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ORIGINAL

Descriptive Framework for Project Management for the Implantation of Enterprise IT Applications in SMEs

Marco Descriptivo para la Gestión de Proyectos de Implantación de Aplicaciones Informáticas Empresariales en las PYMEs

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ABSTRACT

Adopting an Enterprise IT Application (EITA) is a complex process that requires effective management to ensure success. Studies show that failure rates for such projects range from 30 % to 70 %, with 57 % of implementations taking longer than expected, 54 % exceeding budget, and 41 % failing to achieve the anticipated benefits. This paper proposes a framework for managing EITA implementation projects in small and medium-sized enterprises (SMEs). The framework was developed by coding and analyzing interviews with 18 professionals who have experience with EITA implementations. The interviews were transcribed and analyzed using the qualitative analysis software MaxQDA. The outcome is a descriptive framework that outlines the necessary activities for each phase of an EITA implementation project, taking into account the specific limitations and constraints of SMEs. This framework is designed to be a practical tool for project managers overseeing EITA implementations in SMEs, as well as for professionals new to this type of project, providing them with a foundational structure for effective project management.

Keywords: CRM; ERP; Implantation; Implementation; Project Management.

RESUMEN

La adopción de una Aplicación Empresarial de TI (EITA, por sus siglas en inglés) es un proceso complejo que requiere una gestión eficaz para asegurar el éxito. Los estudios muestran que las tasas de fracaso de estos proyectos oscilan entre el 30 % y el 70 %, con un 57 % de las implementaciones tomando más tiempo de lo esperado, un 54 % excediendo el presupuesto, y un 41 % que no logra alcanzar los beneficios previstos. Este artículo propone un marco para gestionar proyectos de implementación de EITA en pequeñas y medianas empresas (PYMEs). El marco fue desarrollado mediante la codificación y análisis de entrevistas con 18 profesionales que tienen experiencia en implementaciones de EITA. Las entrevistas fueron transcritas y analizadas utilizando el software de análisis cualitativo MaxQDA. El resultado es un marco descriptivo que detalla las actividades necesarias para cada fase de un proyecto de implementación de EITA, considerando las limitaciones y restricciones específicas de las PYMEs. Este marco está diseñado como una herramienta práctica tanto para los gerentes de proyectos que supervisan implementaciones de EITA en PYMEs, como para profesionales que se inician en este tipo de proyectos, brindándoles una estructura básica para la gestión eficaz de proyectos.

Palabras clave: CRM; ERP; Gestión De Proyectos; Implantación; Implementación.

INTRODUCTION

One factor that influences the implantation of Enterprise Information Technology Applications (EITA) in Small and Medium Enterprises (SME) is Project Management; in addition, there are other important factors such as adequate software customization, information security, chief executive officer (CEO) involvement, adequate change management, and end-user training.[1] This article will deal exclusively with project management for an EITA implantation.

We consider an EITA an application that is on the market and ready to be acquired and used. Examples of EITAs include Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Content Management System (CMS), Learning Management System (LMS), and Point of Sale (PoS). Other names for an EITA are Commercial off-the-shelf (COTS) and ready-to-use Software Product (RUSP).

Project management comprises the planning, delegation, monitoring, and control of all aspects of a project, sustains the motivation of the various factors involved in order to achieve the project goals, achieving the expected performance in terms of time, cost, quality, scope, benefits, and risk.[2,3]

For their part, Chalgham et al. mention that managing a project involves Identifying requirements, addressing stakeholder needs, concerns, and expectations, and balancing competing project constraints that relate to quality, time, budget, resources, and risks.[4]

In addition, project management focuses on continuous communication with stakeholders to understand their needs and expectations, addressing milestones as they occur, generating interest, and encouraging stakeholder participation in project activities.[5]

The core competencies of a project manager for successful software include strong technical knowledge, project lifecycle management, effective leadership skills, risk management, stakeholder management, and quality management. These competencies enable the project manager to understand technical challenges, establish milestones, motivate the team, anticipate issues, meet stakeholder needs, and ensure the delivery of a high-quality product.[6]

