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Bibliometric Study of Scientific Research from 2009 to 2019 on Critical Success Factors and Project Management Performance

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RESUMO

Objetivo: Este artigo tem o objetivo de realizar uma análise bibliométrica nas publicações científicas inseridas na plataforma Web of Science e relacionadas a Fatores Críticos de Sucesso (FCS) e desempenho em gerenciamento de projetos.
Fundamentação teórica: A pesquisa está baseada nos conceitos de gestão de projetos, fundamentadas nos Fatores Crítico de Sucesso e desempenho em gerenciamento de projeto
Desenho/Metodologia/abordagem: Para realização desse estudo foi utilizada a base de dados de fornecedor de dados livres da plataforma Web of Science, onde foram extraídas e consultadas publicações para análise. Entretanto, para as análises estatísticas e análise de conteúdo utilizou-se o software livre VOSviewer e planilhas de Excel, incluindo-se o site www.wordart.com para representar a nuvem de palavras-chaves.
Resultados: Os resultados apontam a relevância da temática com grande número de publicações no período de 2009 a 2019. Os setores da engenharia são as principais áreas que abordam a temática, com destaque para: apresentação de modelos, implementação, métricas, fatores críticos, ferramentas e cases, que são base para os estudos de desempenho. Os dados mostram que é necessário criar redes de parcerias com maior integração, colaboração e intercambio entre as publicações desenvolvidas por pesquisadores no país.
Originalidade/Valor: Ao fazer uma análise bibliométrica entre Fatores Críticos de Sucesso e desempenho em gerenciamento de projeto, espera-se que possa colaborar na compreensão e ampliação dos estudos e no aperfeiçoamento contínuo para as pesquisas em gerenciamento de projetos, além de contribuir para discussão da qualidade dos trabalhos científicos na área.
Palavras-chave: Gerenciamento de projetos, Fatores Críticos de Sucesso, Desempenho em projetos, Bibliometria.

ABSTRACT

***Purpose**: This paper seeks to carry out a bibliometric analysis of scientific research available on the Web of Science platform and related to Critical Success Factors (CSF) and project management performance.*
***Theoretical framework**: This study is based on concepts related to project management, particularly Critical Success Factors and project management performance.*
***Design/methodology/approach**: To conduct this study, scientific publications were retrieved from the database on the Web of Science platform and analyzed. A statistical and content analysis was carried out using the VOSviewer free software and Excel sheets, as well as the WordArt website (www.wordart.com) to create a keyword cloud.*
***Findings**: Results show the importance of the subject matter, which was featured in a large number of publications from 2009 to 2019. Engineering sectors are the main areas that deal with it, especially by presenting models, implementing metrics, critical factors, tools and cases, which are used as a basis for performance studies. Data show that partnership networks need creating with greater integration, collaboration, and exchange between publications developed by researchers in Brazil.*
***Originality/Value**: By carrying out a bibliometric analysis based on Critical Success Factors and project management development, it is expected to help understanding and the development of studies and the continuous improvement of research into project management, as well as to contribute to the discussion of the quality of scientific research in the field.*
***Keywords**: Project management, Critical Success Factors, Project performance, Bibliometrics.*

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1. INTRODUCTION

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 Moeuf *et al*. (2019), Critical Success Factors (FCS) can be used to manage a work project as they represent focal areas that should get constant attention and careful administration. To Asgari, Kheyroddin and Naderpour (2018), a deep understanding of the critical factors allows an organization to evaluate threats and opportunities, which is essential to develop a solid strategy and achieve the intended results. Therefore, according to Meredith and Zwikael (2019), the main challenge in contemporary project management is to determine which critical measures can guarantee the project will be successful for all stakeholders.

Studies such as those by Zheng *et al*. (2019), Avileis Junior *et al*. (2018), and Chen and Lee (2018) 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 paper is to carry out a bibliometric analysis of scientific works, from national and international journals, related to critical success factors and project management performance. The analysis includes keyword search, content analysis and statistical analysis using the database of the Web of Science platform. Statistical treatment of data was performed using the VOSviewer free software and Excel sheets.

This paper is initially a review of literature with some definitions on project and project management, critical success factors, and project management performance. Later on, publications are analyzed based on bibliometric maps of the academic production in project management. In total, the paper consists of five sections: introduction, literature review, methodological procedures, results and discussion, and conclusions.

2. THEORETICAL FOUNDATION

2.1. Concepts of project and project management

There are many definitions of *project* and they have been enhanced. To understand project management, it is necessary to know how to recognize what a project is. According to Kerzner (2006), project is an enterprise that has a well-defined goal, consumes resources, and operates under pressure of deadlines, costs, and quality. As a result, project management can be defined as planning, scheduling and controlling a series of integrated tasks in order to successfully achieve goals that benefit all participants.

