GESTÃO & PRODUÇÃO

ISSN 0104-530X (Print)
ISSN 1806-9649 (Online)

ORIGINAL ARTICLE

Study on the state of the art of critical success factors and project management performance

Estudo sobre o "estado da arte" em fatores críticos de sucesso e desempenho em gerenciamento de projetos

Geordy Souza Pereira[1], Olívio Novaski[2], Norival Ferreira dos Santos Neto[3], Francisco de Assis da Silva Mota[1]

[1]Universidade Federal do Piauí – UFPI, Engenharia de Produção, Campus Universitário Ministro Petrônio Portella, Teresina, PI, Brasil. E-mail: geordy@ufpi.edu.br; assismota@ufpi.edu.br

[2]Universidade Estadual de Campinas – UNICAMP, Faculdade de Engenharia Mecânica, Campinas, SP, Brasil. E-mail: novaski@fem.unicamp.br

[3]Universidade Estadual de Maringá – UEM, Departamento de Engenharia Mecânica, Maringá, PR, Brasil. E-mail: nfsneto@uem.br

How to cite: Pereira, G. S., Novaski, O., Santos Neto, N. F., & Mota, F. A. S. (2022). Study on the state of the art of critical success factors and project management performance. *Gestão & Produção*, 29, e4722. http://doi.org/101590/1806-9649-2022v29e4722

Abstract: This article has carried out a state-of-the-art survey of the main international publications related to Critical Success Factors (CSFs) and project management performance from 2009 to 2019. The publications were extracted from the databases of the platforms *Engineering Village*, *Web of Science* and *Scopus*. In total, 77 works published in major international journals were selected for the bibliographic review. It was noted that the approaches that stood out in these articles are related to evaluation system, maturity analysis, types of strategies, use of management tools, and project governance process. The research has also identified 19 CSFs most cited in these publications and grouped them into categories. The results showed that a CSF related to human resources – team commitment – was the most cited in the publications. It is expected that the results of this work can contribute to the understanding, expansion and continuous enhancement of research in the field of project management. By producing a database of scientific works and presenting an overview of the needs and challenges that have to be overcome, it should also contribute to providing researchers with a theoretical background for further development in the field.

Keywords: Project management; Critical success factors; Performance; State of the art; Bibliographic survey.

Resumo: O presente artigo realizou um levantamento do tipo "estado da arte" nas principais publicações internacionais relacionadas a Fatores Críticos de Sucesso (FCS) e desempenho em gerenciamento de projetos no período de 2009 a 2019. Para isso, foi utilizada a base de dados de fornecedores de dados livres das plataformas *Engineering Village, Web of Science* e *Scopus* onde foram extraídas e consultadas publicações para análise. Assim, encontrou-se para revisão bibliográfica o total de 77 trabalhos publicados nas principais revistas internacionais. Verificou-se que as abordagens que mais se destacaram nestes artigos são relacionadas ao sistema de avaliação, à análise de maturidade, aos tipos de estratégias, ao uso de ferramentas de gestão e ao processo de governança nos projetos. A pesquisa, também, identificou 19 FCS mais citados nessas publicações e agrupou-os em categorias. Os resultados mostraram que o FCS relacionado aos

Received Apr. 2, 2022 - Accepted Aug. 10, 2022
Financial support: This work was carried out through DINTER UFPI/UNICAMP with financial support from CAPES – Coordination for the Improvement of Higher Education Personnel.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

recursos humanos - comprometimento da equipe - foi o principal elemento e o mais citado nas publicações. Espera-se que os resultados deste trabalho, possam colaborar na compreensão e ampliação das pesquisas e no aperfeiçoamento contínuo para os trabalhos em gerenciamento de projetos. Além de contribuir para construção da memória, na medida em que produz um banco de dados sobre as produções científicas, dando uma visão de suas necessidades e a possibilidade de apropriação de um referencial teórico para os pesquisadores que desenvolvem estudos na área.

Palavras-chave: Gerenciamento de projetos; Fatores críticos de sucesso; Desempenho; Estado da arte; Levantamento bibliográfico.

1 Introduction

This article is a state-of-the-art survey of the main international publications related to Critical Success Factors (CSFs) and project management performance from 2009 to 2019. According to Ferreira (2002), state-of-the-art research is bibliographic and intended to map and discuss a certain type of academic content in different fields of knowledge, seeking to find which aspects and dimensions have been highlighted and favored at different times and places. Romanowski & Ens (2006) understand that state-of-the-art studies weigh up the research in a given field.

Project management is essential for both public and private companies because it represents a competitive strategy that aims to attain growing levels of quality and bring added-value to the interests of customers (Hartono et al., 2019). Projects are seen as a tool to improve businesses, providing help to implement strategic changes, and the ability to manage projects can improve as processes are defined, understood and enhanced (Haron et al., 2018).

According to Mir & Pinnington (2014), there is evidence that the value sought in a high-performance project management system is associated with the project success. The link between project management performance and its success is hard to design, as it involves complex constructions, often with insufficient details and accuracy, thus leading to fragmented and incomplete findings.

Moeuf et al. (2019) point out that CSFs can be used to manage work programs since they represent focal areas that can be under constant attention and careful administration. Asgari et al. (2018) state that a deep understanding of CSFs allows organizations to assess threats and opportunities, which is indispensable in the development of a solid strategy to achieve project results. Therefore, according to Meredith & Zwikael (2019), the main challenge in contemporary project management is to determine which critical measures can assure the project will be successful for all stakeholders.

Studies such as those by Avileis et al. (2018), Chen & Lee (2018), and Zheng et al. (2019) show the need to analyze project management processes in order to create an evaluation structure aligned with continuous improvement. That being said, understanding the success of different projects and adapting models that can accurately measure their management and success is a complex and challenging task.

In this regard, the aim of this article is to carry out a state-of-the-art survey of scientific works related to CSFs and project management performance published in international journals. The survey is based on keywords, the concept of discourse genre and the databases of the platforms *Engineering Village, Web of Science*, and *Scopus.*

Initially this article presents a literature review with definitions on project and project management, critical success factors, and project management performance. Later on, publications are analyzed based on bibliometric surveys of the academic production in project management. In total, the article consists of five sections: introduction, literature review, methodological procedures, results and discussion, and conclusions.

2 Literature review

2.1 Concepts of project and project management

Asgari et al. (2018) describe projects as a set of activities that should be conducted within clear limits of scope, specified deadlines, approved costs, and detailed service quality. The exclusion of one of these four factors can lead to a costly or failed project.

Szalay et al. (2017), for their part, define project as a temporary effort to create a specific product or service, somehow different from all other products and services, having a well-defined start and finish, using resources, being conducted by people, and following parameters such as cost, time and quality.