Also, it is important to involve project stakeholders, including managers, administrators, and technical staff, to raise awareness, set realistic expectations, increase support, and ensure successful implantation and user adoption. Kibera's study suggests that lack of stakeholder involvement and inadequate change management have been barriers to adopting technologies such as Customer Relationship Management.[7]

Software projects often need more budget, time, and scope management due to misdiagnosed issues that take inappropriate importance to company policies. Lui and Chan's work proposes to give greater importance to top management to solve failed projects by identifying the owners of the problems and reorganizing the team structure according to the process areas.[8]

Top management plays a crucial role in supporting project teams by designing the organization to facilitate project management. This includes reorganizing the structure to prioritize projects or integrating projects within the existing organization. They define the project manager's responsibilities, level of authority, and relationships with the project's home department and other departments. Top management also determines communication channels, conflict resolution methods, and the relative prioritization of outcomes, costs, and schedules.[9,10,11,12]

It is also necessary to mention that along with implementing an EITA, there are cross-cutting issues, such as process management, people involvement, project management, change management, leadership, and communication.[13]

Standards and methodologies for project management

The PMBOK maintains a globally recognized standard and guideline for the project management profession. A standard is based on a formal document that describes established rules, methods, processes, and practices. PMBOK works with five processes: initiation, planning, execution, monitoring and control, and closure. In addition, it identifies ten knowledge areas for organizing processes: integration, stakeholder, scope, human resources, time, cost, risk, quality, procurement, and communication.[14]

ISO 21500:2012 Guides project management concepts and processes that are important for project performance. It identifies the following processes: initiation; planning; implementation; control; and closure. It also identifies 10 "themes" for organizing processes: integration; Stakeholder; scope; resource; time; cost; risk; quality; procurement; and communication.[15]

Adnan Kraljić & Tarik Kraljić propose to use Scrum as an agile framework for partial deliverables during the management of a software implantation project; the division into small parts of the project helps stakeholders to perform tasks with short-term goals.[16,17]

Another methodology used in agile software is Kanban, which is a planning system that provides a clear visualization of assigned jobs. Scrum and Kanban are the most widely adopted methods currently, methodologies are especially suitable for software and technology projects.[18]

The PMBOK defines several areas of knowledge: scope management, time management, and cost management,

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among others, this, in turn, implies the need to use a large work team with expertise in different areas of technology to perform correct project management.[19]

ITIL (Information Technology Infrastructure Library) is a set of good practices for managing information technology services. Although not specifically focused on project management, it does offer guidance for delivering technology services effectively and efficiently.[20]

Project management standards and guides are essential in providing concepts, processes, and techniques for various knowledge areas. However, defining and achieving success in information systems project management can be challenging due to the multitude of stakeholders and variables that project managers and teams must consider.[21]

In current methodologies, which contemplate agile principles, an implantation plan proposes the introduction of new organizational roles and functions, and the importance of transparent team roles is emphasized. To facilitate adaptation to new organizational processes, employees are involved in strategic planning through interactive workshops.[22]

Identified problem.

It can be considered that the implantation of an Enterprise IT Application (EITA) can be a long and complex process, which is why there is a high rate of failed implantations, thus affecting business performance, as well as great economic losses, affect processes, employees and even the culture of an organization.[23]

A failure can be defined as cancellation of the implantation, inability to run the organization after implantation, disruption of production and normal workflow because of the new software, or a system put in place with inadequate features.

