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PROJECT MANAGEMENT IN THE IMPLEMENTATION OF ERP SYSTEMS

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Abstract: This article presents the solution for project management at *OesteSis Sistemas e Gestão Empresarial*, through the collection and organization of data from ongoing implementation projects. This data is presented in panels using the Power BI tool, allowing the manager and employees in the implementation sector to view relevant indicators for analyzing project results and making strategic decisions. A survey carried out with the company's manager demonstrated that the panels created were effective in measuring performance in the implementation of ERP systems, adapting good implementation practices and measuring the results obtained in each implementation, correcting flaws for the next projects developed. The application of project management techniques allowed the recording of lessons learned, which represent the knowledge and experiences acquired throughout the life cycle of a project. These lessons learned served as the basis for future adjustments to improve results. Furthermore, the article discusses studies that indicate that a short implementation time brings significant benefits, such as cost reduction, greater efficiency, better user adaptation and risk reduction.

Keywords: Project management. Enterprise Resource Planning. PowerBI. Implementation of systems.

INTRODUCTION

With the growing need for companies to computerize, the demand for ERP (Enterprise Resource Planning) systems, or integrated management systems, has increased. As highlighted by Sommerville (2011), the process of implementing these systems can vary from simple to complex, depending on the client's business rules. Therefore, it is crucial to develop a carefully followed mapping and implementation plan to fulfill all project deliverables (SOMMERVILLE, 2011).

However, many companies face problems during the implementation process, such as insufficient technical or social resources, deadlines or risks not defined in the project scope. According to Kardec (2015), only 26% of projects are successful, and the rest are aborted or do not meet the requirements established in the schedule. Thus, there is a need to manage implementation projects within software companies. In this management, project management strategies and techniques are applied to maximize the result and efficiency of the final delivery of the ERP implementation.

The general objective of this research is to study and apply project management techniques to a company implementing ERP systems. So that it can have relevant indicators for decision-making regarding the implementation projects carried out.

According to the PMBOK guide (PMI, 2003), project management is the application of knowledge, skills, tools and techniques to meet project requirements and achieve desired results. Strategic project management involves the analysis and selection of projects based on strategic criteria, such as alignment with the company's vision and expected financial return (PINTO, SLEVAK; 2019). The process of implementing a system is a unique project for each company, and for it to be executed in the best way it is necessary to control and manage it. The implementation process is divided into three stages: pre-implementation, implementation and post-implementation. implementation (SOUZA, 2000). This research focuses on studying the second and third stages, in which the implementation sector of software companies plays a crucial role in the success of the project.

“Project management plays an important role in the selection, prioritization and control of projects within an organization, in accordance with its strategic objectives.

This approach allows for a better allocation of resources, minimizing the risk of project failure and maximizing the return on investment. investment” (ARCHIBALD, 2003). The generation of indicators is important to measure the performance of implemented projects and identify areas that need improvement (PMI, 2017). Therefore, performance indicators, as emphasized by Souza and Zwicker (2009), must be used to evaluate the effectiveness of system implementation, considering factors such as time, cost and quality.

Therefore, the study of project management for the implementation of ERP systems in the company OesteSis Sistemas e Gestão Empresarial, with the use of performance indicators suitable for the company's objectives, is of great relevance to guarantee the success of the system implementation and satisfaction of customers.

LITERATURE REVIEW

In this chapter, topics related to project management, ERP systems, system implementation, Business Intelligence, and the Power BI tool will be presented. These conceptual approaches are extremely important for the development of this research.

MANAGEMENT OF PROJECTS

Project management involves planning, organizing, coordinating and controlling resources to achieve specific objectives within a given time frame and budget. (SANTOS, VIRGILIO; 2015) Its role is fundamental in a wide variety of sectors, especially in software implementation, as it allows organizations to achieve efficient and successful results.

The Project Management Institute (PMI), one of the leading global project management organizations, defines project management as “the application of knowledge, skills, tools,

and techniques to achieve project objectives” (PMBOK, PMI, 2003). This involves clearly identifying and defining project objectives, developing a detailed plan to achieve them, assigning tasks and resources, monitoring progress, and adjusting as needed.

