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MANAGEMENT OF UNCERTAINTY IN PROJECTS AND ITS STRATEGIES

GESTÃO DA INCERTEZA EM PROJETOS E SUAS ESTRATÉGIAS

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Abstract: Uncertainty is the variable factor that affects the project at different stages. The project being carried out in a complex environment with a high load of uncertainty requires an adequate form of management. The project manager is concerned with how to manage the project to achieve success. This study aims to analyze what has been discussed in the last five years, between 2015 and 2020, between the Sciences of Production Engineering, Administration and Computer Science on the management of project uncertainties. To achieve the objective, a systematic review was carried out where the articles were searched in two databases, Scopus and Web of Science. The result explains the importance of managing uncertainty in the project realization environment. The manager must seek to understand the origin of unforeseen events, that is, internal or external. If it is internal, the targeted actions to deal with are more viable, and if it is external, the more tense the actions until the stakeholders are taken into account. Managing project uncertainty requires much more from the team in terms of collaboration and the ability to remain flexible.

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Resumo: A incerteza é o fator variável que afeta o projeto em diferentes etapas. O projeto sendo executado em um ambiente complexo de alta carga de incerteza exige uma forma de gestão adequada. O gerente de projeto se preocupa em como gerenciá-lo para alcançar o sucesso. Este estudo tem como objetivo analisar o que se discutiu nos últimos cinco anos, entre 2015 e 2020, entre as Ciências da Engenharia da Produção, Administração e Computação sobre a Gestão das incertezas em projetos. Para atingir o objetivo, foi realizada uma revisão sistemática onde os artigos foram pesquisados em duas bases de dados, Scopus e Web of Science. O resultado explica a importância do gerenciamento de incertezas no ambiente de realização do projeto. O gerente deve buscar entender a origem de imprevisto, ou seja, interno ou externo. Se for interno, as ações direcionadas de lidar são mais viáveis, e se for externa, mais tensas são as ações até os stakeholders são levados em conta. Gerenciar a incerteza de projeto exige muito mais da equipe, no sentido de colaboração e a capacidade de permanecer flexível.
Palavras-Chave: Risco e incerteza. Sistema de informação. Gerenciamento sintetizado. Colaboração e habilidade.

INTRODUCTION

With the increasing interdependence of markets, companies become more vulnerable to various risk factors and uncertainties, such as economic, financial and even competitive movements of competitors, and thus may significantly affect the results of companies. According to Scofano et al (2013), the great majority of the companies are currently adopting in the projects the means to reach the defined strategic planning and in this way to reach their objectives traced initially. To conduct projects efficiently, use project management as a way to plan, organize, supervise and control all aspects of the project in a continuous process that can improve performance during execution and create conditions to increase the chances of success. The topic of uncertainty management in projects is integrated with other management processes, including risk management. Risk and uncertainties in the academic literature, go together sometimes to become confused with each other.

This article sought to focus on the management of uncertainty, bringing the difference between Risks and Uncertainties. For the delimitation of this topic the following question was elaborated: What has been discussed in the last five years about the management of uncertainty in projects in the area of production engineering in opposition to the administration and computer science? Thus, the purpose of this article is to present an analysis of project uncertainty management, the key concepts to understand the unexpected events that disrupt the well-prepared project delivery. For a systematic review, a search using Scorpus and Web of Science as databases by two large global networks. A justification for choosing this theme is based on the advent of globalization, which disseminates the practices of managing

uncertainties in projects as an essential tool in the face of competition between associations to minimize them, turning them into opportunities. as discussed later in this article.

MATERIAL AND METHODS

For this study, we used the revision of the method Systematic of the literature - RS L - that according to Galvão and Pereira (2014) the RSL is considered secondary study, that have in primary studies its data source. Primary studies are understood to be the scientific papers that report the results of first-hand research. When it is verified that the primary studies included in systematic review follow inhomogeneous procedures, their results are combined using meta-analysis techniques. Methods for the preparation of Systematic reviews include: Elaboration of the research question; Search in the literature (step 1); Selection of articles (step 2 and step 3); Extraction of data (step 4); Evaluation of methodological quality; Synthesis of data (meta-analysis – step 5); Evaluation of the quality of evidence; and Drafting and publication of results.

