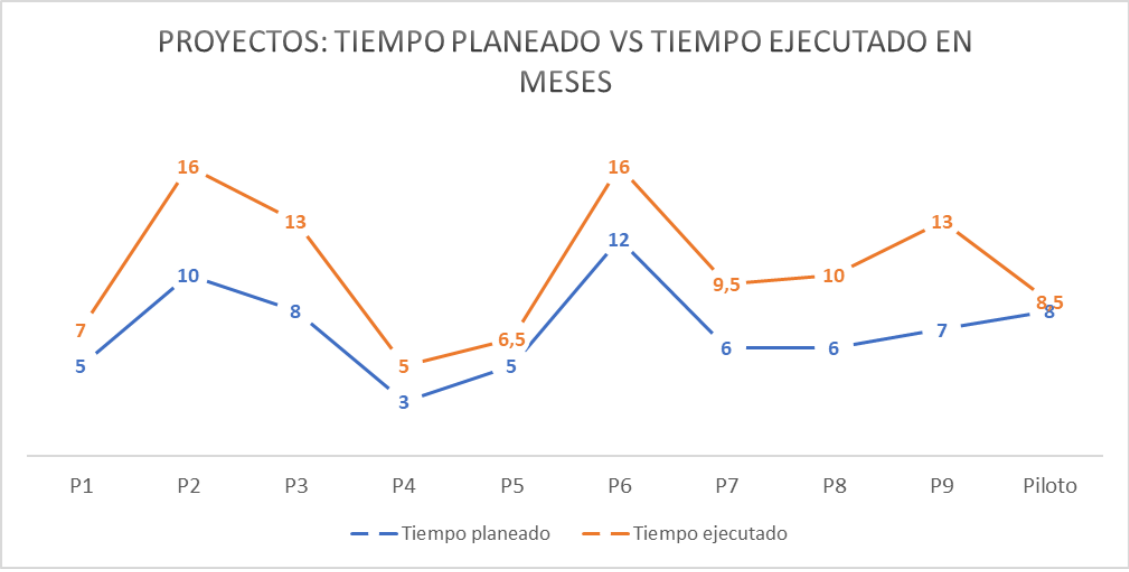

Figure 2 Comparison chart of planned versus executed time on pilot company projects in the last two years.

Own source. In original language Spanish

3. Budget execution and return on investment: despite the additional 15 days in the execution of the project, the client's satisfaction with the initial product allowed the budget difference of an additional 5 million Colombian pesos (about 1,000 dollars) to be covered, generating a benefit with respect to the cost of the project.

4. Quality of the deliverables: the project met the expectations regarding the quality of the different modules of the developed software product. The customer rated the overall product with an average of 9.97/10.00.

5. Project risks materialized: during the execution of the project no risk materialized.

6. Degree of maturity of the process: it is estimated that the pilot's company increased its maturity level from level 2 (intuitive) to level 3 (Conceptualization and definition). He structured an orderly process of guidelines in IT project management in a top-down manner from corporate governance, through the management of the IT area and concluding with the area of management of software development projects. Standardized and documented the

different activities of each process and the roles that perform them.

Socialization of integrating framework of PMI, COBIT, and ISO/IEC 38500.

Once the pilot for the application of the integrated framework of PMI, COBIT and ISO/IEC was concluded, the results were socialized in the pilot company and in the other companies of the diagnosis, the proposed framework, its general scheme or integrating model.

4. Conclusions

The main objective of the research was to recognize how the application of ISO/IEC 38500, COBIT and PMI good practices impacts the management of information technology projects, through the application of a pilot project in a company with difficulties in completing its IT projects, and it was concluded that, indeed, the implementation of an integrating framework of PMI, COBIT and ISO/IEC 38500 in an IT project positively impacts the management of the project and contributes to increasing its chance of success.

To achieve the proposed general objective, 6 specific objectives were proposed in this research for which the following conclusions are presented after developing this research:

The diagnosis of project execution and its success rates revealed that the companies participating in the research had difficulties in completing their IT projects correctly, in fact, 50% of them sincerely expressed that only 30% maximum of their projects managed to complete within the established parameters. Among the factors with the highest incidence in the failure of IT projects were: Inadequate scope management; deficiencies in budget management, i.e., cost management; and difficulties in managing the quality of the products derived from the projects.