The concept of project is described in a similar way by the *Project Management Institute* (PMI, 2017): a temporary effort undertaken to create a product, service or exclusive result. Projects are carried out to achieve aims by means of delivery production. Their temporary nature indicates they have a definitive start and end. The term *temporary* does not necessarily imply short duration, it refers to their engagement and endurance; furthermore, it does not apply to the product, service or result created by the project, as most projects are intended to create a lasting result.

Therefore, project management is the application of knowledge, tools and techniques to the activities of the project to address its requirements. There should be proper integration among the processes involved in this application so as to allow organizations to have an efficient and effective project management (PMI, 2017).

According to Radujković & Sjekavica (2017), project management is the planning, organization, monitoring and control of all aspects of the project so that all involved achieve their aims in a safe way, within the schedule, budget, and performance criteria. However, taking into account project management success, it is possible to find different approaches.

Project and project management are integrated to the discussion on the concept of project success. It is also important to note that the concepts of project and project management evolve and thus expand the approaches towards project success. In the specialized literature, authors discuss this question in different topics, such as: stakeholder project management (Nguyen, 2019; Davis, 2016; Serrador & Turner, 2015); sustainable project management (Chan & Adabre, 2019; Mavi & Standing, 2018); project benefits management (Zwikael et al., 2018; Carvalho et al., 2018; Badewi, 2016); project attributes and complexities (Hartono et al., 2019; Dao et al., 2017); new methodological approaches of agile and lean projects (Lishner & Shtub, 2019; Nold & Michel, 2016; Sanchez et al., 2019); integrated project delivery (Yu et al., 2019); and project manufacturing environment (Pacagnella et al., 2019).

2.2 Critical success factors and project management performance

According to Rezvani & Khosravi (2018), in the literature on project management there are two viewpoints with respect to project success: the project success factors and the project management success criteria. The latter are associated with standard measures of cost, time and scope, which are called “iron triangle” and can be taken retrospectively after the conclusion of the project. Kerzner (2017) states that triple restrictions can be defined as a triangle with its three sides representing time, cost and performance (which can include quality, scope and technical performance).

Critical success factors, on the other hand, are understood as elements that can be influenced to increase the chances of success/failure of a project. They focus more

specifically on questions – e.g., behavior capabilities of project teams and the satisfaction of customers and stakeholders –, and can be measured before the conclusion of the project (Rezvani & Khosravi, 2018).

According to Altarawneh & Samadi (2019), success factors are management system inputs that lead directly or indirectly to project or business success. Nevertheless, the criteria by which a project is considered successful have to be decided in the initial stages of the project, when it is conceived, to avoid that differences emerge among the project teams.

Almarri & Boussabaine (2017), for their part, point out that success factors are instruments that make it easier to achieve project aims and that CSFs depend on the type and life cycle of projects. CFSs are used to improve the result of projects and project management.

Asgari et al. (2018) state that CSFs are used to support and evaluate the success of a strategic and tactical approach in the implementation of projects, increasing the success probability. This system is used by executors in the delivery of projects in order to obtain enhanced performance with limited resources.

In this regard, CSFs can be analyzed and monitored intending to soften the causes of failures, which can be an important contribution related to the elements determining project efficiency. Joslin & Müller (2015) state that CSFs have evolved from simplistic concepts, known as iron triangle (time, quality and costs), to something encompassing many more success criteria.

Another way to analyze CSFs is to establish categories or measures to determine the best form of measurement. Pacagnella et al. (2019), in their research on project environment, have identified the most statistically influential CSFs in project performance. The authors grouped CSFs into five categories: 1) human resource factors; 2) organizational factors; 3) factors related to the relationship with stakeholders; 4) project management factors; and 5) factors related to technical aspects.

However, according to Zheng et al. (2019), in project management the performance is measured by how the project has progressed, which does not help manage the project in the future. An interesting practice would be to use the indicators that can signal future events, helping the manager to monitor the project for goal achievement. Such indicators are called main indicators.

In the literature on project management, CSFs have been investigated in a wide variety of contexts and applications and in different sectors, such as construction industry (Nursin & Latief, 2018; Tsiga et al., 2016; Yan et al., 2019), aviation industry (Adabavazaeh & Nikbakht, 2019), information technology (Adzmi & Hassan, 2018; Ghayyur et al., 2018), service industry (Yang & Yang, 2018), medical technology (García-Villarreal et al., 2019), renewable-energy industry (Maqbool et al., 2018), as well as in general projects (Liu et al., 2018; Mba & Agumba, 2018) and in the fields of management and entrepreneurship (Martens et al., 2018; Silva et al., 2018).

3 Methodological procedures

This study consists of a bibliographic survey featuring both qualitative and quantitative aspects. In order to carry out this state-of-the-art survey, the literature of the field of project management was investigated, specifically the topics related to Critical Success Factors (CSFs) and project management performance. The publications analyzed were extracted from the databases of the platforms *Engineering Village*, *Web of Science* and *Scopus*, which provide a wide index of the literature from reliable scientific sources.

The research was conducted in April 2018 and updated in November 2019. Data were collected and organized for analysis by identifying the topic in the title, abstract or

keywords based on the following combinations: "*measure and project management*", "*performance and project management*", and "*success*" *and* "*Project" and "management*".

Using the combinations of keywords and restricting the search criteria to articles published between 2009 and 2019, a total of 1927 articles were found on the platforms. Table 1 presents a summary of the searches performed on the platforms according to each keyword combination.

Table 1. Summary of the searches performed on the platforms *Engineering Village, Web of Science* and *Scopus.*

Search	Keywords	Filters	Results
Nº 1	"*Measure and project management*"	Articles	634
Nº 2	"*Performance and project management*"	Articles	910
Nº 3	"*Success" and "Project" and "management*"	Articles	383
TOTAL			**1,927**

Source: the author.

Articles were then selected and excluded based on a set of criteria. Only CSFs related to project or project management were considered. The methodological procedures were the following:

1) After the data collection, filters related to fields of interest and conformity to the research theme were created. The first filter excluded documents that did not relate directly to project management studies, thus only articles partially or completely aligned with this field were listed – 384 in total.

2) The second filter excluded documents not aligned with the objects of the research, i.e., critical success factors, and project management performance or measurement, which limited the analysis to 124 articles. Therefore, articles were selected based on five criteria, as described in Table 2.

Table 2. Criteria for selecting and excluding articles.