The Work inventive to be selected out from a general search on "uncertainty management in projects" in the basic platforms: Web of Science and Scopus and in accordance with the objective of this research was by applying the search strings (low cited) and thus yielding 446 articles for the first phase, where the authors read the titles and abstracts of the 446 articles originated from the search strings, selecting those articles that have to do with the objective proposed by the research, observing the inclusion (i) and exclusion (e) which are: (i) answers the research question; (i) it is a scientific article; (i) complete article available (e) Does not answer the research question; (e) a document that is not a scientific article; (e) item repeated (and) item paid. The table below shows the strings applied to the base platforms:

To support the data extractions was used the software Start (Systematic Review Automatic Tool), which according to Montebelo (2007) is a tool to support Systematic Reviews. Its purpose is to support the Planning, Execution and Final Analysis of a Systematic Review, independently of the subject or research area, making the most agile, accurate and replicable. As can be seen in the figure below, provided by Start, of the 446 articles selected, were 43% Web of Science and 57% Scorpus.

The third phase was the complete reading of the 20 articles selected in the previous phase by the authors seeking to answer the questions: R1 - How is "Project uncertainty management" treated? and R2 What is the strategy used to deal with project uncertainty? To extract the responses of sel and tioned articles. The dimensions extracted correspond to the answers of questions R1 and R2, in this stage, the answers extracted from the articles were collected 60 quotas for R1 and 45 quotas for R2, thus a total of 105 quotas. The articles selected for the extraction phase, phase 3, also underwent an evaluation as to their quality and the

quality criteria used were: Was there a clear statement in the research goals? Is the article well-structured considering the proposed objective? Appropriate methodology? Are the results of the article in line with the proposed objective? Does the work prove relevant?

Each of these criteria was as response: Yes or No For "yes" the article was punctuated with two points, and for each "no" answer Article punctuated zero points. Therefore, having as evaluation criteria 05 questions, the articles will have a quality mark between Zero, low quality, and Ten, great quality.

RESULTS AND DISCUSSION

Table 2 presents the articles selected for data extraction. In the table contains the codes of articles numbered 01 to 20, titles, year of publication, journal that published the articles, author's names and evaluation of the quality of articles according to the criteria established and described in the methodology.

Table 2: The articles selected for data extraction

Nº	Title	Year	Magazine	Author	Rating
A1	Incorporating risk and uncertainty into infrastructure asset management plans for pavement networks	(2017)	J. Infrastruct. Syst	Jose Rafael Menendez; Nasir G. Gharaibeh	10
A2	Detection of resource overload in conditions of project ambiguity	(2016)	Ieee transactions on fuzzy systems	Martin Pelikán; Hana Stiková; Ivan Vrana	6
A3	Realizing value from project implementation under uncertainty: an exploratory study using system dynamics	(2017)	international journal of project management	Lin Wang; Martin Kunc; Si-Jun Bai	10
A4	Coping with uncertainty and ambiguity through team collaboration in infrastructure projects	(2017)	International Journal of Project Management	Derek H.T. Walker; Peter R. Davis; Andrew Stevenson	8
A5	Managing uncertainty for sustainability of complex projects	(2017)	International journal of managing projects in business	Tove Brink	10
A6	Supply chain uncertainties linked to information systems: a case study approach	(2017)	Industrial management & data systems	Salomée Ruel; Lhoussaine Ouabouch; Sabry Shaaban;	8
A7	Analysis of interacting uncertainties in on-site and off-site activities: implications for hybrid construction	(2016)	International Journal of Project Management	Mehrdad Arashpou; Ron Wakefield; E.W.M. Lee; Ricky Chan; M. Reza Hosseini	6
A8	Mapping the multi-faceted: determinants of uncertainty in safety-critical projects	(2016)	International Journal of Project Management	Fiona C. Saunders; Andrew W. Gale; Andrew H. Sherry	10
A9	Relationship between the interactive use of control systems and the project performance: the moderating effect of uncertainty and equivocality	(2016)	International Journal of Project Management	Ouafa Sakka; Henri Barki; Louise Côté	10
A10	Optimized scheduling and buffering of repetitive construction projects under uncertainty	(2016)	Engineering, construction and architectural management	Ibrahim Bakry; Osama Moselhi; Tarek Zayed	6
A11	Conceptualizing uncertainty in safety-critical projects: a practitioner perspective	(2015)	International Journal of Project Management	Fiona C. Saunders; Andrew W. Gale; Andrew H. Sherry	10
A12	Reducing front end uncertainties: how organizational characteristics influence	(2017)	Technological forecasting & social change	Patrick Spieth∗, Verena Joachim	10

