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Risk Management in Projects
Gerenciamento de Risco em Projetos
Gestión de Riesgos en Proyectos

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Abstract: This article addresses the risk management process in projects, highlighting its concepts, essential and important steps of Quantitative Analysis through the Probability x Impact Matrix. The objective is to demonstrate how formal risk management contributes to project success by reducing delays and cost overruns. The research is characterized as qualitative, bibliographic and exploratory using materials already published as a result of the study presented. Given the management scenario presented in the study, despite the positive variables, risk management does not eliminate uncertainty, but increases the probability of project success by transforming reactions into planned actions, protecting deadlines, costs and quality.

Keywords: Management. Risks. Projects.

Resumo: Este artigo aborda o processo de gerenciamento de riscos em projetos, destacando seus conceitos, etapas essenciais e importantes da Análise Quantitativa por meio da Matriz de Probabilidade x Impacto . O objetivo é demonstrar como a gestão formal de riscos contribui para o sucesso de projetos reduzindo atrasos e estouros de custos. A pesquisa caracteriza-se como qualitativa, bibliográfica e exploratória utilizando-se de materiais já publicados como resultado do estudo apresentado. Diante do cenário de gestão apresentado no estudo , apesar das variáveis positivas, o gerenciamento de riscos não elimina a incerteza, mas aumenta a probabilidade de sucesso do projeto ao transformar as reações em ações planejadas, protegendo prazo, custo e qualidade.

Palavras-chave: Gerenciamento. Riscos. Projetos.

Resumen: Este artículo aborda el proceso de gestión de riesgos en proyectos, destacando sus conceptos, pasos esenciales e importantes del Análisis Cuantitativo a través de la Matriz de Probabilidad x Impacto. El objetivo es demostrar cómo la gestión formal de riesgos contribuye al éxito del proyecto al reducir retrasos y sobrecostos. La investigación se caracteriza por ser cualitativa, bibliográfica y exploratoria utilizando materiales ya publicados como resultado del estudio presentado. Dado el escenario de gestión presentado en el estudio, a pesar de las variables positivas, la gestión de riesgos no elimina la incertidumbre, pero aumenta la probabilidad de éxito del proyecto al transformar las reacciones en acciones planificadas, protegiendo plazos, costos y calidad.

Palabras clave: Gestión. Riesgos. Proyectos.

1 Introduction

Projects are temporary initiatives that aim to deliver a unique result. However, uncertainty is inherent to any project. The lack of treatment of these uncertainties is identified as one of the main causes of failure, generating delays, extra costs and low quality.

However, the execution of projects is often marked by uncertainties and unexpected obstacles that can compromise progress and the achievement of goals. Given this, risk management emerges as a crucial component, allowing the proactive identification of potential problems, the assessment of their impacts and the formulation of strategies to mitigate them. This approach ensures a more stable, structured development with a greater probability of success.

Given this, risk management emerges as a fundamental process to increase the probability of success. This article aims to explain what risk management is, present the essential steps of project management, detail the risk analysis and management process and demonstrate practical application.

Theoretical Foundation Of Risk Management In Projects Concept And Importance.

Risk management is the process of identifying, analyzing and responding to uncertain events that may affect project objectives. According to PMI, risk is “an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives”, [2021]

Risks have two characteristics: Uncertainty and Impact. It can be a Threat, with a negative effect, or an Opportunity, with a positive effect. (VARGAS 2018)

Project Concept

A project can be conceptualized as a temporary undertaking, with a well-defined purpose, which aims to create an exclusive product, service or result. It is characterized by having a determined beginning and end, as well as specific goals to be achieved. Its unique nature requires meticulous planning, effective organization and continuous monitoring so that objectives are achieved with maximum efficiency (PROJECT MANAGEMENT INSTITUTE, 2021).

Risk Concept

Risk refers to any situation of uncertainty that can influence the results of a project, whether beneficial or harmful. Such events can cause delays, increased costs, operational failures or, conversely, generate opportunities for improvement. Therefore, it is essential to identify and monitor internal and external factors that can impact the progress of project activities (SALLES JÚNIOR et al., 2010).

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The Importance Of Risk Management

Risk management plays a very important role, as it helps to anticipate problems, optimize the decision-making process and increase the chances of project success. Furthermore, it favors more rigorous control of costs, deadlines and quality, providing greater security for customers, investors and other stakeholders.

Organizations that implement this practice tend to achieve superior results and gain a more competitive position in the market (VARGAS, 2018).