Asgari, Kheyroddin and Naderpour (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.

The PMBOK guide by the *Project Management Institute* (PMI, 2017*)* defines project as a temporary effort undertaken to create a product, service or exclusive result. Projects are carried out to reach 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 is 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 and 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.

It can be noted that project and project management are integrated to the discussion on the concept of 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; CHIH; MEREDITH,

2018; CARVALHO *et al.*, 2018; BADEWI, 2016); project features and complexities (HARTONO *et al*., 2019; DAO *et al*., 2017); new methodological approaches of agile and lean projects (LISHNER; SHTUB, 2019; SANCHEZ *et al.*, 2019; NOLD; MICHEL, 2016); 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 and Khosravi (2018), in the literature on project management there are two points of view 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. The former, for their turn, are understood as elements that can be influenced to increase the chances of success/failure of the project. Critical success factors 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.

Radujković and Sjekavica (2017) point out two main concepts of success in relation to projects: project success and project management success. There are similarities and differences between these two dimensions of project success. The main difference refers to linking project success to the result of the compliance evaluation of the general goals of the project, whereas project management success is related to the traditional measurements of time, costs, and quality performance. Nevertheless, due to the existence of several different success models in projects and project management, it is difficult to differentiate them, especially because of their mutual relationships.

That differentiation is better noticed in the operations assignment in the project management. According to Sanchez, Terlizzi and Moraes (2017), on the one hand, project management success is considered the responsibility of the project manager and means to deliver the project results in due time, within budget, and with the necessary characteristics and functions. Consequently, it is generally measured based on the aforementioned iron triangle (time, budget, and scope/quality). On the other hand, project success can be seen as

the responsibility of the project owner, who foresees the project benefits, e.g., finances, quality, flexibility, and innovation.

In that regard, Critical Success Factors (FCS) are used to support and evaluate the success of a strategic and tactical approach in the implementation of the project in order to increase the success probabilities. However, it should be understood that the success of a project does not imply that the organization is completely successful with respect to project management boundaries (LI *et al*., 2019).

Altarawneh and Samadi (2019) state that 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.

Another way to analyze CSF 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 CSF in project performance. The authors grouped CSF into five categories: 1) human resource factors; 2) organizational factors; 3) factors related to the relationship with the 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.

Gunasekera and Chong (2018) point out that the literature suggests that time, costs and quality represent the main measures of the results of project management performance. Ghayyur *et al*. (2018) argue that project success factors can motivate or demotivate project performance, need to be identified and observed, and can be categorized in four classes: people, organization, technique, and process.

In the literature on project management, CSF have been investigated in a wide variety of contexts and applications and in different sectors, such as construction industry (YAN *et al*., 2019; NURSIN; LATIEF; IBRAHIM, 2018; TSIGA; EMES; SMITH, 2016), aviation industry (ADABAVAZAEH; NIKBAKHT, 2019), information technology (ADZMI; HASSAN, 2018; GHAYYUR *et al*., 2018), service industry (YANG; YANG, 2018), medical

technology (GARCÍA-VILLARREAL; BHAMRA; SCHOENHEIT, 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 (SILVA *et al*., 2018; MARTENS *et al*., 2018).

3. METHODOLOGICAL PROCEDURES

The term *bibliometrics* was proposed by Pritchard at the end of the 1960s and can be defined as the application of mathematical and statistical methods to the analysis of literary works (CHUEKE; AMATUCCI, 2017). Bibliometric studies play a fundamental role in the understanding of the quality and performance of scientific knowledge production (PIMENTA *et al*., 2017) and are more complex than a simple statistical survey, allowing for more detailed and diversified analyses and thus being a useful tool for science (FERREIRA, 2010).

To carry out this study, the database of the Web of Science platform was used, where publications were consulted and retrieved for analysis. The platform contains a comprehensive literature index from trustful sources, is designed for the scientific community, and provided this research with a better use of the related tools. However, for statistical and content analyses the VOSviewer free software were used, including the WordArt website (www.wordart.com) to create a keyword cloud.

After the selection of papers, the report extracted from the platform was exported to VOSviewer for data analysis of the publications. According to Van Eck and Waltman (2010), VOSviewer is a software developed to create, visualize and explore bibliometric maps based on any type of network data. To Ruas and Pereira (2014), VOSviewer is a tool focused on the visualization and creation of bibliometric maps. It can be used to explore maps from different perspectives, each of them emphasizing a specific characteristic, e.g., publications, authors, keyword maps, co-occurrence of citations, among others.

The software is a free network viewer and has an intuitive and user-friendly interface. Two types of mapping were done using it: the first one based on bibliographic data and the second one, on text data. To analyze the report, data were configured by co-occurrence and frequency of keywords for at least 85 keywords, which correspond to 51% of occurrences. From these settings a data network and the cluster layout (map) were generated for analysis. All the software settings were based on Van Eck and Waltman (2013).