	the intensity of front-end analysis				
A13	The hybrid it project manager: one foot each in the it and business domains	(2017)	International journal of project management	Dong-Gil Ko, Laurie J. Kirsch	10
A14	Realizing value from project implementation under uncertainty: an exploratory study using system dynamics	(2017)	International journal of project management	Lin Wang, Martin Kunc, Si-Jun Bai	10
A15	Managing uncertainty for sustainability of complex projects	(2017)	International journal of managing projects in business	Tove Brink	10
A16	A new orientation to deal with uncertainty in projects	(2016)	International journal of project management	Fritz Böhle, Eckhard Heidling, Yvonne Schoper	8
A17	Mapping the multifaceted: determinants of uncertainty in safety-critical projects	(2016)	International journal of project management	Fiona C. Saunders, Andrew W. Gale, Andrew H. Sherry	8
A18	Relationship between the interactive use of control systems and the project performance: the moderating effect of uncertainty and equivocality	(2016)	International journal of project management	Ouafa Sakka, Henri Barki, Louise Côté	6
A19	Managing uncertainty and equivocality in joint process development projects	(2016)	Journal of engineering and technology	John Ahmet Erkoyuncu	8
A20	Conceptualizing uncertainty in safety-critical projects: a practitioner perspective	(2015)	Management	David Ronnberg Sjödin Johan Frishammar, Per Erik Eriksson	10

Source: direct search (2021).

In this topic will contain the analyses of the selected articles according to our problem's issues: R1 - How is "Project uncertainty management" treated? and R2 What is the strategy used to deal with project uncertainty? Where these questions guided the discussions below.

R1 - How is "Project uncertainty management" handled?

As the secondary studies in the systematic review of the literature, uncertainty management was used in all projects for the best managers deal with unforeseen event s s. The actual uncertainty was addressed in all scientific areas: Q6 A8 - *"uncertainty is not a simple or unimportant term. Instead, it is a multifaceted concept, one that has been studied in a wide range of intellectual disciplines".* The A11 pointed to three domains that addressed the uncertainty in its content. Q4 A11 - *"highlight three other academic fields that encompass uncertainty (mathematical probability, economics and psicologia- Ogy) and this may have relevance to uncertainty management in projects saving giants like John Maynard Keynes struggled with uncertainty notions; defining - as a state in which reasonably defined probabilities cannot be appended to different outcomes (Keynes, 1937) Smithson (1989) postulates a taxonomy of ignorance and uncertainties, as well as exploring sociological, philosophical, and mathematical aspects of uncertainty. ideas about uncertainty can also be found in the field of psychology, most notably Kahneman and Tversky (1982) subdivision of uncertainty in relation to that attributed to the external world and what is attributed to our own internal state of knowledge".*

The tutors understand the uncertainty as the biggest real factor of project delay. Q1 A2 - *"In real projects, there is always some uncertainty in time management, since it is*

*impossible to pre-see all eventualities or random effects that can influence the progress of the project's s activities"*Q1 A3 -".*One of the main reasons for this situation (Failure of projects) lies in the rapidly changing environment of today uncertainties that cannot be fully estimated and generally involves"* unknown - unknown events such as strategy evolution, introduction of new technology conflicts and resources, have impact on the project implementation and enforce the perceived value of the expected objectives". According to Q4 A4 - *"Cleden also identified the uncertainty as unknown, suggesting that they are hidden and unpredictable events".* Identifying the unpredictable makes it easy to carry out a project in action as shown in article A8 - Q2A8 "*The challenges facing these projects are how to identify and manage project risks, uncertainties and complexities to minimize the potential for failure*".

