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The importance of risk management in civil engineering

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***Keywords*— Projects, Control, monitoring.**

***Abstract*—** *The civil construction industry needs of a proper project management inside of companies, the risks must be dimensioned in order to avoid any negative impacts to the success of the project. The present article consists of a bibliographic description that starts from understanding the relevant importance of risk management applied to projects in the construction industry. This study consists of a comparative bibliographic analysis, between the guide to the best practices of project management, and the study of authors on the importance of risk management in the construction industry. Projects in civil engineering are based on the success of their done objectives, which are linked to compliance with the schedule, cost, deadline and quality. Thus, risk management is essential for the project success, enabling the monitoring of these parameters. Risk management creates a wide vision of the project, and turns possible to identify risk situations to prepare control plans for the most impacts. Through these plans, it is possible to mitigate expenses, avoiding rework, waste and delays in activities, in addition to contributing to the improvement of quality management system for the services performed.*

I. INTRODUCTION

The civil construction industry needs of a proper project management inside of companies, the risks must be dimensioned in order to avoid any negative impacts to the success of the project.

According to [1], project management is considered one of the main concern inside of organizations, is essential to use the standards procedures in the initial phases of the construction stage, to ensure the monitoring and control of risks in the development of the project. Still for the authors, risk management aims to prevent in order to minimize or stop possible risks from the identification, analysis, monitoring and control.

As stated in [2], the effects that the risks offer to civil construction companies have error margins that are considered harmful for the execution of planned activities, which can lead to the interruption or even the ruin of the project.

Therefore, it is possible to understand the importance of risk management in projects, since it covers fundamental elements such as scope, time, cost and quality, which can suffer significant impacts, according to the Project Management

Institute - PMI [3].

Considering the description of risks as an uncertain event or condition, which, when it occurs, causes positive and negative effects on the project objectives, [4] recommends an adequate planning in risk management, aiming to prevent events that change the results, and consequently, the organizational success of the project.

The present study consists of a bibliographical description, that starts from understanding the importance

of risk management applied to projects in the civil engineering construction sector.

II. METODOLOGY

This study is a comparative bibliographic analysis between the best practices guide for project management PMBOK (Project Management Body of Knowledge), prepared by the Project Management Institute, the current international standard NBR ISO 31000: 2009 [5] and the study of authors on the importance of risk management in the construction industry.

After the literature analysis, a comparison was made between the concepts related to risk and its management, described by the PMBOK and ISO 31000 literature, and the analysis presented by authors who have created studies about the relevance and the importance of risk management in projects, And later the transcription of this analysis, with the highlight most relevant items.

III. RESULTS AND DISCUSSIONS

Risks

According to [3] risks are described as an uncertain event or condition, which, when occurring, can cause positive or negative effects on the project objectives, such as scope, time, cost and quality), which may have one or more causes, one or more impacts . In the ISO 31000 standard, risks are defined as the effect of uncertainties on project objectives, where uncertainty is considered a partial or non-partial state of an event, where there is a lack of information and knowledge, enabling the occurrence and existence of consequences.

Both literatures can characterize the uncertain nature of risks and the effects on projects. However, [6] consider the definition of risks described by the PMI as an optimistic view, because, presents the possibility of positive impacts, while in ISO 31000, a traditional view, is based on the possibility of failures from lack of knowledge. The authors [7] confirm the traditional view of ISO 31000 when they describe that in the initial stages of civil construction projects, where risks are identified, there is a few of data and information available, which can lead to failures.

After bibliographic studies together with practice, [8] highlight that the perception of negative risk is greater, because the possible failures are associated with an exaggerated condition of consequences, almost always disregarding the probability of occurrence. In view of this reality, [9] argues that there must be a broad vision, considering the positive and negative risks, they would enable greater benefits for the business, since not only would the failures be mitigated and eliminated, but the opportunities could be used and converted into better results.

Risk management

Risk management is defined by PMI as a systematic process to identify, analyze and respond to risks in projects, aiming to increase the probability, and impact of positive events, and reduce the probability and impact of negative events that may interfere with the purpose of the project. In ISO 31000, this management must be based on coordinated activities, to direct and control the company in relation to the projects risks.

The authors [6] states that by performing the management properly, make benefits for the enterprise more viable, and, to encourage a proactive approach to risks, in order to improve the organization's learning and resilience. The correct application of risk management as a competitive advantage for the organization, will increase the productivity and competitiveness, besides of improve the quality of processes, it will ensure the preservation of company resources.

Civil construction risks are generally linked to engineering, execution and supply processes, as described by [11].

The authors [12] states that plan and manage the projects correctly has become a necessity for the survival of a company in this market. As reinforced by [13] where it states that in the Civil Construction market, the profit is inversely proportional to the cost of construction and, cut out extra expenses generated by unforeseen events is a necessary factor for construction companies to achieve the planned profit with the execution of the project.

To [14] manage risks is a practice that can guarantee the perpetuity of the company, as it becomes able to present solutions with lower costs, the events that generate extra expenses for the work. As described by [12], by proving that the implementation of a risk management process, the occurrence of reworks that generated expenses in the execution of the foundation and the reinforced concrete floor of an industrial shed has decreased. In addition, due to the identification of risks, there was a great reduction in the number of unforeseen events during the work.

After studies on risk management in high-end buildings, [6] concluded that delays in their correction affected not only expected profits, but also added negative values to the company's image in relation to the market. The authors also claim that risk management contributes to the improvement of the company's management processes. [12] achieved similar results, by proving that

meeting deadlines and saving on an industrial project contributed to the company's image to the customer. Another important point identified by the authors was the documental improvement in the control of the work, due to the creation of conference spreadsheets and mobilization schedules, with the implementation of risk management.

IV. CONCLUSIONS

The success of projects in the civil construction sector is based on enforcement its objectives, which are linked to the fulfillment of the scope, cost, deadline and quality. Therefore, risk management is essential for this success, because it enables the monitoring of these parameters.

Risk management creates a wide vision of the project, and turns possible to identify risk situations to prepare control plans for the most impacts. Through these plans, it is possible to mitigate expenses, avoiding rework, waste and delays in activities, in addition to contributing to the improvement of quality management system for the services performed.

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