According to KERZNER, Harold (2017), author in the field of project management, highlights the importance of project management by stating: “Project management is the key to organizational success. It allows organizations to achieve their strategic objectives, deliver consistent results and respond effectively to changes in the environment”, which leads us to the importance of carrying out good management to maximize success when we have several sectors and people involved in the project, a fact that happens during a system implementation or exchange, as stated by Charles G. Cobb, stating that project management plays a crucial role in maximizing the value delivered to stakeholders, ensuring that expectations are met and that results are achieved efficiently.

Applying project management in the software area both in the development stage and in its implementation is crucial because this way we will be ensuring that the entire software process is mapped and monitored, thus ensuring that the steps are adapted to the schedule and that there are no delays or incidents during the deployment process. Managing the implementation of a system is the right thing to do, as stated by DRUCKER, Peter F. (2001), “Management is doing things the right way; project management is doing the right things”.

Implementing an ERP system is a complex task that involves several interrelated processes and impacts the entire organization. Project management plays a critical role in this process, ensuring that the project is executed in a structured manner, within the established scope, deadline and budget, and that the

expected benefits are achieved (LAURSEN & AMBRUZ, 2016).

SISTEMAS ERP (*ENTERPRISE RESOURCES PLANNING*)

ERP (Enterprise Resource Planning) systems play an essential role in the integrated management of companies, allowing the integration and automation of processes on a single platform. These systems cover several areas, such as finance, human resources, purchasing, sales, production, logistics, among others (LAUNDON, LAUDON, 2016). ERPs are software that integrate a company's information and processes, providing a unified view of all areas of the business (AL-MASHARI; Zairi, 2000). With their ability to centralize and integrate data, ERPs provide a solid foundation for efficiently managing an organization.

In summary, ERP systems play a fundamental role in the integration and efficient management of a company, covering various areas and processes. Although the implementation of these systems is complex, the benefits achieved, such as cost reduction and improved efficiency, are significant for the organization (SOUZA; SACCOL, 2010). ERP Systems are software that integrate a company's information and processes into a single system, allowing a unified view of all areas of the business" (AL-MASHARI; ZAIRI, 2000). These systems are composed of modules that cover various areas, such as finance, human resources, purchasing, sales, production, logistics, among others (LAUDON; LAUDON, 2016).

ERP systems are one of the biggest changes an organization can face, requiring the restructuring of processes and training of employees to deal with the new tool (LAUDON; LAUDON, 2016). Although implementing an ERP system is challenging, using these systems can bring significant

advantages to business management.

Furthermore, ERP systems allow for better integration between areas of the company, since data is shared between different modules. This facilitates communication between departments and reduces communication gaps and rework (SHANKAR; KANNAN, 2016). The use of an ERP system can also help with risk management, by allowing better monitoring of the company's activities and the identification of problems more quickly and efficiently" (WU et al., 2011).

ERP SYSTEMS IMPLEMENTATION

Implementing ERP systems is a complex and crucial process for companies that want to integrate and optimize their business processes. This implementation involves a series of steps, from selecting the appropriate system to configuration, user training and data migration. The effective implementation of an ERP system can bring several benefits to the organization, such as improving efficiency, standardizing processes, making informed decisions and obtaining competitive advantages (LAUDON; LAUDON, 2016).

When implementing an ERP system, it is essential to follow a structured and methodological approach in order to ensure the success of the project. One of the fundamental steps is selecting the ERP system best suited to the company's needs. As stated by Laudon and Laudon (2016), the correct choice of the ERP system is a critical factor for the success of the implementation. This involves a detailed analysis of the company's requirements, considering factors such as features, scalability, technical support and costs.

Once the ERP system has been selected, the configuration phase begins, which consists of customizing the system according to the organization's specific processes and needs. The appropriate configuration of the ERP

system is essential to ensure adherence to business processes and obtaining the expected results, (LAUDON; LAUDON, 2016).