The A3 treats the management of uncertainty under the and wind in which the manager does not know how to explain the source or cause and once that happens can change the whole project plan in progress. Thus, the Q7 A3 says that - *"The uncertainties are modeled in two ways according to their frequencies and characteristics of the impacts: continuous uncertainty continuing uncertainties are disturbances in the implementation of a project that is not significant enough to stop the deployment, but they. still require monitoring and control due to the long-term impacts. This type of uncertainty is often part of any implementation project unforeseen crises. unforeseen crises are caused by discrete rarely, but once they occur, their impact is felt -If substantially nature alone makes these events difficult to define or prevent even though some researchers have tried to clarify their main sources".* Already the A8 speech that each person can identify uncertainty differently as portrays Q8A8- *"A final source of uncertainty arises from the project on an individual level: for example, different personality types can see the uncertainty very differently".*

Some uncertainty responses in the project refer to an ill-defined project. In the background, the project definition or its planning that encompasses the objectives defines the expected values. Q2 A3 - *"Some research refers to this perspective as" limited planning "end" problem-solving "and assert that the value of a project is not well known in advance, but is defined and updated with prevailing uncertainty".* A3Q3 – "*Meanwhile, tactical uncertainty can cause disruptions and delays in project progress, even without strategic changes".* The non-estimation of probabilistic events, that is, uncertainty happens without a minimum notice to the manager. A Q1 A17*: "uncertainty is seen as a lack of probabilistic estimation due to uncontrollable external factors, it arises in the middle of the project at the individual level, each member views the uncertainty differently a phenomenon that may arise due to factors in the environment external, exemplary, institutional decision-making processes, or external market actions or competitors".* In order to deal with such events, they need planning to ease the shocks they might suggest in the project. And Q4A3 and Q1 A14 complement by stating that - Q1A14 *"There are always unforeseen events, which cannot be designed or analyzed before the progress of projects, and has vital effects".* If any uncertainties are unknown, how can they be

planned? project risk (PRM) to events that 'out of nowhere.' A3Q4- *"When we consider unfathomable uncertainty, events that take place without notice requires retroactive thinking and a way" reactive," i.e., remedy actions to help mitigate impacts on project development. Uncertainty manifests itself in two aspects: evolving goals and interruptions and delays (D & D)".*

Many confuse themselves with managing uncertainty and risk. Two events that need to be carefully analyzed for project success. A Q3 A15: *"The uncertainty differs in two ways: the risk as the known unknown and the uncertainty itself as the unknown. It can be managed, turned into risk as much as possible to make it manageable and manageable".* Q4A8- "*The APM defines the uncertainty of the project as a state of incompatibility complete knowledge about a proposition".* And by striking a difference between risk and uncertainty, the A5Q4 - *"uncertainty is understood as the unknown unknowns".* Strangers are events that are so out of this world that they never occur to people as something that could happen while the risk represents unknown unknowns. The uncertainty cannot be calculated since nobody has imagination, attention, and knowledge of the event ". In the construction project as the hybrid construction: Q2 A7 - *"The effect of uncertainty is significant in hybrid construction projects where a combination of on-site and off-site activities is concurrently in progress".* Civil projects have a common determinant of uncertainty that Article A8 highlighted: Q1 A8 - *"Our findings are that the six determinants of project uncertainty are similar in civilian and civil aerospace projects".* Most of the common determinants of project uncertainty were the impact of time on project uncertainty, and individual perceptions of uncertainty were mentioned less frequently by respondents". Reinforcing, the A11 determined uncertainty in two concepts: Q7 A11 - *"In contrast, determinants of uncertainty based on individual bases in two concepts. Limited rationality - that our attempts to act entirely rationally are limited; for example, by incomplete information, by limits on our cognitive ability, or by the time available to make a decision".*