Failure rates vary throughout history, and in different studies, there are failure rates that vary between 30 % and 70 %, which also indicates that 57 % of business software implantations take longer than expected, 54 % exceed their budget, 41 % fail to obtain more than 50 % of the benefits and 40 % manage to operate but later suffer an interruption, and finally delimiting that 32 % of executives and 39 % of employees are dissatisfied after implantation.[24]

In the implantation of an EITA in SMEs, there may be multiple causes for its integration in SMEs to be deficient, such as inadequate selection of EITA, scant support from senior management, inadequate project management, and change management among the main.[1] In project management some drawbacks are:

Planning: In this phase, one of the most common drawbacks is the lack of a clear and detailed project management plan, which includes the definition of clear and measurable objectives and goals, the establishment of an adequate budget, the identification of the necessary resources and the determination of delivery times. Also, there may be a lack of consideration of end-user requirements and technical and budget constraints.

Execution: In the delegation phase, there may be communication and coordination problems among project team members, which may lead to a lack of understanding and clarity regarding the assigned tasks and responsibilities of each team member. There may also be risk management issues, where project risks are not adequately identified, assessed, and addressed, which can lead to project delays and increased cost.

In the monitoring phase, one of the main drawbacks may be the lack of proper monitoring of the project's progress. This may be due to a lack of adequate tools to monitor the progress of the project, or a lack of resources and trained personnel to carry out the follow-up. This can lead to project delays and a failure to meet established goals and objectives.

The problem to be addressed in this research is the lack of frameworks or methodologies that guide SMEs in managing the EITA implantation project. Although there is indeed literature on the management of software projects, most of these are directed toward development and not necessarily towards implantation or deployment.

Objective

This research aims to identify a descriptive framework used by project managers for implanting Enterprise IT Applications in SMEs. Software implantation refers to both the implantation of new systems and the upgrade of existing systems. These projects greatly impact organizations, but their success and antecedents should be researched more.[25]

This paper starts with a brief introduction to project management and its main frameworks for project management. The research design is presented, followed by the results, and finally, conclusions, recommendations, and future work are presented

METHOD

For this research, we used a qualitative approach. Qualitative research in Information Systems aims to empirically investigate a variety of related phenomena through qualitative data from various sources, such as interviews, observations, interventions, and archival materials. Qualitative research methods have been used

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extensively in previous research, and a rich portfolio of knowledge is available to support this type of research.[26,27]

Interviews were used for data collection. For this research, we adapted Yin's recommendations for conducting case studies[28]; thus, we worked in four stages: planning, data collection, data analysis, and presentation of results.

In the planning stage, the analysis unit was defined, the data collection instruments, and interview questionnaires were also designed. In addition, companies and IT professionals that could collaborate in this research were also identified at this stage.

The unit of analysis of this study is: "how the management of IT application implantation projects is carried out" and corresponds to the core of this research.

The instruments for data collection were a Letter of invitation (presented with a summary of the research and the authors), information for participants (a document containing information about participating in the research and confidentiality), an informed consent form (in this document, the interviewee declares having received information about the project and its scope), interview questionnaire (document with the questions to be asked to the interviewees) and interview protocol (the document that guides how to conduct the interview).

Once experts had reviewed the structure and content of the interviews, the data collection stage began. A total of eighteen interviews were conducted, which were divided into three groups of professionals of six each. The groups interviewed were as follows: project managers of companies supplying Enterprise IT Applications with implantation experience, project managers of client companies implanting an EITA, and project managers of public companies implanting an EITA. The interviews were conducted via videoconference using Microsoft Teams, the average duration of the interviews was 45 minutes.

The next stage was the analysis of the information collected. First, the interviews were transcribed in clear verbatim format; then, the interviews were coded using the qualitative analysis software MaxQDA following Kuckarts recommendations.[29] A descriptive framework used by project managers to manage EITA implantation projects was obtained from the codes.

Finally, the descriptive framework is shaped in the last stage, and the results obtained are interpreted. It is necessary to clarify that the framework obtained is based on the information provided by the experts; Based on this information, we try to understand the problems in implanting an EITA. This descriptive framework contains the main aspects that experts consider when implanting an EITA. This research does not contemplate the proposal of a prescriptive framework and its validation.

Table 1 below shows the list of interviewees and some relevant phrases they mentioned in the interview regarding the Management of EITA Implantation Projects.