Methodology

The research is qualitative, as it uses interpretations of bibliographic data and facts collected through magazines, websites, books by authors who address the topic. According to Marconi; Lakatos (2010) research is a formal procedure, with a methodology of reflective thoughts, which requires scientific treatment and knowledge of reality or to discover partial truths.

Research, according to Chizzotti (2006), has been characterized by the type of data collected and the analysis that will be carried out later on this data, which can be quantitative. The research is developed based on already published material, constructed through books, magazines and currently material available on the internet, relating to the topic: Risk Management in Projects.

The research is carried out from secondary sources, that is, it is developed through material already prepared; books and scientific articles. Rodrigues (2014)

The purpose of the study was exploratory, to become familiar with a subject that is still little known and little explored. Rodrigues (2014) says that exploratory research is preliminary research, whose main objective is to seek information on a certain subject or discover a topic for study. Through exploratory research we can also define a topic, define objectives or formulate research hypotheses. It is considered by some authors as an initial study for carrying out another type of research. Rodrigues (2014) .

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Results And Discussion

Project Start

Starting a project is the formal moment of recognition and authorization of the idea. It serves to define what will be done, who the people involved are and the value of the initiative. Structuring this phase is vital to align expectations and avoid wasting time and resources.

Projects are in one form or another in the daily life of any organization. Therefore, knowledge, at least basic, of how it is managed is essential. (NETO 2020). Essential Parts for Startup

Figure 1 - Initial Project Stages



Source:Roberto Gil Espinha 2020

To structure the basis of any project in an organized way, these fundamental structural components:

Justification: Explain the “why” of the project. Detail the problem to be solved or the opportunity to be taken advantage of.

Objectives: Clearly define what will be achieved. Use SMART goals (specific, measurable, achievable, relevant and time-bound).

Initial Scope: Define what is included in the project is as important as what is outside of it.

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Stakeholders: Identify the sponsor, team, and target audience or beneficiaries.

Project Charter (TAP): Formalize the above information into a concise document that authorizes the project manager to use resources in execution.

Project Closure Term (TEP): Project delivery is the final phase of a project's life cycle, where tangible or intangible results are passed on to the client or sponsor. This process includes the detailed presentation of planning and the transfer of responsibilities.

4.2. Project Management

For Maximiano (1997, p.20), projects are finite undertakings, which have clearly defined objectives based on a problem, opportunity or interest of a person or an organization.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is carried out through the appropriate application and integration of the 47 project management processes, logically grouped into five process groups which are:

Initiation.

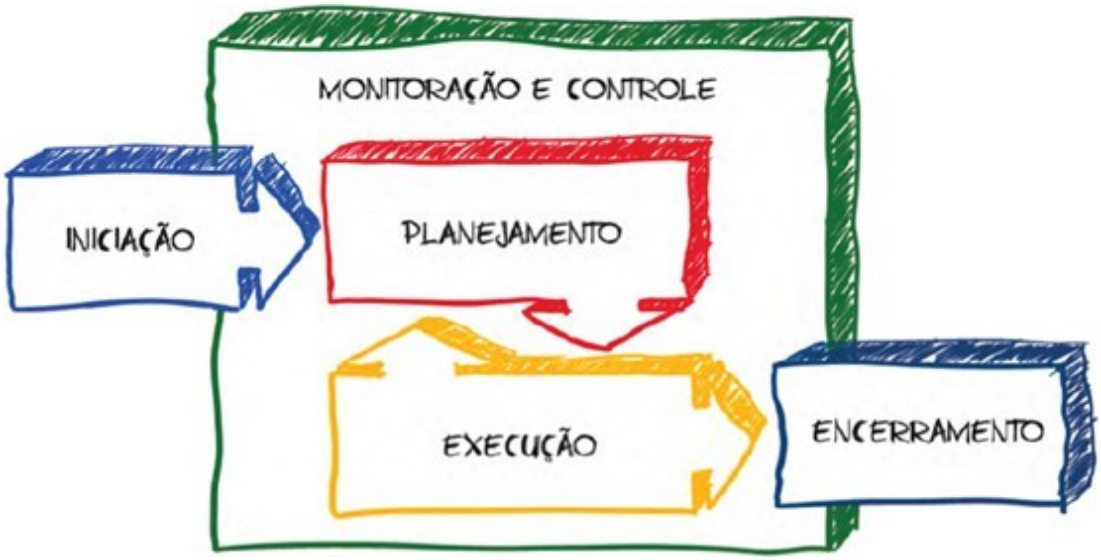
Planning.

Execution.

Monitoring and control.