The uncertainty present in the information system development project. A project that requires a large investment to launch new product involves uncertainty and other flaws that need to be managed. The information system in the supply chain allows the sharing of information. Q2 A6 - *"The typologies of uncertainties are common but often ignore the uncertainties associated with ISs and their use". The authors suggest that the ISs considered are the potential uncertainty factors in the SCM context".* And complementing Q3 A6 means that - *"There are risks and uncertainties during the investment, the launch of a new product, the implementation of a new IS and the management of a global supply chain (SC). Our study is positioned at the intersection of research in SCM and IS management. These two fields of research share the need to manage information flows within an inter-organization. Although the coupling of physical and information flows is obvious and well known in SCM".* The uncertainty being the lack of information in the project execution. The A9 considers this project as Q A9 - "*Such a project can be considered characterized by high levels of both uncertainty and*

misconceptions. Thus, by itself, the concept of uncertainty is not enough to fully capture the challenge and more ambiguous aspects of ISD projects". Some authors have seen in Q1 to 12: *"Uncertainty is treated as an exogenous variable in a situation where there is a lack of information".*

The A19 synthesized the management of uncertainty in its relevant and explicit form. A way to seek information and model to deal with the unforeseen. Thus, he pointed out Q1 A19: *"First, uncertainty management refers to the management model of which will be implemented in a project to capture more information needed, then to know that territory from this information is to build strategies for the project so that the uncertainties are identified so that the manager can work with anality in which knowledge is sufficient to drive the success of the project. Uncertainty management is precisely the management of the different possibilities that exist for success in a project. The more information, the more likely you are to deal with these situations of uncertainty, the misconceptions will be less if management recognizes the weaknesses and possible mistakes of a project. After all, the significance of the existence of uncertainty and the misconception and how they were conducted and that subsidizes suggestions for the management of projects".* And Q1A13 talks about creating strategies to deal with the lack of information Q2 A13 - *"a strategy should be implemented, which allows iteration, experimentation, and less formal planning could help manage uncertainty or lack of information".* The A9 article focuses on how successful the project manager dealt with the uncertainty and misconceptions of the project and the effect on project performance. So, the Q4A9- *"It is important to note that the misconception is different complexity, which is generally seen as a broader concept that incorporates uncertainty and ambiguity".* And complementing Q1A15 brings *"uncertainty is all that the manager does not know and does not know. So, managing uncertainty is through creating a mentioned flexibility, complexity and opportunity creation".*

R2 What is the strategy used to deal with project uncertainty?

In this paper we will discuss how the authors of the selected articles dealt with the strategies used to manage the uncertainties studied by them, noting that according to Bateman and Snell (2009) strategy is a pattern of actions and allocations of resources to achieve the objectives of the organization, in this case the objective of the strategies studied, in this research, is to better manage uncertainties in projects. It was noticed that some of the selected articles proposed some models, matrices, and algorithms to handle and better manage the uncertainties, such as Q1A2 - *"structure matrix to estimate the duration of complex projects with overlapping activity and tried to identify the main activities that affect the uncertainty in the duration of the project";* Q1A1 - *"Recognizing uncertainty in asset management inputs, researchers have developed probabilistic models and procedures for individual components of asset management systems"*; Q1A3- *"A model of system dynamics of a project monitoring and*

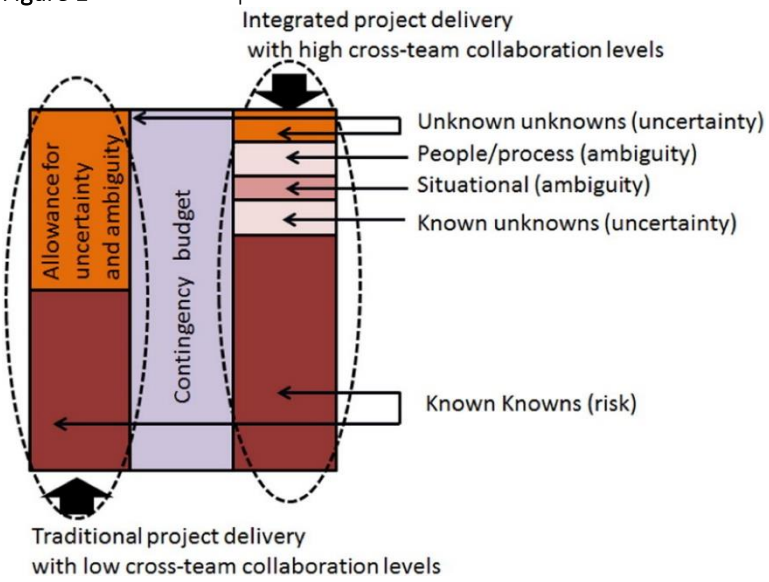
control system, incorporated with strategic and tactical uncertainties, the model experiences with typical corrective actions to disturbances during the implementation of a project under a behavioral paradigm". And the A3 it still shows how the configuration of this dynamic model of the project monitoring system would be: Q6A3 - *"Assuming the total project duration is 100 months, we address the impact of uncertainties on strategic goals and operations respectively. For Strategic Change (SC), we illustrate two scenarios: positive SC and negative SC. D & D (DD), which is represented by a normal random distribution, is defined as low level, medium level, and high level. Note that we only want to provide a wide range of uncertainty levels to represent their impact, but in practice, a low level of DD may be within a tolerance project manager, so no corrective action is necessary, and with a high DD Level, the project may require replanning since the outage".* The Q1A10 - *"presents an algorithm for optimally scheduling repetitive construction projects under uncertainty".*