Criteria	Selection criteria	Elimination criteria
a) **Theme 1** - Performance	Contextualized in some way: indicators, measurement, or description	Not approached or only outlined with economic or financial character
b) **Theme 2** - Success	Approached in project management success, or CSFs in project management	The application of CSFs was not in project management
c) **Theme 3** - Project Management	Contextualized in some way: application, use of tools, management	Not approached directly
d) **Keywords**	Presence of or some proximity with "*performance*", "*measure*", "*success*", and "*project management*"	No relationship with project management
e) **Article approach**	Conceptual discussion on the theme; case study; application and statistical analyses	Very specific approach, e.g., strict case study without relationship with a broader analysis of project management

Source: the author.

Ferreira (2002) points out that most state-of-the-art studies opt to analyze works based on the abstracts, but a deeper analysis requires the examination of the whole texts. In addition to that, the nature of the material must be taken into account based on the concept of discourse genre. At first, this study has prioritized the analysis of the title, keywords and abstracts of the articles retrieved from the aforementioned platforms, but later articles were fully examined so that different approaches to CSFs and project management performance could be analyzed. The bibliographic review encompassed a total of 77 works published in major international journals.

According to Bakhtin (2003), every abstract can be read as one of the discourse genres belonging to the academic sphere, with determined purposes and specific production conditions. Every abstract is read as a firm statement delimited by the alternation of the productive subjects and by the relationship between partners involved in its production and reception. In this regard, in the present work the concept of discourse genre was applied in three stages of the bibliographic review:

a) in the concepts of *project* and *project management,* expanding the approaches towards project success. In the specialized literature authors discuss the matter in a variety of topics, and 26 articles were identified in this survey;

b) regarding *project management success*, a review of the main project management journals was carried out aiming to point out the main success criteria. A total of 23 articles were identified, which sum up the main considerations of several authors on project success criteria;

c) in the study of CSFs, those most cited in the articles were found in the approach to the relationship between “critical success factors” and “project management performance”. Out of the works consulted, 28 articles with relevance in the investigation of CSF studies and project management performance were identified.

It is worth pointing out that, by dealing with many texts with close-related topics, this research presents several similar ideas and the content may become repetitive at times.

4 Results and discussion

For a better understanding of the results, the analyses of the state of the art of CSFs and project management performance were divided into two topics. The first refers to project management success and is based on the concept of success by Radujković & Sjekavica (2017) and Rezvani & Khosravi (2018), which distinguishes project success factors from project management success criteria. The second refers to CSFs with respect to project management performance, presenting the main CSFs after the conduction of the bibliographic survey and literature review.

4.1 State of the art of project management success

Nowadays, an ever-growing number of projects increase their complexity and can require a major technical advance for being successful. Kerzner & Saladis (2017) point out that traditional project management works well when the course of the project is clearly understood: the scope is well defined, all stakeholders agree on the aims and expectations, risks have been assessed and are well understood, and the success probability is regarded as very high.

According to Berssaneti & Carvalho (2015), the aim of project management is to assure the project success. Nevertheless, companies face new challenges when they

adopt project management methodologies, e.g., a construction project or an information system project. Furthermore, success, as a subjective term, depends on the perspective of who is measuring it.

In the context of project management, Joslin & Müller (2015) point out that the word *success* is employed when one intends to express that something desired was achieved, something that was planned or attempted, i.e., when the delivery of the project happens at the expected time, within the budget, in compliance with the mission and aims of the company. The word *failure* describes the opposite condition, when the expected goals are not achieved.

However, a project can be considered acceptable even when the results regarding costs and deadlines are not those expected (Tripathi & Jha, 2018). To determine whether it is successful or not, performance standards need to be developed during the project and compared to the results (Nursin *&* Latief, 2018). Therefore, project success or failure can be perceived in different ways by stakeholders (Martens et al., 2018).

Furthermore, it is essential to understand that project success does not imply that an organization is totally successful within the boundaries of project management. Shenhar & Holzmann (2017) consider that organizational performance is enhanced when projects are successfully completed, so it is important for managers to correctly understand project success.

Badewi (2016) observes that the definition of project success has changed over time. In the beginning of the 1970s, it focused on the application of project management tools, but today there is a concern to satisfy all stakeholders. In view of this, project success is now measured from a different perspective, e.g., from the project efficiency, the influence of the team and the customer, the business success, or preparation for the future.

Davis (2016) reports in her works that in literature review there is a wide discussion about the concept of project success, but the definition of success is still inconsistent. There is a need for a performance measurement method that uses appropriate dimensions along with new perspectives able to describe the perception of different groups of stakeholders, as this is possibly critical to prevent a project failure. However, the method should be easy to use and access, in addition to producing consistent results.

According to Meredith & Zwikael (2019), project success can change over time, as conditions change and the projects are seen in longer hindsight. Time horizons also play a relevant and distinct role for some stakeholders, e.g., a project manager has a short-term interest, whereas others, such as the project sponsor, the CEO, or the boss of the customer organization, have long-term interests and concerns.

On the other hand, Haron et al. (2018) understand that project success can be evaluated based on the way the resulting product or service supports the organizational governance. It is important for the project manager to know about the policies and procedures of the organizational governance regarding the object of the product or service. To guarantee the project success, the project manager should have the required knowledge of project management.

According to Radujković & Sjekavica (2017), there are two main concepts of success with respect to projects: project success and project management success. There are similarities and differences between these two dimensions of project success. The main difference is that project success is linked to the result of the evaluation of the compliance of the general project goals, whereas project management success is associated with traditional measurements of time, costs, and quality performance. Nevertheless, on account of the existence of several different models of success in projects and project management, it is difficult to establish a clear differentiation between them, especially considering their mutual relationships.

Such differentiation is better noticed in the operational assignment of project management. According to Sanchez et al. (2017), on the one hand, project management success is a responsibility of the project manager and means to deliver the project results by the deadline, within the budget, and with the necessary characteristics and functions. As a result, success is generally measured based on the iron triangle (time, budget, and scope/quality). On the other hand, project success can be seen as a responsibility of the project owner, anticipating the project benefits, e.g., related to finances, quality, flexibility, and innovation.

Based on the concepts of success by Radujković & Sjekavica (2017) with respect to project and project management, 17 international articles were selected. They were published between 2009 and 2019 and seek to point out the main success criteria. Table 3 sums up the main considerations of several authors on project success criteria.

Table 3. Main authors and project success criteria.