Furthermore, user training is a crucial aspect for the successful implementation of an ERP system. Adequate training allows users to understand and effectively use the system's functionalities, maximizing its benefits and is essential to ensure the adoption and adequate use of the ERP system (LAUDON; LAUDON, 2016).

When implementing an ERP system, it is also important to consider data migration, that is, the transfer of existing data to the new system. This process requires care and precision to ensure data integrity and consistency. Successful data migration is critical to avoiding future problems and ensuring continuity of operations. In summary, implementing ERP systems is a challenging but rewarding process for organizations. Proper system selection, custom configuration, user training, and data migration are critical aspects that must be carefully planned and executed. By following a methodological approach and counting on the support of specialized professionals, companies can reap the benefits of an effective implementation of an ERP system.

Implementing an ERP system is a complex process, which involves supplier selection, planning, requirements definition, software configuration, user training and data migration (JACOBS; WESTERKAMP, 2007). This implementation requires the adaptation of business processes to adapt to the system's best practices. According to Laudon and Laudon (2016), the implementation of an ERP system is one of the biggest changes that an organization can face, as it requires the restructuring of processes and the training of employees to deal with the new tool. However, adopting an ERP system can bring several benefits to the company, such as reducing costs, improving operational efficiency,

standardizing processes and making more assertive decisions (SOUZA; SACCOL, 2010).

Finally, it is important to highlight that the implementation of an ERP system must be carefully planned and executed, in order to minimize risks and ensure the success of the project. This involves defining clear objectives, choosing a system suited to the company's needs, carrying out tests and training, and creating a contingency plan for possible problems (LAUDON; LAUDON, 2016).

Among the implementation of an ERP system, we have the role of the software supplier company as a fundamental element for the success of the project, as it demands total responsibility and ability to deal with all technical aspects regarding the implementation of the software and its adaptation to the company's processes.

Implementation time is a relevant indicator to measure the time required for the ERP system to be completely implemented and fully operational. A shorter implementation time may indicate greater efficiency in system implementation and better project management. The implementation cost is an indicator that measures the total cost of implementing the ERP system, including acquisition of hardware, software, training and consultancy. A lower cost indicates greater efficiency in resource management and negotiation with suppliers (O'BRIEN; MARAKAS, 2010).

The level of user satisfaction is an important indicator to measure user satisfaction with the implemented ERP system. A high satisfaction rate indicates that the system meets users' needs and is being used effectively" (KUMAR; HILLEGERSBERG, 2000). The adherence rate is an indicator that measures the degree of users' adherence to the ERP system. A higher adherence rate indicates that users are using the system appropriately and that the system is being effectively integrated into the

organization's processes" (KIM; PARK, 2010).

Return on investment (ROI) is an indicator that measures the financial return that the organization obtained after implementing the ERP system. A higher ROI indicates that the system implementation was successful and is generating financial benefits for the organization (LEVINE; H. A, 2005).

BUSINESS INTELLIGENCE - BI

Business Intelligence (BI) is a set of processes, technologies and tools that assists organizations in collecting, organizing, analyzing and presenting relevant data for decision making. It allows you to transform raw data into valuable information and strategic insights, providing support for effective, data-informed management. (SHARFA, DELEN, & TURBAN, 2019).

One of the main advantages of BI in decision making is the ability to provide real-time information. With BI tools, managers can access updated data instantly, allowing for more agile and responsible decision-making (VERCELLIS, 2009). This is especially important in an ever-changing business environment, where speed in decision-making can make a difference to an organization's competitiveness.

Furthermore, BI enables a holistic and integrated view of data, allowing managers to have a comprehensive understanding of the company's performance. With personalized dashboards and reports, it is possible to view key information in a clear and concise way, identify trends, patterns and valuable insights that can guide strategic decision making (INMON et al., 2013).

Another advantage of BI is the ability to perform advanced and predictive analysis. With algorithms and data mining techniques, it is possible to identify correlations, predict future behaviors and make decisions based on hypothetical scenarios (TURBAN et al., 2019).