The A10 brings as a strategy to deal with the uncertainties in projects to create algorithms capable of identifying the uncertainties: Q2A10 - *"Testing the algorithm revealed several discoveries. Diffuse numbers can be used to capture uncertainty in various inputs without the need for historical data. The modified algorithm is capable of optimizing schedules, for different objectives, under uncertainty. Finally, AI can be used to capture desired users' confidence in the final schedule".* And thus, being Q4A10 - *"The algorithm developed explains uncertainties associated with crew quantities, productivity and costs. In addition, it has sizes and inserts time slots in a structured way, which allows users to adjust these buffers based on the desired level of confidence in the generated schedule".* And A5 talks about creating a probability event as strategy Q5A4 - *"Strategies can be simply to avoid problems that occur during a project life cycle (PLC). Uncertainty was also discussed in terms of difficulty in developing a probability profile of an event occurring within the project deadline or in developing an assessment of its likely impact".* Q2A14 portrays models as strategies - *"The SD models contemplate the external events and correct the impact of the events and the consequences of these managerial actions taken, a model that eliminates the bias, aims to eliminate the deviation between the predicted productivity and the predicted value, so bias is removed from product, the manager optimistic goals".*

Another tool cited by the articles is the use of a Kaleidoscope to deal with uncertainties in projects as shown in Q1A8 - *"Our main contribution is to validate the Kaleidoscope of Uncertainty in a larger data set, enriching our understanding of the sources of uncertainty of the project in these two important and highly consequential design environments".* And the Q1A11 complements – *"empirical findings and synthesizes theory and practice to present the kaleidoscope uncertainty as a means of understanding the sources of uncertainty in terms of safety-critical projects".* On the other hand, article A7 talks about analyzing the uncertainties as a whole, inside and outside the project. Q1A7 - *"While project managers usually analyses separately the uncertainties in the local and off-site, the practical implications of the research,*

the results suggest the adoption of a holistic approach in which risk management practices in both environments are integrated" and article A15 of the other approach to integration, in which case the integration of the teams formed to better deal with the uncertainties Q1A15: *"involve project actors at the level as well as at the installation level. A project being unique, involving people early is a possible solution to deal with uncertainty".* This combined with the creation of alternative plans for different uncertain scenarios Q2A15: *"The creation of alternative plans creates a readiness to adjust quickly to changing circumstances, in addition to supporting flexibility in the work performed" see Figure 2.*

Figure 1: Research steps



Source: Walker et al. (2017, p. 184).