Authors	Success criteria
Meredith & Zwikael (2019)	Project management (cost, scope and quality)
	Project ownership (positive benefit for the project sponsor)
	Project investment (business goals or project value)
Anantatmula & Rad (2018)	Communication and top management support
	Use of planning technique and tools
	Manager qualification and competence
	Customer satisfaction
Haron et al. (2018)	Customer satisfaction
	Project team competence
	Performance of collaborators and suppliers
	Time, cost and quality
Serrador et al. (2018)	Top management support
	Stakeholders
	Budget and time
	Disposition
Martens et al. (2018)	Innovation
	Risk taking
	Proactivity
	Autonomy and aggressive competitiveness
Sanchez et al. (2017)	Project size
	Duration
	Manager’s formal power
Szalay et al., 2017	Project cost management
	Communication management
	Change process management
	Good project governance
	Concern with the project life cycle
Badewi (2016)	Project benefits governance
	Project results
	Benefits for stakeholders
	Impact for users
Varajão & Trigo (2016)	Project characteristics (type and size)
	Stages of the project and post project (project results)
	Stakeholder engagement
	Definition of KPIs
	Definition of project evaluation criteria

Table 3. Continued...

Authors	Success criteria
Carvalho et al. (2015)	Sustainability
	Economic and competitive advantage
	Stakeholder management
	Project ecology
Todorović et al. (2015)	Knowledge management benefits in the project environment
	Identification of KPIs and CSFs
	Knowledge acquisition and transfer
	Proper documentation to evaluate project results
Joslin & Müller (2015)	Project governance
	Use of PM tools and techniques
	Context of the organization environment
	Team management
Jordão et al. (2015)	Definition of planning
	Definition of aims
	Communication among members
	Risk management
	Obtained results
Berssaneti & Carvalho (2015)	Project efficiency
	Resources for project execution
	Activity application and project coordination
	Use of PM tools
	Maturity level in project management in companies
Besteiro et al. (2014)	Definition of the project scope
	Scope compliance
	Team commitment
	Budget compliance
	Project planning
	Communication ability
Mir & Pinnington (2014)	Project team
	Project efficiency
	Business success
	Operational excellence
	Preparation for the future
Vezzoni et al. (2013)	Efficient communication
	Empowerment
	Change management
	Requirements management
	Top administration support
	Risk management

Source: the author.

Therefore, based on the analysis of the relevant literature, it could be noted that there is a diversification of the approaches to project success criteria. Those related to aviation system, maturity analysis, types of strategies, use of management tools, and project governance process stand out.

Nowadays researchers see project success as a complex and ambiguous concept. According to Mir & Pinnington (2014), projects differ in size, and the complexity of criteria used to measure success varies from project to project, which makes it unlikely that a universal set of project success criteria can be agreed on. Individuals and stakeholders often interpret project success in varied ways.

A research conducted by Serrador et al. (2018) demonstrates that project success is known for being influenced by many individual factors – organizational, technical, and psychological/social–, which leads to a second-order factor, called organizational climate and consisting of three dimensions: top management support, sufficient resources, and will to adapt. The results of that research showed that organizations intending to improve project success should focus on developing a climate that includes senior management support, stakeholder engagement, totally dedicated teams, agile methods and support, frequent meetings with product owners, and a good attitude of the team towards changes.

In short, project management success can be defined by the statement of Anantatmula & Rad (2018) that the aim of project management is to make an efficient use of resources to conclude deliveries by the deadline and within the budget. In other words, project management success is the internal measure of efficiency, and project success is related to the external efficiency of the project.

Therefore, some studies in the literature of project management focus on project success or failure, while others generate lists of critical success factors, each list varying in scope and purpose, as reported by Dvir et al. (2006). These matters will be approached in the next topic.

4.2 State of the art of CSFs regarding project management performance

In the past a project was considered successful when it was concluded, regardless of deadline, cost or quality. This concept has evolved and in the 1970s it was usual to say that a project was successful when it was finished by the deadline and meeting the planned costs and quality. This used to be the “traditional project management”. From the 1980s on, “modern project management” added aspects such as satisfied customer, team with high morale, as well as aspects that are particular to each type of business (Chegu Badrinath & Hsieh, 2019).

According to Jitpaiboon et al. (2019), project success depends on different dimensions of project performance, such as budget, time, and quality of final results, among others, hence project performance focus on the measured or tangible results of a project. Barclay & Osei-Bryson (2010) state that project performance is seen as an achievement of project success, project management, and product success, which is aligned with the performance criteria of stakeholders.

Gunasekera & Chong (2018) point out that the literature suggests time, cost, and quality of final results represent the main measures of project management performance results. Ghayyur et al. (2018) argue that project success factors can be motivating or discouraging for project performance and need to be identified and observed. These factors can be divided into four classes: people, organization, techniqe, and process.

Project management is a field where the focus on studies on project failure prevention is ascending, which is reflected by a growing set of professional associations, standards, methodologies and tools, in constant updates of definitions of tools and methodologies, such as PMBOK (2017) and PRINCE2 (2009). However, the update of these resources has not been resulting in an increase in project success (Davis, 2016).

Melnyk et al. (2014) define metrics as more than a performance measure, having three distinct elements: a) a performance measure that quantifies what is happening; b) a performance standard, or objective, indicating what is considered good and bad performance to guide the organization direction; c) consequence related to the degree of aims. Although measures are informative, metrics are critical for the business perspective. All three elements are needed: the removal of any of them neutralizes the metrics and decreases their efficiency in business perspective.

Patah & Vargas (2016), conducting a research on performance team evaluation, divided performance indicators as follows: 1) Strategic performance indicators – those related to the success expected by the customer, organizational results and benefits for investors; 2) Operational performance indicators – those that seek to achieve project product success (by meeting quality requirements) and project management success (through the compliance of definitions planned in the project); 3) Attitude performance indicators – the ones related to the humans aspects of the project team members.

Therefore, collecting, measuring and analyzing real data of a project can provide a more accurate knowledge of CSFs, eliminating perception mistakes during the process and highlighting the real needs of the project performance. According to Oppong et al. (2017), the nature and type of a project can determine the attributes involved. On account of this, it is important for project managers to identify the attributes applicable to each context so that project organizations can select concise and manageable attributes and assure an efficient management.

Table 4 presents the main CSFs identified after the bibliographic survey and literature review. The CSFs found were the most cited in several articles. This was the result of the research carried out on the relationship between “critical success factors” and “project management performance”.

Table 4. Literature review on CSFs with respect to project management.

Nº	Critical Success Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Rank
1	Team commitment		•		•	•				•	•				•	•		•	•	•	•		•	•			•		•	15
2	Project planning	•		•				•				•	•				•		•			•			•	•	•			11
3	Definition of scope	•			•	•							•		•	•	•	•							•	•				10
4	Determination of control points		•			•			•			•							•			•	•		•					9
5	Communication ability		•				•							•								•			•	•		•	•	8
6	Influence of stakeholders	•							•													•	•			•	•	•		7
7	Project monitoring meetings						•		•		•			•					•				•						•	7
8	Determination of critical success factors		•		•				•					•		•				•				•						7
9	Record of lessons learned				•			•			•			•	•			•											•	7
10	Deadline compliance			•				•					•		•				•		•			•						7
11	Establishment of goals	•								•			•						•					•			•			6
12	Determination of preventive actions		•								•						•					•	•					•		6
13	Budget compliance			•	•													•	•		•			•						6
14	Scope compliance	•					•					•				•		•						•						6
15	Definition of restrictions							•				•			•					•							•			5
16	Definition of a reward system			•			•							•								•						•		5

Table 4. Continued...