This provides a solid foundation for making more informed and informed decisions.

BI promotes a data-driven culture, where decisions are based on concrete evidence and not just intuition or assumptions. This helps to minimize risks and increase the effectiveness of decisions, leading to better results and organizational performance (SHARDA et al., 2014). The use of Business Intelligence (BI) can be an effective strategy for measuring the efficiency of systems implementation ERP, allowing access and analysis of data in real time to identify trends, opportunities and bottlenecks that impact process efficiency (MUNDY; LYCETT, 2014).

Through BI, it is possible to have a set of well-defined performance indicators aligned with the company's objectives. Some examples of indicators that can be used to measure the efficiency of implementing ERP systems are: average implementation time, percentage of projects delivered on time, average implementation cost, percentage of adoption by users, among others.

The integration of the BI system with the project data storage system is essential for automatically feeding data and generating reports with greater speed and accuracy. The use of BI in the implementation of ERP systems allows managers to quickly identify problems and opportunities for improvement, in addition to monitoring system performance in real time (MUNDY; LYCETT, 2014). Therefore, the use of Business Intelligence can be an effective strategy for measuring the efficiency of implementing ERP systems, allowing you to identify problems and opportunities for improvement more quickly and accurately.

The use of Business Intelligence (BI) in ERP system implementation projects has proven to be an effective strategy for maximizing the success and efficiency of these projects, providing a broad, data-based view

throughout the process.

One of the main advantages of using BI in ERP implementation projects is the ability to monitor performance in real time. With the use of control panels and personalized reports, managers can monitor key performance indicators, such as average implementation time, percentage of completion of steps, costs involved and user adoption (MUNDY; LYCETT, 2014). This allows you to identify problems, bottlenecks or deviations and take corrective actions quickly, ensuring the efficient progress of the project.

Additionally, BI offers analytical capabilities that help identify patterns and trends throughout the ERP implementation process. With data mining techniques and advanced analysis, it is possible to identify valuable insights, such as the main challenges faced, critical success factors and best practices to be adopted (SHARDA et al., 2014). This data-based information contributes to more informed and strategic decision-making, enabling continuous adjustments and improvements to the project.

Another advantage of using BI in ERP implementation projects is the ability to provide accurate reports and analyzes on the system's performance and return on investment. With the integration of BI with data management and storage systems, it is possible to generate results indicators, such as cost reduction, increased operational efficiency and user satisfaction (TURBAN et al., 2019). This information is essential for evaluating the impact and success of ERP implementation, providing insights for future decisions.

POWER BI

Among the tools for demonstrating and analyzing data through graphs and dashboards, the most used has been Power BI, a data analysis and visualization tool

developed by Microsoft. "Power BI is one of the most powerful data analysis tools available today. It allows anyone, regardless of their technical skill, to explore and understand data effectively." (SINGH; AVI, 2016). This tool allows users to collect, transform, analyze and visualize data in an interactive and intuitive way. Power BI offers advanced reporting capabilities and interactive dashboards, enabling users to discover valuable insights and make informed decisions based on their data.

As Ferrari (2019) states in his article, "Power BI empowers organizations to extract value from their data, transforming it into actionable information that drives intelligent decision-making."

The ease of integration with various data sources means that Power BI allows you to import information from databases, local files, and cloud services. This capability facilitates the analysis of data from different sources, which even allows you to join data from one or more data sources to perform the analysis.

Power BI provides a comprehensive set of interactive visualizations such as charts, pivot tables, maps, and more. This allows you to present your data in a visually appealing and understandable way. "Power BI is a complete business intelligence solution that empowers users to transform raw data into valuable insights through interactive reports and impactful visualizations." (CLARK; DAN, 2020).

Therefore, choosing the appropriate tool to demonstrate the data is of utmost importance so that the information is displayed correctly and that its presentation is easy to understand, as decision-making based on this data will be more assertive.