Table 1. List of interviewees with ideas mentioned

No.	Interviewee	Relevant ideas
1	PM-Suppier-1	"In the public sector, EITA implementation is challenging due to the heavy workloads of public officials, who often claim they lack time. In contrast, the private sector operates differently, where directives from management are expected to be followed by users. The prototype helps to highlight these distinctions."
2	PM-Suppier-2	"... we have traditional and agile methodologies; in that sense, both have been used. The traditional one is lagging because of the cascading processes and the very exhaustive documentation it requires; agile methodologies are replacing the traditional methodology, but today agile methodologies such as Scrum are used to implement or develop software products."
3	PM-Suppier-3	"The project manager ensures timely delivery within the agreed budget. Since unforeseen issues often arise during execution, it's essential to have expertise in work breakdown structures to better estimate time and costs." "Missing deadlines increases costs and can lead to contractual penalties, where the client may impose financial consequences for non-compliance, requiring the project team to bear a portion of the expenses."
4	PM-Suppier-4	"The culture we have for delivering software is to decompose all the parts, that is to say, to solve small business problems, and we can deliver solutions in a short period, usually one or two weeks."
5	PM-Suppier-5	"... there should always be a post-production follow-up because you must be accompanying the customer until they learn how to use the platform because not everyone adapts."
6	PM-Suppier-6	"Sometimes the client requests to bring extra staff to help them to take the inventory because some businesses do not have it, and it is necessary to upload data to the EITA."
7	PM-Client-1	"... we have had some challenges with software because mainly not all of them adapt to the needs of the institution; when we acquire something, it already comes ready, and in financial systems, it is complicated for an institution to have the personnel to be able to develop its system; then, we have to couple ourselves to a tool and then gradually review the developments together with suppliers and thus comply with the processes that the institution requires."

8	PM-Client-2	"We hold daily follow-up meetings lasting 15 minutes to an hour to monitor ongoing activities." "The ultimate measure of success is meeting deadlines. If the project is completed and fully functional within the estimated timeframe, it was managed well. However, requesting an extension due to a critical issue indicates that something went wrong in the process."
9	PM-Client-3	"One of the main risks we have had in most projects is the change of laws. There have been times when certain modules are already implemented, and in the time it took the process, new regulations appear, so we have to review everything that has been developed to adapt or desist."
10	PM-Client-4	"We have not used methodologies, but we know that there are companies that provide software search services, they are in charge of gathering the information and the whole process, but we have not used a methodology."
11	PM-Client-5	"In projects, there are always deadlines to define, and all compliance is recorded in minutes so that at the end, we can make a retrospective analysis if there was extra time in what was initially considered."
12	PM-Client-6	"The IT department of the client company works with the supplier in the implantation process because it is always necessary to follow up on the project being implemented."
13	PM-Public-1	"Several meetings were held with area representatives to ensure that the work aligned with their specific needs. A deadline for system launch was then established, and after successfully completing functionality tests, the new version of the system was introduced to all department users, informing them of the official launch date."
14	PM-Public-2	"Once officials recognize the necessity of the software, two key elements are required: detailed procedures from their area and a project lead with extensive experience in the process. This individual must be well-versed in the procedures, as we need someone with years of expertise, not someone with limited experience"
15	PM-Public-3	"Something important to consider is that in a public institution, one of the fundamental factors to start a project is precise that the need is established, that a problem or some guideline has been detected, but above all, the issue is to identify compliance with a specific regulation."
16	PM-Public-4	"Prior to the IT technician raising the requirement, there should be the raising of processes. We would be minimizing inconveniences."
17	PM-Public-5	"The supplier has its planning, and they cannot guarantee the work overnight, but they are based on previous implantation processes that they have already carried out."
18	PM-Public-6	"Success is gradually lifting the procedure because their people already realize what they really want and what they must do. However, the people who do the procedure and who will use the system must be involved for the lifting."