Nº	Critical Success Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Rank
17	Indication of changes in the deadline and budget		•				•					•							•		•									5
18	Project conclusion meetings					•				•							•	•											•	5
19	Project documentation							•					•			•	•									•				5

Source: the author, extracted from: 1) Gudienė et al. (2014); 2) Tripathi & Jha (2018); 3) Nguyen (2019); 4) Pacagnella et al. (2017); 5) Ahmad et al. (2019); 6) Moeuf et al. (2019); 7) García-Villarreal et al. (2019); 8) Murad et al. (2018); 9) Yang & Yang (2018); 10) Tsiga et al. (2016); 11) Asgari et al. (2018); 12) Zwikael et al. (2018); 13) Chen & Lee (2018); 14) Zhang & He (2016); 15) Gunduz & Yahya (2018); 16) Adzmi & Hassan (2018); 17) Pacagnella et al. (2019); 18) Maghsoodi & Khalilzadeh (2018); 19) Jitpaiboon et al. (2019); 20) Yu et al. (2019); 21) Adabavazaeh & Nikbakht (2019); 22) Li et al. (2018); 23) Altarawneh & Samadi (2019); 24) Ojoko et al. (2018); 25) Li et al. (2019); 26) Yan et al. (2019); 27) Syed et al. (2018); 28) Maqbool et al. (2018).

A total of 19 CSFs influencing project management performance were identified. They were analyzed in a wide variety of projects and applied to different sectors. This shows that CSFs can influence project results and they have been an important area of debate and discussion in project management. As stated by Tsiga et al. (2016), some studies indicate that CSFs are specific to each sector and some factors play a more relevant role in certain sectors.

To better understand and analyze the results listed in Table 4, CSFs were grouped based on categories proposed by Pacagnella et al. (2017) and Tsiga et al. (2016). The result is shown in Table 5.

Table 5. Categories and CSFs found in the literature review.

Categories	Critical Success Factors
Factors related to human resources	✓ Team commitment
	✓ Definition of a reward system
Factors related to the relationship among stakeholders	✓ Communication ability
	✓ Influence of stakeholders
Factors related to project management	✓ Project planning
	✓ Definition of the scope
	✓ Determination of the critical success factors
	✓ Deadline compliance
	✓ Establishment of goals
	✓ Determination of preventive actions
	✓ Budget compliance
	✓ Scope compliance
	✓ Indication of changes in the deadline and budget
	✓ Project conclusion meetings
	✓ Project documentation
	✓ Record of lessons learned
	✓ Project monitoring meetings
Factors related to technical aspects	✓ Definition of restrictions
	✓ Determination of control points

Source: the author, adapted from Pacagnella et al. (2017) and Tsiga et al. (2016).

The table shows that factors related to project management, grouped into 13 CSFs, are the most relevant for the authors, whereas factors related to technical aspects, grouped into 2 CSFs, and factors related to the relationship among stakeholders, also including 2 CSFs, had a secondary importance in the publications. However, even though factors related to human resources consist of only 2 CSFs, one of them – team commitment – was the most cited in the publications included in the bibliographic survey.

In the literature on project management, several studies demonstrate the relationship between human resources and the level of success achieved in projects. Team commitment means the existence of motivated collaborators and team spirit grounded on cooperation and participation, which increases the project success probability.

According to Zhang & He (2016), an integrated project team means all parties agree on sharing gains and difficulties, making a collective effort for the project success. They actively participate in the whole project process and make collaborative decisions on the general project performance. Jitpaiboon et al. (2019) indicate that a harmonious relationship among team members generates an intrinsic motivation and improves team and project performance.

CSFs can influence project results, as stated by Tsiga et al. (2016), and some of them are specific to certain sectors, while others play broader roles.

5 Conclusions

This article has carried out a survey of the main international publications related to Critical Success Factors (FCS) and project management performance from 2009 to 2019. A total of 77 works published in the main international journals were selected, including: 26 articles on the concepts of project and project management, expanding their approaches towards project success; 23 articles reporting project management success and seeking to indicate the main success criteria; and 28 articles describing the most relevant CSFs for project management performance.

Therefore, from the bibliographic survey and literature review it could be noticed that there is a diversification of approaches related to this theme. The approaches that stood out are related to evaluation system, maturity analysis, types of strategies, use of management tools, and project governance process. Other studies identify project success or failure, while the rest of them generate lists of critical success factors. Scopes and aims vary in each study.

This research has also identified and grouped into categories the main CSFs, i.e., those most cited in the articles and influencing project management performance. Such CSFs have been analyzed in a wide variety of projects and applied by the respective authors to different sectors. Results show that 13 CSFs are the most relevant for the authors and refer to project management, whereas those related to technical aspects (2) and relationship among stakeholders (2) had a secondary importance in the publications. However, even though factors related to human resources consisted of only 2 CSFs, one of them – team commitment – was the most cited in the publications included in the bibliographic survey.

It is expected that this work, which carried out a study on the state of the art of critical success factors (CSFs) and project management performance, can contribute to the understanding, expansion and continuous enhancement of research in the field of project management. By producing a database of scientific works and presenting an overview of the needs and challenges that have to be overcome, it should also contribute to providing researchers with a theoretical background for further development in the field.

References

Adabavazaeh, N., & Nikbakht, M. (2019). Interpretive structural modeling analysis of reverse supply chain critical success factors in air industry. In *Proccedings of the 15th Iran International Industrial Engineering Conference* (pp. 99-105). Yazd, Iran: IIIEC. http://dx.doi.org/10.1109/IIIEC.2019.8720737.

Adzmi, R. M., & Hassan, Z. (2018). A theoretical framework of critical success factors on information technology project management during project planning. *IACSIT International Journal of Engineering and Technology*, 7(4), 650-655. http://dx.doi.org/10.14419/ijet.v7i4.35.23078.

Ahmad, M. F., Zainudin, M. H. H., Hamid, N. A., Ahmad, A. N. A., Rahman, N. A. A., & Nawi, M. N. M. (2019). Critical success factors of lean six sigma and its relation on operational performance of SMEs manufacturing companies: a survey result. *International Journal of Supply Chain Management*, 8(1), 64-69.