Regarding the approach, this research is quali-quantitative, which, according to Ensslin and Vianna (2008), can be used to better explore little-structured questions, territories still not mapped, unexplored horizons, problems involving actors, contexts, and processes. Quali-quantitative models are thus an evolution of those that are merely qualitative or quantitative. By analyzing when to use the quali-quantitative approach, it can be noticed that there is a certain agreement in what refers to its utility in exploratory studies, i.e., those in which there is little initial knowledge of the problem under investigation and its boundaries.

Therefore, there are two types of content analysis: a) *quantitative content analysis*, which is commonly regarded as a "specific data collection method", since it is used to collect and classify information, e.g., in journal papers; the methodological core of content analysis is the system of categories used to classify material; b) *qualitative content analysis*: it is based on the definition of material, on the analysis of the situation in which it was produced, in the formal classification of the material, and in the definition of the analysis of the selected texts and what is really intended to interpret of them (SCHNEIDER; FUJII; CORAZZA, 2017).

In this research the quali-quantitative method was applied in two contexts, which are described below:

1) *In the research sample*

According to Bardin (2011), content analysis can be structured in: a) pre-analysis: systematization of ideas, hypotheses, and aims; definition of the fluctuating readings; b) exploration of the material and treatment: systematic application of the decisions taken; c) interpretation of the results: application of significant validation tests. To carry out these activities, the following procedures are needed: 1) definition of the universe and sample; 2) codification; 3) analysis and interpretation of results. A synthesis of the search results obtained in this study is shown in Table 1.

Table 1 – Sum-up of the searches done on the Web of Science website.

Search	Keywords	Filters	Results
Nº 1	"Measure and project management"	Papers	634
Nº2	"Performance and project management"	Papers	910
Nº 3	"Success" and "Project" and "management".	Papers	383
	TOTAL		**1.927**

Source: The author.

After data collection, filters by area of interest and adequacy to research theme were created. Documents not directly addressing project management studies were excluded, which resulted in 384 papers in the database partially or totally aligned with the research. In the second filter, documents not aligned with the aims of the research, i.e., critical success factors, project management performance or measurement, were excluded, reducing the total to 124 papers for analysis. Exclusion and selection of papers were based on five criteria, as described in Table 2.

Table 2 – Criteria for the selection and exclusion of papers.

Criteria	Selection criteria	Exclusion criteria
a) **Theme 1**- Performance	Contextualized in some way: indicators, measurement, or description	Theme not approached or only outlined from an economic or financial perspective
b) **Theme 2** - Success	Approach of project management success or Critical Success Factors in project management	CSF not applied to project management
c) **Theme 3** – Project management	Contextualized in some way: application, use of tools, management	Not directly approached
d) **Keywords**	Presence of or some proximity with "performance", "measure", "success", and "project management"	No relationship with project management
e) **Paper approach**	Conceptual discussion related to the theme, case study, application, and statistical analyses	Strictly specific approach, as in one-off case studies with no relationship with the more comprehensive analysis provided by project management

Source: The author.

After the analysis of the title, keywords and abstract of each paper, 77 works published in major international journals were selected for the bibliographic review proposed in this research.

2) ***In the content analyses in bibliographic review studies****:*

According to Flick (2013), content analysis is a classic procedure to analyze text material from any origin, from media products to interview data. The method is based on the use of categories derived from theoretical models. Generally these categories are applied to texts instead of the material itself. Content analysis seeks to classify the content of texts by associating statements, sentences or words to a system of categories.

In the present work, content analysis was applied in three stages of bibliographic review, carried out in the following contents:

a) In the concepts of *project* and *project management*, expanding their approaches to project success. Authors in the specialized literature discuss the matter in many topics;

b) Major journals dedicated to project management were reviewed with respect to *project management success*, intending to identify the main success criteria. In total, 23 papers were identified, and they sum up the main considerations of seceral authors on project success criteria;

c) In the study of CSF the most cited factors were found in the papers approaching the relationship between "*critical success factors*" and "*project management performance"*. In total, 28 papers with relevance to investigate CSF studies regarding project management performance were selected.

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. Data analysis from combinations of keywords in the Web of Science database

The research was carried out in April 2018 and updated in November 2019. Using combinations of keywords and employing search criteria limited to papers published in the period between 2009 and 2019, 1927 papers were obtained from the platform. Figure 1 shows the areas of study and application from the combinations of keywords performed in the Web of Science database.

Figure 1 – Areas of study and application from combinations of keywords.