RESULTS

A descriptive Framework for the Management of EITA Implantation Projects was obtained from the interviews conducted with professionals who carry out or have carried out the Management of the Enterprise Software Applications Implantation Project. This framework is based on the PMBOK guidelines of the Project Management Institute[30] and SCRUM methodology,[17] and consists of five phases: initiation, planning, execution, monitoring & control, and closure.

Before presenting the framework, it is necessary to clarify that implanting an EITA is done in three moments and involves teams from the software contracting company and the software supplier.[31]

Pre-implantation

It is the first phase when the company identifies its needs, defines processes, and performs an EITA's search, evaluation, and selection. This phase ends with selecting the EITA and the supplier to implant it. If the companies are formal, they will sign a contract.

Implantation

In this phase, the contracted supplier starts with the analysis of the company, designs a solution, adjusts the processes between the company and the EITA, performs the installation, customization, and parameterization of the EITA, then loads or migrates data, tests, and training. This phase ends when the EITA is launched into production.

Post-implantation

It is the last phase; it starts with stabilizing the system just launched to production. In addition, the EITA's support, update, and extension are performed in this phase.

This article focuses on the second phase, the software implantation process, for which the EITA Implantation Project Management Framework is proposed, as illustrated in figure 1. The core of this framework consists of five phases: initiation, planning, execution, monitoring and control, and closure. Additionally, these activities can be combined with activities from the Scrum framework. The activities to be carried out in each phase are described below.