Another point of view presented by some of the important articles selected is that the perception of uncertainties in the project, is not a bad point, on the contrary, can be a strong point, therefore the companies have in these uncertainties the opportunity to innovate, innovation as a strategy for dealing with uncertainties Q4A5 - *"In theory, temporary organizations (e.g., projects) may be key to innovation, allowing companies to conduct 'unusual experimental activities' (Brady and Hobday, 2012, p.28). A key issue for the grassroots organization is thus to harness the benefits of uncertainty and complexity for creating sustainable innovation opportunities through knowledge employment and experimentation within these temporary project organizations".* The information used in a proper way can generate strategies to manage the uncertainties better, as was seen in the theoretical reference 1 according to Starec (2007), today's information is the main asset in the struggle for survival of an organization since relevant information helps strategies and decision-making. And following this reasoning, the selected articles show how information can be used to support strategies for dealing with uncertainties, such as Q1A16 - *"Implementing an experience-based project is an important strategy to deal with uncertainties".* Q1A9 - *"According to the information processing literature, organizational actions can be seen as processing systems that*

aim to reduce uncertainty. Given the generally accepted definition of uncertainty as for the lack of information to achieve a given task. Organizational theorists agree that its resolution requires managers to ask appropriate questions about a task, and respond to them by collecting the necessary information". And article A6 already talks about working with an Information System to manage uncertainties, Q2A6 - *"ISs play a key role in SCM. In a context of high uncertainty, they allow information to be analyzed quickly and collectively in order to facilitate better decisions. DeGroote and Marx (2013) find that ISs improve an SC's ability to detect market changes by improving the adequacy, accuracy, accessibility, and timeliness of information flows among SC members. In addition, ISs can improve competitiveness and ultimately strengthen performance in the current era of intense competition and technological advancement".* But when you talk about misunderstandings information does not end up being enough, as the A9 says: Q3A9 - *"Resolution of uncertainty requires the collection and interpretation of additional information. Daft and Lengel (1986) argue that obtaining more information is not enough to solve misconceptions. Because it reflects ambiguity and lack of clarity, solving mistakes requires building models, setting tasks, evaluating, and restructuring everything that can be achieved when managers promote rich communications among all participants in the task".*

And a share of A19, explains better the complexity and importance of integrating appropriate information, strategies and managing uncertainties in projects: A19Q1: *"First, uncertainty management refers to the management model of which will be implemented in a project to capture more information needed, then to know that territory from this information is to build strategies about the project so that the uncertainties are identified so that the manager can work with a reality where knowledge is enough to drive the success of the project. Uncertainty management is precisely the management of the different possibilities that exist for success in a project. The more information, the more likely you are to deal with these situations of uncertainty, the misconceptions will be less if management recognizes the weaknesses and possible mistakes of a project. After all, the significance of the existence of uncertainty and the misconception and how they were conducted and which subsidizes suggestions for project management".* As we can see, there is a complexity to deal with project uncertainties, all actions, from information gathering, to the creation of strategies to manage project uncertainties, must be aligned with each other with the common goal of managing the uncertainties. uncertainties in the projects.

FINAL CONSIDERATIONS

Uncertainty being the important factor in project management, its management mostly contributes to project success. With the defined objective, this work contributes to the management of uncertainty showing what it has been talking about in the last five years. The approach of this topic by the systematic review of the literature showed the different forms

that uncertainty is managed with the basis in the literature in project uncertainty. We found some models and tools that were revealed in the articles to manage the uncertainty adequately. In the analysis of the articles were identified that the causes of uncertainty and the strategy to deal with this phenomenon. The key determinant of project uncertainty comes from the environment. The ever-changing environment demands managers a technique to control the unpredictable. The manager must seek to understand the origin of unforeseen, that is, internal or external. If it is internal, the directed actions of dealing are more viable, and if external, the more tense are the actions until the stakeholders are taking into account. Managing project uncertainty requires much more from the team in the sense of collaboration and the ability to remain flexible. The project of construction and IT are the project s involving a high uncertainty.

The study revealed with a specific characteristic the relevant factors in the project. The knowledge factors, location information where to carry out the project. These factors can be a point of research for the next work, emphasizing in an objective way how to capture this information for the reduction of uncertainty. The technique suggested in some articles, the search for the information necessary to identify previously possible events. Each project being unique presenting a different feature, thus a different management tool. Turning uncertainty into risk makes management easier.

The limitations of the present study were due to some articles, found in both platforms, being paid, thus making it impossible to use them in the contribution of the debate. For future studies, it would be important to map uncertain variables that have occurred in case studies on the researched topic - uncertainty management - and the strategies used for each case study, so the present work adds up to the important collection contributing more with the theme.

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