Closing

Figure 2 - Project Phases



Source Kelem - 2020

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Initiation: It is the starting point, with an opening term being created which provides inputs, tools to be used and outputs.

Planning: In this phase, all details of the project, activity schedule, relationship between deliveries, resource allocation, cost analysis and other actions that reduce the occurrence of difficulties and unforeseen events are carried out. Support plans are also made here, such as: risk management, quality, communication, among others.

Execution: As the name suggests, it is the phase where everything foreseen in the planning is put into practice, hence the importance of efficient planning.

Monitoring and Control: This is the phase that aims to analyze what was planned vs. executed, proposing corrective or preventive solutions if there is a failure.

Closing: Last but not least, the closing. At this stage, delivery is carried out, which undergoes an evaluation and thus formal acceptance is made and project documentation is closed. At this stage, it is common to discuss errors that occurred during the process and are analyzed so that similar situations are not repeated in new projects.

Based on these influences and the needs identified in the analyzes and interviews, the project manager must, in general, lead his team to achieve the project objectives. In other words, they “are responsible for meeting needs: tasks, team needs, and individual needs” (PMI, 2013, p. 17).

Risk Management For Vargas, Ricardo (2010)

> "[...] There is a misperception among people that the Project Manager is necessarily a technical expert on the subject matter of the project [...] It is not necessarily the technical mastery of what the project will address, but the ability he has to assemble a team that has, among its members, people with deep technical knowledge. The Project Manager is nothing more than an integrator."

The risks of a project are uncertain events that may occur in the future and cause some impact, whether negative or even positive, in relation to its objectives.

This area of knowledge is essential to the success (or failure) of a project, as it is directly linked to other areas of the project, such as scope,

as it connects directly with disciplines such as scope, costs, resources and quality.

Project risk management focuses on planning and identifying risks, with the purpose of minimizing negative risks and promoting positive risks.

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Figure 3 - Overview of Risk Management processes



Source: Project Management Knowledge Guide (PMBOK Guide 7th edition)

Risk Management is an area of activity of the project manager that has a lot of influence on results. To manage risks efficiently, the project team needs to understand whether the project's risk exposure situation is acceptable for its initiation and continuation. (NETO 2020).

Plan Risk Management — Defines how the risk management activities of a project should be carried out.

Identify Risks — identifies the individual and general risks of the project.

Perform Qualitative Risk Analysis — creates a prioritized list of individual project risks for analysis, which may be through assessing their probability of occurrence and impact.

Perform quantitative risk analysis — numerically analyzes the individual risks identified in the project.

Plan Responses to Risks — develops actions to address risks.

Implement Risk Responses — inserts risk response actions.

Monitor Risks — monitors the implementation of risk response actions.

Entities of all types and sizes face external and internal influences and factors that make it uncertain whether they will achieve their objectives. Managing risk is part of governance and leadership, and is fundamental to the way entities are managed at all levels. This contributes to the improvement of management systems.

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Risk Identification

The implementation phase is a continuous process of identifying the risks of a project. New risks may arise during the project and harm the entire schedule due to the lack of a contingency plan in cases of emergencies.

The most used practices are:

Brainstorm

The purpose of brainstorming is to obtain a complete list of project risks. The project team typically brainstorms, often with a multidisciplinary set of experts who are not part of the team. Ideas about project risks are generated under the leadership of a facilitator, either in a traditional free-form brainstorming session with ideas provided by participants or a structured one using group interview techniques. Risk categories, as a risk breakdown structure, can be used as a framework. Then, risks are identified and categorized according to type, and their definitions are refined.

Checklists And Connections Learned

Takes risks from similar past projectors. 70% of risks are repeated.

Assumption Analysis

All projects live by “we assume that…” Ex: “We assume that the supplier delivers in 15 days”. What if it doesn't deliver?

Swot Analysis

Strengths, Weaknesses, Opportunities, Threats. Weaknesses and Threats experienced easy risks.

Delphi Technique

The Delphi technique is a way to obtain expert consensus. Project risk experts participate anonymously in this technique. The facilitator uses a questionnaire to solicit ideas about important project risks. Responses are summarized and redistributed to experts for additional comments. Consensus can be reached after a few rounds of this process. The Delphi

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technique helps to reduce bias in the data and prevents anyone from unduly influencing the result

Document Review

Contract, scope, schedule. Each external dependency = possible risk.

Risks In 2 Steps

Risk should not be confused with problem. The problem has already happened. The risk can still happen. It has two fundamental characteristics: uncertainty and impact (VARGAS 2018). There are two types of risk:

Negative Risk - Threat: May cause delay, extra cost, defect. Ex: supplier delays.