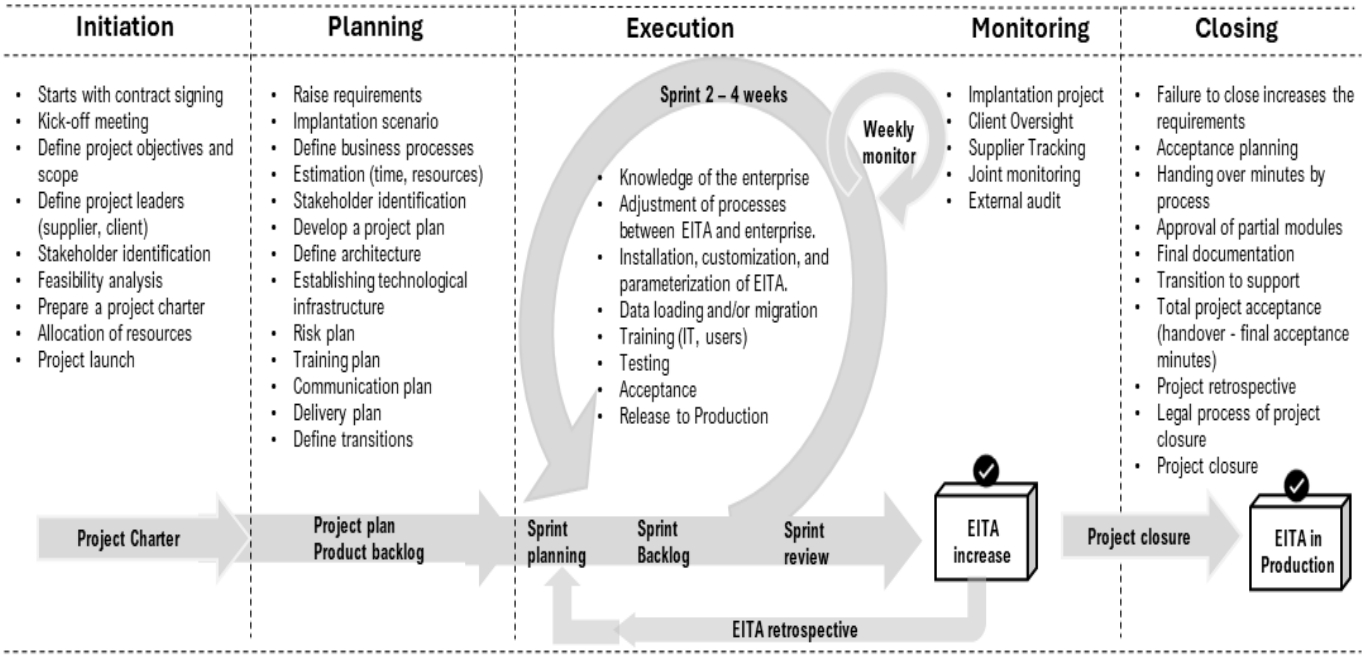

Figure 1. Framework for the management of EITA implantation projects in SMEs

Initiation phase

The initiation phase begins when the contract is signed (the last activity of the pre-implantation phase); in this contract, the supplier must state the schedule, the cost, and the implantation team.

In addition, in this phase, an initial meeting is held between the leaders of the contracting enterprise (client) and the software supplier enterprise; in this meeting, the project managers (client, supplier) are designated, and the objectives and scope of the project are defined. Next, the people responsible for the project by areas (stakeholders) are identified, and economic and human talent resources are assigned.

In this phase, the Project Charter is drawn up, which should include the general project schedule, delivery deadlines, and control milestones. It is recommended that this phase ends with the launching (socialization) of the project, in which the areas to be intervened, the changes to be made, the expected benefits, estimated time, and the means of communication to be used in the project are mentioned transparently.

Planning phase

This phase is one of the most complex as it defines the entire project's planning. It includes gathering requirements, defining the implantation scenario, business processes to be automated, identifying stakeholders, creating a detailed project plan, establishing the architecture, and developing risk, training, communication, and delivery plans. It concludes with the transition to the new EITA.

During requirements gathering, management communicates strategic objectives, while users provide operational insights. Functional and non-functional requirements are identified and recorded in signed agreements between the client and EITA supplier. The implantation scenario is defined, with options such as first-time implementation, integration with third-party software, or full migration to a new EITA.

Next, the processes to be automated are defined, and estimates for time, personnel, costs, and slack are calculated. Key stakeholders are identified, including project personnel, main users, end users, and technology area staff. The detailed project plan includes a work breakdown structure (WBS), schedules, budgets, roles, testing, and release timelines. The product backlog is derived from this plan.

The architecture, deployment location, and number of users are outlined, along with a risk plan and mitigation strategies. Additionally, a training plan is developed, outlining who and when to train, along with a communication plan detailing what, when, and how to communicate. The delivery plan defines which modules will be delivered and when. Lastly, the transition to the new EITA can be phased, parallel, or executed as a full "Big Bang" launch.

Execution phase

The execution phase consists of carrying out the planned activities in Sprints of two to four weeks. Each Sprint begins with a Sprint planning, and from this planning, the Sprint backlog is derived. Each Sprint starts

with an in-depth knowledge of the enterprise regarding the functionality to be implanted.

During the process, adjustments are made between the EITA module and the company's processes. The hosting infrastructure is determined, and the module is installed, customized, and parameterized. An initial data load or data migration is performed, followed by training for both end users and IT staff. After thorough testing and user acceptance, the system is scheduled for production.

To get to know the company in depth, work meetings are held with area managers, and users who are familiar with the processes to be automated and the end users who will use the EITA are also identified. A detailed gathering of the requirements is carried out with all of them.

Concerning the adjustment of processes between the company and the EITA (module), there are several scenarios.[32] The first scenario, where the EITA adjusts to the company, in this case, software developments must be made to cover the mismatches; in the second scenario, the company adjusts to the software, in this case, the company adopts the processes established by the EITA.

The next step is to determine the technological infrastructure where the EITA will be hosted; it can be internally in the company (on-premise) or externally to the company (cloud). In addition, depending on the size of the software to be implanted, this infrastructure will have a testing platform (quality), pre-production platform (training), production platform, connectivity, servers, database, storage, power supply, and backups, among others.

The EITA is then installed, customized, and parameterized. Once the EITA is operational, data loading begins. This data loading can be done with initial data (which makes the software usable) or with a total migration from an old system to a new system.