METHODOLOGICAL PROCEDURES

The research will be applied and will have a qualitative and descriptive approach. Bibliographical research and survey methods will be used, with the participation of employees from the company's implementation sector, directors and the companies where the FLYERP system will be implemented. The research questions involve implementation project management methods, the indicators necessary for analyzing results and the development of means of collecting project data in addition to the arrangement of results through graphs in Power BI. The study is limited to the company OesteSis Sistemas e Gestão Empresarial, its manager and implementation technicians, who will analyze the data in the BI panels to make decisions and support the management of ongoing projects.

The development of this research work had as its study area the ERP systems implementation sector at the company OesteSis Sistemas e Gestão Empresarial, located in Chapecó - SC, which has been operating in the resale and implementation of the FLY-ERP Management System since 2020. The study focused on the management of software implementation projects and the use of performance indicators to monitor the performance of ongoing projects. In addition, the work also addresses the strategic management of projects, that is, it helps in making more assertive decisions based on the data collected during the project.

In relation to the analysis of the solution data, 9 project implementations were monitored covering companies in the commercial area of the city Chapecó / SC. The data collection period took place from August 2022 to April 2023, a period that will serve as a study for the present research.

SOLUTION DEVELOPMENT

Before the research was carried out, it was identified which software reseller companies that had an implementation sector could participate in it, the requirements would be: to have had already implemented means for analyzing implementation data, had monthly implementation projects to execute, with this the company ``OesteSis Sistemas e Gestão Empresarial``, which the academic works for, found itself in need of these analyzes and solutions for application and study.

The development of the research began in August 2022, where initially a survey was carried out to analyze what resources would be necessary for the development and execution of the research project with the company OesteSis Sistemas e Gestão Empresarial. With this it was identified that the company did not keep recorded the data collected from each ERP implementation project, gave hours of each project, modules, technicians, schedule, and did not have indicators to measure the results of each implementation, which was a problem as there was no metrics and data to manage the projects in progress or the projects executed.

After this initial survey, it was necessary to create a database where implementation technicians could record and collect implementation data, thus creating a spreadsheet shared between technicians, with some specific indicators to be filled in during each implementation, it was the responsibility of each technician to fill in the data at the end of each process or stage carried out in the implementation project for which they were responsible.

The data to be collected was selected based on the criteria presented in the methodological procedures, namely: implementation time, implementation cost, level of user satisfaction, adherence rate. Some data that the company manager needed to analyze the return

on investment (ROI) at the end of each implementation project were also adjusted.

Below is a model of the spreadsheet presented for company use and data collection during implementations, each project/client has an exclusive tab to fill out:

PROJETO 01	RESPONSÁVEL/USUÁRIO	PROJETO	PREVISTO			REALIZADO			MOTIVO	MÓDULO EM % IMPLANTADO/CL. DE APROVAMENTO/USUÁRIOS
			TEMPO IMPLANTAÇÃO	TREINAMENTO	RETIENIMENTO	TEMPO IMPLANTAÇÃO	TREINAMENTO	RETIENIMENTO		
001	FRANZ	01/09/2022	1	1	100%	1	1	100%	100%	
			2	2	100%	2	2	100%	100%	
			3	3	100%	3	3	100%	100%	
			4	4	100%	4	4	100%	100%	
			5	5	100%	5	5	100%	100%	
			6	6	100%	6	6	100%	100%	
			7	7	100%	7	7	100%	100%	
			8	8	100%	8	8	100%	100%	
			9	9	100%	9	9	100%	100%	
			10	10	100%	10	10	100%	100%	
			11	11	100%	11	11	100%	100%	
			12	12	100%	12	12	100%	100%	
			13	13	100%	13	13	100%	100%	
			14	14	100%	14	14	100%	100%	
			15	15	100%	15	15	100%	100%	
			16	16	100%	16	16	100%	100%	
			17	17	100%	17	17	100%	100%	
			18	18	100%	18	18	100%	100%	
			19	19	100%	19	19	100%	100%	
			20	20	100%	20	20	100%	100%	

Figure 1 – Project Monitoring Data
Source: Authors (2023)

As we can analyze, Figure 1 presents the company/client to implement the system, its execution period, responsible technician, hours contracted for project implementation, and the contracted modules. This data is passed on by the commercial sector after closing the commercial proposal. Each contracted module has a “standard” time to be foreseen for configuration and implementation. This data is analyzed within the scope of the project in order to create the appropriate schedule. The responsible implementation technicians must record the time spent implementing each module, note the user’s learning according to analysis during the training, and whether they managed to implement the module completely or partially within the deadline stipulated in the scope, and if this was not implemented because there was no viable time or people to manipulate the module in the company/client where it was being implemented.