Almarri, K., & Boussabaine, H. (2017). Interdependency of value for money and ex-post performance indicators of public private partnership projects. *Journal of Engineering, Project, and Production Management*, 7(2), 90-98. http://dx.doi.org/10.32738/JEPPM.201707.0005.

Altarawneh, J. Y., & Samadi, B. (2019). The relationship between critical success factors and success criteria in construction projects in the United Arab Emirates. *International Journal of Advanced and Applied Sciences*, 6(7), 43-53. http://dx.doi.org/10.21833/ijaas.2019.07.006.

Anantatmula, V. S., & Rad, P. F. (2018). Role of organizational project management maturity factors on project success. *Engineering Management Journal*, 30(3), 165-178. http://dx.doi.org/10.1080/10429247.2018.1458208.

Asgari, M., Kheyroddin, A., & Naderpour, H. (2018). Evaluation of project critical success factors for key construction players and objectives. *International Journal of Engineering, Transactions B: Applications*, 31(2), 228-240.

Avileis, L. Jr., Novaski, O., Anholon, R., & Pinto, J. S. (2018). Procedimento para determinar a maturidade em gestão de projetos baseado na norma NBR ISO 21500:2012. *Revista Gestão da Produção, Operações e Sistemas*, 13(3), 56-76.

Badewi, A. (2016). The impact of project management (PM) and benefits management (BM) practices on project success: towards developing a project benefits governance framework. *International Journal of Project Management*, 34(4), 761-778. http://dx.doi.org/10.1016/j.ijproman.2015.05.005.

Bakhtin, M. (2003). *Estética da criação verbal* (4. ed.). São Paulo: Martins Fontes.

Barclay, C., & Osei-Bryson, K. M. (2010). Project performance development framework: an approach for developing performance criteria & measures for information systems (IS) projects. *International Journal of Production Economics*, 124(1), 272-292. http://dx.doi.org/10.1016/j.ijpe.2009.11.025.

Berssaneti, F. T., & Carvalho, M. M. (2015). Identification of variables that impact project success in Brazilian companies. *International Journal of Project Management*, 33(3), 638-649. http://dx.doi.org/10.1016/j.ijproman.2014.07.002.

Besteiro, É. N. C., Novaski, O., Pinto, J. S., & Anholon, R. (2014). Fatores críticos de sucesso para o gerenciamento de projetos: estudo exploratório. In *Anais do Congresso Nacional de Excelência em Gestão* (pp. 1-22). Rio de Janeiro: CNEG.

Carvalho, M. M., Patah, L. A., & Bido, D. S. (2015). Project management and its effects on project success: cross-country and cross-industry comparisons. *International Journal of Project Management*, 33(7), 1509-1522. http://dx.doi.org/10.1016/j.ijproman.2015.04.004.

Carvalho, V. G., Barbalho, S. C. M., Silva, G., & Toledo, J. C. (2018). Benefits management as a path for project management offices contribute to programs and influence on project performance. *Business and Management Studies*, 4(1), 20. http://dx.doi.org/10.11114/bms.v4i1.2976.

Chan, A. P. C., & Adabre, M. A. (2019). Bridging the gap between sustainable housing and affordable housing: the required critical success criteria (CSC). *Building and Environment*, 151(15), 112-125. http://dx.doi.org/10.1016/j.buildenv.2019.01.029.

Chegu Badrinath, A., & Hsieh, S. H. (2019). Empirical approach to identify operational critical success factors for BIM projects. *Journal of Construction Engineering and Management*, 145(3), 04018140. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0001607.

Chen, C. A., & Lee, H. L. (2018). Critical success factors and performance evaluation model for the development of the urban public bicycle system. *Asian Economic and Financial Review*, 8(7), 946-963. http://dx.doi.org/10.18488/journal.aefr.2018.87.946.963.

Dao, B., Kermanshachi, S., Shane, J., & Anderson, S. (2017). Exploring and assessing project complexity. *Journal of Construction Engineering and Management*, *143*(5), 1-10. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0001275.

Davis, K. (2016). A method to measure success dimensions relating to individual stakeholder groups. *International Journal of Project Management*, 34(3), 480-493. http://dx.doi.org/10.1016/j.ijproman.2015.12.009.

Dvir, A., Ben-David, A., Sadeh, A., & Shenhar, J. A. (2006). Critical managerial factors affecting defense projects success: A comparison between neural network and regression analysis. *Engineering Applications of Artificial Intelligence*, 19(5), 535-543. http://dx.doi.org/10.1016/j.engappai.2005.12.002.

Ferreira, N. S. A. (2002). As pesquisas denominadas “estado da arte”. *Revisão & Sínteses*, 23(79), 257-272.

García-Villarreal, E., Bhamra, R., & Schoenheit, M. (2019). Critical success factors of medical technology supply chains. *Production Planning and Control*, 30(9), 716-735. http://dx.doi.org/10.1080/09537287.2019.1572248.

Ghayyur, S. A. K., Ahmed, A., Ali, M., Naseem, A., Razzaq, A., & Ahmed, N. (2018). A systematic literature review of success factors and barriers of Agile software development. *International Journal of Advanced Computer Science and Applications*, 9(3), 278-291.

Gudienė, N., Banaitis, A., Podvezko, V., & Banaitienė, N. (2014). Identification and evaluation of the critical success factors for construction projects in Lithuania: AHP approach. *Journal of Civil Engineering and Management*, *20*(3), 350-359. https://doi.org/10.3846/13923730.2014.914082.

Gunasekera, V. S., & Chong, S. C. (2018). Knowledge management critical success factors and project management performance outcomes in major construction organisations in Sri Lanka: a case study. *VINE Journal of Information and Knowledge Management Systems*, 48(4), 537-558. http://dx.doi.org/10.1108/VJIKMS-06-2018-0051.

Gunduz, M., & Yahya, A. M. A. (2018). Analysis of project success factors in construction industry. *Technological and Economic Development of Economy*, 24(1), 67-80. http://dx.doi.org/10.3846/20294913.2015.1074129.

Haron, N. A., Devi, P., Salihudin, H., & Alias, A. (2018). Project management practice and its effects on project success in Malaysian construction industry. In *IOP Conference Series: Materials Science and Engineering* (Vol. 291, pp. 012008). Bristol: IOP Publishing.

Hartono, B., Sulistyo, S., Chai, K., & Indarti, N. (2019). Knowledge management maturity and performance in a project environment: moderating roles of firm size and project complexity. *Journal of Management Engineering*, 35(6), 04019023. http://dx.doi.org/10.1061/(ASCE)ME.1943-5479.0000705.