Data loading involves either initial data for system operation or a full migration from legacy systems. Data migration is a complex process that often requires a specialized team to clean, prepare, and transfer data by modules, ensuring information quality is maintained.

Training and testing occur in parallel. End users first receive training before testing the system, and a quality area validates the system before it goes live. A signed certificate confirms users' endorsement of the EITA's correct operation. Training for both end users and IT personnel is critical, with records kept for project closure, as additional training may be required.

Once the Sprint is completed, a Sprint Review is conducted for user acceptance. If any issues are identified, a retrospective is held to address missing objectives, and the process returns to Sprint Planning. The EITA goes live once all tests are passed, and management approves the production release date, which is communicated to all relevant stakeholders.

Monitoring and control phase

The monitoring and control of the project is done in three instances. The EITA supplier's project manager does the first monitoring, the second monitoring is done by the person in charge of the project on the client's side, and the third monitoring can be done by an external party to the supplier and client if there is a prior agreement between the parties. In addition, this external actor can help resolve possible conflicts during the project.

Supplier monitoring consists of constantly monitoring the project, reviewing its control indicators, holding meetings to verify progress, verifying compliance with established goals, defining adjustment strategies, and complying with established deadlines and deliverables.

On the client's side, the IT area traditionally follows up on the project, monitors the deadlines and deliverables offered by the contractor, and holds periodic meetings with users to verify progress and resolve concerns. In addition, they rely on end users to evaluate procedures, endorse the system, and make progress reports for payment to the supplier.

There is also joint monitoring, which is carried out between the client and the supplier. Control meetings are held in this monitoring, possible conflicts are resolved, evidence of what has been done is verified through checklists, and delays and issues not considered in the project are managed.

Closing phase

The last phase is the project's closing and is important for both parties (supplier, customer). If the supplier does not close the project, he runs the risk of increasing requirements; if the client does not close the project, he runs the risk of not receiving the complete project.

In this phase, the acceptance of the project is planned, the delivery-reception minutes are signed to the satisfaction of each process, partial modules are approved, evidence of everything that has been done in the project is gathered, and the total delivery-reception of the project is made. In addition, both the client and the supplier can make a retrospective of the project, and finally, the legal process of project closure is performed.

It is important to emphasize that the EITA goes into production in this phase and should be executed decisively to avoid additional iterations due to the risks associated with not properly closing an implementation

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project.

CONCLUSIONS

Although PMI has released a new version of the PMBOK (seventh) for project management, current projects are still managed with the previous version (sixth), which is based on the phases of initiation, planning, execution, monitoring & control, and closure. In addition, some project managers, in practice, are doing a mix between the PMBOK and agile methodologies, specifically Scrum.

The planning phase is crucial since it is here where the project's scope is defined, the implantation scenario is defined, the detailed project plan is defined, and the transition to the new system is defined. This phase must be agreed between the supplier and the client.

In the execution phase, it is important to adjust the EITA process to the software process; most managers recommend not modifying the EITA, as this delays the system and increases risks. Also, in the implantation phase, testing the EITA and training the EITA users is important. There are two ways of loading data into the EITA: the easiest and most used is loading initial data, and the second and more complex way is migrating historical data. Even migrating historical data may involve another project.

It is recommended that monitoring and control be carried out in three stages. The supplier does the first to control that its time and costs are under control; the client does the second to verify that the supplier is progressing as agreed; the third, monitoring and control are done jointly by the client and the supplier, this increases the probability of success of the implantations of the EITA and reduces the risk of conflict between the parties.

It is very important to close the contract for both the supplier and the client. If it is not closed, the supplier's requirements may increase, and if the client does not close the project, there may be pending deliverables.

Finally, it is advisable that during the complete project, documentation of the activities carried out is generated, for example, minutes of meetings, agreements, requirements gathering, information delivery, testing, training, and module approval. These minutes help monitor the project and avoid conflicts between the parties during the project.

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CONFLICT OF INTEREST

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