These factors of direct incidence in the failure of the projects, in turn, were influenced by difficulties in their governance schemes, after the diagnosis process, it was evidenced that the lack of structuring in the management of IT and its projects, could be having a high impact on the low success rates in its IT projects and one of these companies was proposed to be subject to diagnosis, conduct a project management pilot with the framework proposed in this research that integrates ISO/IEC 38500, COBIT and PMI, in order to determine if a better structured model for IT governance, IT management and IT project management could increase the success of your projects.

In the process, an extensive tour of the most recognized methodologies and standards worldwide for project management, especially those of IT, was carried out. In the different methodologies previously analyzed, no explicit integration with IT management and IT governance aligned with corporate governance was found, and this is as important as ignoring the culture associated with a project because shortcomings of this type can lead to the success or failure of the project. The research in the development of this objective of identifying relevant methodological references showed that among the most accepted standards for IT governance are: VALIT of ITGI and ISO/IEC 38500:2008; whereas COBIT and ITIL are among the most widely accepted for IT management, with the advantage that COBIT is also responsible for governance; and that definitely the most accepted for project management is the PMI with its PMBOK guide.

Likewise, existing integration research of these referents was analyzed and it was found that three of the integrations observed as referents effectively proposed a model of alignment between standards, frameworks or methodologies that provided benefits for IT governance, IT management and project management, these integrations presented proposals for duly standardized processes, With specific activities and roles, without presenting as this research, a proposal at the level of artifacts for practical application, it did constitute an important reference on the basic elements that a framework that seeks to align these components and influence the success of the project should have.

In the fourth objective, referring to developing a proposal for the framework of the PMI, COBIT and ISO/IEC 38500 references, a framework integrating good practices was structured during this research: PMI, COBIT and ISO/IEC 38500 with a simple, easy-to-understand language, identifying the most relevant processes, as complete as possible, but at the same time granular so that large, medium and small organizations can implement only those processes that are applicable to them, identifying with greater or lesser complexity the deliverables that they can produce and that could give them a better percentage of success in their IT projects.

At the level of detail of the framework presented in this research, the processes were identified and named, and for each of them, deliverables with specific artifacts were proposed for each component.

Finally, in view of the purpose of developing a test pilot of the framework proposal in an information technology project of a company with difficulties in its IT projects, a company with some difficulties in meeting goals in the management of its IT projects was selected and the proposed framework for its application was delivered. they were also advised in the construction of the deliverables associated with the selected processes of the framework.

The company selected for the test pilot chose, with the advice of this research, the necessary and adaptable processes to the project for the application of the framework and at the end of the pilot the hypothesis that the implementation of an integrating framework of PMI, COBIT and ISO/IEC 38500 in an information technology project, it would positively impact the management of the project and contribute to the increase of its possibility of success, since the company achieved the scope of the software engineering project.

In perspective, the proposed framework is timeless and independent, each proposed process is susceptible to be augmented with new deliverables and artifacts; depreciating any that is declared obsolete by new management trends; or adding new documents in the additional information section, this makes the proposal processes adaptable to changing PMBOK and COBIT standards, as well as the complexity of the organizations that use them. In the structured proposal for the PMI, COBIT and ISO/IEC 38500 integrative framework, an ecosystem of artifacts is suggested that can be selected by the organization for the management of IT projects, articulated with others or complemented from corporate experience, so that an entity that adopts the framework will be able to apply the principles of complexity and adaptability expressed by the PMBOK, to apply the framework proposed in this research in accordance with the needs of the environment of each of its projects.

It is expected that the results of this research, by applying the good practices of ISO/IEC

38500, COBIT and PMBOK integrated into the proposed framework, will provide a sufficiently rigorous alternative from the technical perspective, for its apprehension in different IT project management environments: public, private, academic and other sectors. and practical enough, agile and useful enough for application in different sizes of organizations by being able to select the processes and deliverables of this framework that are applicable to them.

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