Jitpaiboon, T., Smith, S. M., & Gu, Q. (2019). Critical success factors affecting project performance: an analysis of tools, practices, and managerial support. *Project Management Journal*, 50(3), 271-287. http://dx.doi.org/10.1177/8756972819833545.

Jordão, R. V. D., Pelegrini, F. G., Jordão, A. C. T., & Jeunon, E. E. (2015). Fatores críticos na gestão de projetos: um estudo de caso numa grande empresa latino-americana de classe mundial. *Gestão & Produção*, 22(2), 280-294. http://dx.doi.org/10.1590/0104-530X1091-13.

Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, 33(6), 1377-1392. http://dx.doi.org/10.1016/j.ijproman.2015.03.005.

Kerzner, H. (2017). *Project Management metrics, kpis, and dashboards*: a guide to measuring and monitoring project performance (3rd ed.). New York: International Institute for Learning. http://dx.doi.org/10.1002/9781119427599.

Kerzner, H., & Saladis, F. P. (2017). *Project management: workbook and PMP®/CAPM® exam study guide* (12th ed.). New Jersey: Hoboken.

Li, Y., Ning, Y., & Chen, W. T. (2018). Critical success factors for safety management of high-rise building construction projects in China. *Advances in Civil Engineering*, 2018(5), 1-15. http://dx.doi.org/10.1155/2018/1516354.

Li, Y., Song, H., Sang, P., Chen, P. H., & Liu, X. (2019). Review of Critical Success Factors (CSFs) for green building projects. *Building and Environment*, 158(1), 182-191. http://dx.doi.org/10.1016/j.buildenv.2019.05.020.

Lishner, I., & Shtub, A. (2019). Measuring the success of lean and agile projects: are cost time, scope and quality equally important? *The Journal of Modern Project Management*, 7(1), 1-4.

Liu, P., Li, Q., Bian, J., Song, L., & Xiahou, X. (2018). Using interpretative structural modeling to identify critical success factors for safety management in subway construction: a China study. *International Journal of Environmental Research and Public Health*, 15(7), 1359. http://dx.doi.org/10.3390/ijerph15071359. PMid:29958438.

Maghsoodi, A. I., & Khalilzadeh, M. (2018). Identification and evaluation of construction projects' critical success factors employing fuzzy-TOPSIS approach. *KSCE Journal of Civil Engineering*, 22(5), 1593-1605. http://dx.doi.org/10.1007/s12205-017-1970-2.

Maqbool, R., Rashid, Y., Sultana, S., & Sudong, Y. (2018). Identifying the critical success factors and their relevant aspects for renewable energy projects: an empirical perspective. *Journal of Civil Engineering and Management*, 24(3), 223-237. http://dx.doi.org/10.3846/jcem.2018.1691.

Martens, C. D. P., Machado, F. J., Martens, M. L., Silva, F. Q. P. O., & Freitas, H. M. R. (2018). Linking entrepreneurial orientation to project success. *International Journal of Project Management*, 36(2), 255-266. http://dx.doi.org/10.1016/j.ijproman.2017.10.005.

Mavi, R. K., & Standing, C. (2018). Critical success factors of sustainable project management in construction: a fuzzy DEMATEL-ANP approach. *Journal of Cleaner Production*, 194, 751-765. http://dx.doi.org/10.1016/j.jclepro.2018.05.120.

Mba, M. F. B., & Agumba, J. N. (2018). Critical success factors influencing performance outcome of joint venture construction projects in South Africa: comparison of first and second order models. *Construction Economics and Building*, 18(3), 74-94. http://dx.doi.org/10.5130/AJCEB.v18i3.5885.

Melnyk, S. A., Bititci, U., Platts, K., Tobias, J., & Andersen, B. (2014). Is performance measurement and management fit for the future? *Management Accounting Research*, 25(2), 173-186. http://dx.doi.org/10.1016/j.mar.2013.07.007.

Meredith, J., & Zwikael, O. (2019). When is a project successful? *IEEE Engineering Management Review*, 47(3), 127-134. http://dx.doi.org/10.1109/EMR.2019.2928961.

Mir, F. A., & Pinnington, A. H. (2014). Exploring the value of project management: linking project management performance and project success. *International Journal of Project Management*, 32(2), 202-217. http://dx.doi.org/10.1016/j.ijproman.2013.05.012.

Moeuf, A., Lamouri, S., Pellerin, R., Giraldo, S. T., Valência, E. T., & Eburdy, R. (2019). Identification of critical success factors, risks and opportunities of Industry 4.0 in SMEs. *International Journal of Production Research*, 2(1), 1-17.

Murad, S. A., Murad, D. F., Wandanaya, A. B., & Fernando, E. (2018). Critical success factor online service quality in online marketing: a systematic literature review. In *Proccedings of the International Conference on Information Technology and Electrical Engineering* (pp. 158-163). Indonesia: ICITEE. http://dx.doi.org/10.1109/ICITEED.2018.8534931.

Nguyen, L. H. (2019). Relationships between critical factors related to team behaviors and client satisfaction in construction project organizations. *Journal of Construction Engineering and Management*, 145(3), 1-10. http://dx.doi.org/10.1061/(ASCE)CO.1943-7862.0001620.

Nold, H., & Michel, L. (2016). The performance triangle: a model for corporate agility. *Leadership and Organization Development Journal*, 37(3), 341-356. http://dx.doi.org/10.1108/LODJ-07-2014-0123.

Nursin, A., & Latief, Y. (2018). Critical success factors in developing collaborative design-build project team to improve project performance. In *Proccedings of the MATEC Web of Conferences* (Vol. 159, pp. 01025). Indonesia: EDP Sciences. http://dx.doi.org/10.1051/matecconf/201815901025.

Ojoko, E. O., Osman, E. H., Rahman, A. B. A., & Bakhary, N. (2018). Evaluating the critical success factors of industrialised building system implementation in Nigeria: the stakeholders' perception. *International Journal of Built Environment and Sustainability*, 5(2), 127-133. http://dx.doi.org/10.11113/ijbes.v5.n2.240.

Oppong, G. D., Chan, A. P. C., & Dansoh, A. (2017). A review of stakeholder management performance attributes in construction projects. *International Journal of Project Management*, 35(6), 1037-1051. http://dx.doi.org/10.1016/j.ijproman.2017.04.015.

Pacagnella, A. C. Jr., Silva, S. L., & Pacífico, O. (2017). Critical success factors and the "iron triangle": a study in project manufacturing environments. In *Proceedings of the International Conference on Industrial Engineering and Operations Management*, Bristol, UK, July 24-25 (pp. 266-276). Retrieved in 2022, April 2, from https://www.ieomsociety.org/ieomuk/papers/65.pdf

Pacagnella, A. C. Jr., Silva, S. L., Pacífico, O., Ignacio, P. S. A., & Silva, A. L. (2019). Critical success factors for project manufacturing environments. *Project Management Journal*, 50(2), 243-258. http://dx.doi.org/10.1177/8756972819827670.