With this data collected, the research moves on to its second part where it needed to analyze this data and present it to technicians and managers effectively. Therefore, it was analyzed that the best tool for this would be to use Power Bi, which can read the data from the spreadsheet presented and demonstrate the analysis in the form of graphs and tables.

The analysis of management data for each project, such as: ROI, execution time of each project by each technician, will be carried out by the company manager, who will be able to use the information presented in the panels to make strategic decisions about the management of implementation projects. Data regarding expected time, projects per technician and data regarding module retraining will be available for viewing by implementation technicians. The objective is to provide a clearer and more objective view of the performance of ongoing projects, facilitating decision-making and identifying possible points for improvement.

In Figure 2, the panel with the management indicators demonstrated by the Power BI tool for the manager is presented.



Figure 2 – Management data panel
Source: Authors (2023)

DATA ANALYSIS

After delivering the panels for analysis, time was given for their use, then a survey was carried out with the manager of the company ‘OesteSis Sistemas e Gestão Empresarial’, and some implementation technicians. The research raised questions about usability and also the positive points about starting to maintain data from project portfolios and their specifications, as well as having results from these analyses, and showing them through the Power BI tool.

The manager says that the beginning of

using data storage was extremely important to be able to measure the results of each implementation, as well as make more assertive decisions regarding changes and implementation of implementation schedules. Another decisive factor was being able to measure the time spent on each implementation phase, in this it was analyzed that in the data import phase, there was a problem where in the initial scope there was a “standard” of 15 hours programmed for this process, but with the data analysis it was noted that this time was outside the real value, which is an average of 19 technical hours between import/manipulation and validation of imported data, when the client comes from a previous ERP system and needs to import this information.

This changed the time for this phase to 19 hours, when the customer needs to import data. Furthermore, the implementation technicians stated that the panels created with the performance indicators helped to measure the performance of each one, in each specific module of the system in the implementation of the FLYERP systems, thus leading to the conclusion and decision making that improvement of the even in system modules where there were difficulties in developing deployment configurations. Adaptation of the panel was requested in its final phase so that it could be possible to analyze the projects independently and the projects as a whole.

The manager and the company continue to use the implemented process and analysis panels until the present date of presentation of this research, as they are the most effective way to manage implementation portfolios, and there was a very satisfactory result with the use of the same.

FINAL CONSIDERATIONS

As seen, the business management process is essential for managing companies in the field of implementing ERP systems, and its application in organizing and presenting indicators relating to completed and developing projects is fundamental. Based on this, this work sought to apply project management techniques to an ERP systems implementation company which did not have any control or management of implementation projects in progress. The proposal was to measure the results obtained when applying the techniques to this branch of technology.

The research project was applied to the implementation sector of the company OesteSis Sistemas e Gestão Empresarial, from August/2022 to April/2023. During the process of applying the methods, metrics for collecting, organizing, manipulating and demonstrating the collected data were developed, so that the company's implementation sector team and its manager could assertively analyze the data and thus make strategic decisions with regarding the schedule and execution of projects.

Given the results obtained with the manipulation and processing of data, the company can adjust commercial issues, which were previously not analyzed due to the lack of collection and processing of data for each implementation, thus increasing the company's ROI and better allocating resources. of each project.

The initial objective of the project, which was to maintain the management and monitoring of implementation projects, was successfully met, resulting in management assistance, process adaptation and an increase in the company's ROI. The tools developed will be used by the company studied, and as this is a scientific research work, it is expected that research derived from this will emerge with the aim of updating and improving what has already been created.

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