Positive Risk - Opportunity: If it occurs, it brings benefits. Ex: new technology reduces costs by 20%.

ISO 31000 (ABNT 2018) reinforces that managing risk is about creating and protecting value, not just avoiding losses.

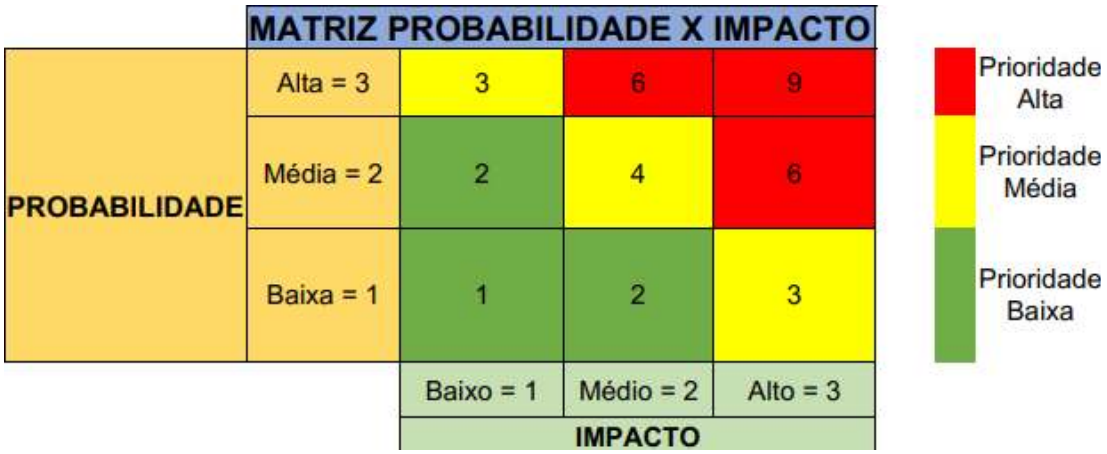
Risk Matrix: Probability X Impact

The probability and impact matrix is an essential tool for risk and project management. Assessing the chances of a given risk occurring and the severity of the consequences of this possible event, it is very useful in the hazard identification, analysis and prioritization phases by providing a structured, objective and easily applicable methodology.

From the identification of risks and their respective probability of occurrence and impact, it is possible to define the response to risks – reduce, avoid, accept or share – and establish strategies for each situation. (Ximenes et at. 2025)

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Figure 4: PROBABILITY X IMPACT MATRIX



Source: Ximenes 2025

Parameters:

1 (very low): the risk would cause an insignificant impact. The consequences are limited or almost non-existent;

2 (low): the threat has a small impact and the impact on operations is limited;

3 (medium): the result is a moderate negative effect with significant impairment of some aspects. However, it is still possible to control it;

4 (high): the risk results in a significant impact, with a high chance of negatively affecting the objectives;

5 (very high): the most critical reflection, so much so that it can paralyze activities and even cause irreparable damage to the business.

To create a good probability and impact matrix, we will notice benefits such as:

improvement in resource allocation;

increased predictability of threats;

critical risk mitigation;

planning more efficient responses;

easy adaptation to new scenarios;

reduction of operational uncertainties;

more informed decision making with fewer mistakes.

The Probability and Impact Matrix is a simple but effective tool for managing project risks. By evaluating risks based on probability and their impact, the matrix helps project

managers prioritize and address the most critical risks. By applying this matrix to projects, it is possible to take preventive measures and mitigate risks before they can affect the project.

Final Considerations

The purpose of this article is to demonstrate the importance of Risk Management in Projects, the complexities in terms of execution, Risk Management works precisely with the uncertainty that exists in projects, aiming to identify potential problems and opportunities before they occur, with the aim of eliminating or reducing the probability of occurrence and the impact of negative events on the project objectives, in addition to enhancing the effects of the occurrence of positive events.

When structuring a project effectively, several steps are required, such as organizing work routines, mapping processes and ensuring the optimal allocation of resources, as well as standardizing activities to increase productivity and predictability.

In this way, entities eliminate problems such as duplication of work, fragmented management and loss of information, achieving greater efficiency, control and agility for their projects.

In this way, it is emphasized that risk management in projects is no longer an optional tool and has become a critical success factor. The application of the analysis steps and the use of the Risk Matrix allows prioritizing efforts and reducing project uncertainties. Therefore, risk management in projects satisfactorily achieves the ability to successfully implement the project.

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