Patah, L. A., & Vargas, D. M. No. (2016). Avaliação da relação entre a virtualidade de equipes e o desempenho operacional de projetos: uma análise. *Revista de Gestão e Projetos*, 7(2), 54-74. http://dx.doi.org/10.5585/gep.v7i2.440.

Project Management Institute – PMI. (2017). *Um guia do conhecimento em gerenciamento de projeto: guia PMBOK* (6. ed.). Newtown Square, Pennsylvania: PMI.

Radujković, M., & Sjekavica, M. (2017). Project management success factors. *Procedia Engineering*, 196, 607-615. http://dx.doi.org/10.1016/j.proeng.2017.08.048.

Rezvani, A., & Khosravi, P. (2018). A comprehensive assessment of project success within various large projects. *Journal of Modern Project Management*, 6(1), 114-122.

Romanowski, J. P., & Ens, R. T. (2006). As pesquisas denominadas do tipo "estado da arte" em educação. *Revista Diálogo Educacional*, 6(19), 37-50.

Sanchez, F., Micaëlli, J. P., Bonjour, E., & Monticolo, D. (2019). A step for improving the transition between traditional project management to agile project management using a project management maturity model. *The Jounal of Mordern Project Management*, 7(19), 103-119.

Sanchez, O. P., Terlizzi, M. A., & Moraes, H. R. O. C. (2017). Cost and time project management success factors for information systems development projects. *International Journal of Project Management*, 35(8), 1608-1626. http://dx.doi.org/10.1016/j.ijproman.2017.09.007.

Serrador, P., & Turner, R. (2015). The relationship between project success and project efficiency. *Project Management Journal*, 46(1), 30-39. http://dx.doi.org/10.1002/pmj.21468.

Serrador, P., Reich, B. H., & Gemino, A. (2018). Creating a climate for project success. *Journal of Modern Project Management*, 6(1), 38-47. http://dx.doi.org/10.19255/JMPM01604.

Shenhar, A., & Holzmann, V. (2017). The three secrets of megaproject success: clear strategic vision, total alignment, and adapting to complexity. *Project Management Journal*, 48(6), 29-46. http://dx.doi.org/10.1177/875697281704800604.

Silva, M. C., Rampasso, I. S., Anholon, R., Cooper Ordoñez, R. E., Quelhas, O. L. G., & Silva, D. (2018). Critical success factors of Brazilian Business incubators. *Latin American Business Review*, 19(3–4), 197-217. http://dx.doi.org/10.1080/10978526.2018.1534545.

Syed, R., Bandara, W., French, E., & Stewart, G. (2018). Getting it right! Critical success factors of BPM in the public sector: a systematic literature review. *AJIS. Australasian Journal of Information Systems*, 22, 1-39. http://dx.doi.org/10.3127/ajis.v22i0.1265.

Szalay, I., Kovács, Á., & Sebestyén, Z. (2017). Integrated framework for project management office evaluation. *Procedia Engineering*, 196(1), 578-584. http://dx.doi.org/10.1016/j.proeng.2017.08.033.

Todorović, M. L., Petrović, D. C., Mihić, M. M., Obradović, V. L., & Bushuyev, S. D. (2015). Project success analysis framework: a knowledge-based approach in project management. *International Journal of Project Management*, 33(4), 772-783. http://dx.doi.org/10.1016/j.ijproman.2014.10.009.

Tripathi, K. K., & Jha, K. N. (2018). Determining success factors for a construction organization: a structural equation modeling approach. *Journal of Management Engineering*, 34(1), 1-15. http://dx.doi.org/10.1061/(ASCE)ME.1943-5479.0000569.

Tsiga, Z. D., Emes, M., & Smith, A. (2016). Critical success factors for the construction industry. *PM World Journal*, 5(8), 1-12.

Varajão, J., & Trigo, A. (2016). Evaluation of IS project success in InfSysMakers : an exploratory case study. In *Proccedings of the International Conference on Informations Systems*, Dublin, Ireland, December 11-14, (pp. 1-10). Retrieved in 2022, April 2, from http://hdl.handle.net/1822/43857

Vezzoni, G., Arruda, A. C., Banzi, A. L. Jr., & Silva, S. L. (2013). Identificação e análise de fatores críticos de sucesso em projetos. *Revista de Gestão e Projetos*, 4(1), 116-137. http://dx.doi.org/10.5585/gep.v4i1.83.

Yan, H., Elzarka, H., Gao, C., Zhang, F., & Tang, W. (2019). Critical success criteria for programs in China: construction companies perspectives. *Journal of Management Engineering*, 35(1), 1-13. http://dx.doi.org/10.1061/(ASCE)ME.1943-5479.0000659.

Yang, C. C., & Yang, K. J. (2018). The analyses of critical success factors for service industries to develop service brands. *Total Quality Management & Business Excellence*, 31(7-8), 800-813. http://dx.doi.org/10.1080/14783363.2018.1446755.

Yu, J. H., Yoo, S. E., Kim, J. I., & Kim, T. W. (2019). Exploring the factor-performance relationship of integrated project delivery projects: a qualitative comparative analysis. *Project Management Journal*, 50(3), 335-345. http://dx.doi.org/10.1177/8756972819832206.

Zhang, L., & He, J. (2016). Critical factors affecting tacit-knowledge sharing within the integrated project team. *Journal of Management Engineering*, 32(2), 1-10. http://dx.doi.org/10.1061/(ASCE)ME.1943-5479.0000402.

Zheng, L., Baron, C., Esteban, P., Xue, R., Zhang, Q., & Yang, S. (2019). Using leading indicators to improve project performance measurement. *Journal of Systems Science and Systems Engineering*, 28(5), 529-554. http://dx.doi.org/10.1007/s11518-019-5414-z.

Zwikael, O., Chih, Y. Y., & Meredith, J. R. (2018). Project benefit management: setting effective target benefits. *International Journal of Project Management*, 36(4), 650-658. http://dx.doi.org/10.1016/j.ijproman.2018.01.002.

Authors contribution

Geordy Souza Pereira and Olívio Novaski work on the conceptualization and theoretical-methodological approach. The theoretical review was carried out by Geordy Souza Pereira and Norival Ferreira dos Santos Neto. Data collection was performed by Geordy Souza Pereira. Geordy Souza Pereira and Francisco de Assis da Silva Mota participated in the data analysis. All authors participated in the writing and final review of the manuscript.