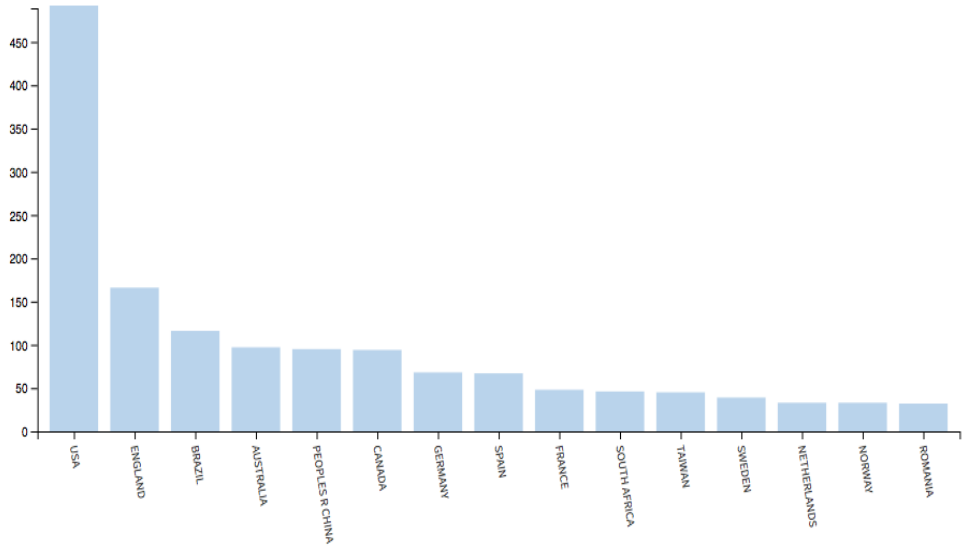
Selecionar	Campo: Categorias do Web of Science	Contagem do registro	% de 1,927	Gráfico de barras
☐	MANAGEMENT	653	33.887 %	
☐	ENGINEERING INDUSTRIAL	225	11.676 %	
☐	BUSINESS	184	9.549 %	
☐	ENGINEERING CIVIL	154	7.992 %	
☐	COMPUTER SCIENCE SOFTWARE ENGINEERING	140	7.265 %	
☐	OPERATIONS RESEARCH MANAGEMENT SCIENCE	128	6.642 %	
☐	COMPUTER SCIENCE THEORY METHODS	101	5.241 %	
☐	COMPUTER SCIENCE INFORMATION SYSTEMS	99	5.138 %	
☐	ENGINEERING MULTIDISCIPLINARY	92	4.774 %	
☐	ENGINEERING ELECTRICAL ELECTRONIC	84	4.359 %	
☐	INFORMATION SCIENCE LIBRARY SCIENCE	67	3.477 %	
☐	COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS	65	3.373 %	
☐	CONSTRUCTION BUILDING TECHNOLOGY	62	3.217 %	
☐	EDUCATION EDUCATIONAL RESEARCH	59	3.062 %	
☐	ENGINEERING CHEMICAL	53	2.750 %	

Source: Web of Science, 2019.

The retrieved works are distributed in many areas, the most prevalent ones being management (33.8%), business (9.5%), and engineering, mainly production engineering (11.7%), civil and construction technology (11.2%), computer engineering (21%), electrical engineering (4.3%), chemical engineering (2.7%), among others.

Figure 2 shows the places of publication (countries) that contribute most to project management studies. Data indicate that the United States (25.3%) are the leaders in producing and publishing scientific texts in the field, and most works are written in English (56%).

Figure 2 –Places of publication (countries).



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Source: Web of Science, 2019.

Institutions (universities) that are most prolific in publications related to the field include the universities of Manchester (1.5%), Quebec (1.2%) and São Paulo (USP) (1.1%). Federal University of Santa Catarina (UFSC) (0.6%) also stands out, being among the 15 largest institutions with production and publications in the field of project management in the last 10 years. Figure 3 presents the ranking of such institutions.

Figure 3 - Ranking of the institutions with the largest production in the field of project management in the last 10 years.

Selecionar	Campo: Organizações - Consolidada	Contagem do registro	% de 1,927	Gráfico de barras
☐	UNIVERSITY OF MANCHESTER	30	1.557 %	
☐	UNIVERSITY OF QUEBEC	25	1.297 %	
☐	UNIVERSIDADE DE SAO PAULO	23	1.194 %	
☐	BUCHAREST UNIVERSITY OF ECONOMIC STUDIES	19	0.986 %	
☐	STATE UNIVERSITY SYSTEM OF FLORIDA	17	0.882 %	
☐	PENNSYLVANIA COMMONWEALTH SYSTEM OF HIGHER EDUCATION PCSHE	16	0.830 %	
☐	UNITED STATES DEPARTMENT OF DEFENSE	16	0.830 %	
☐	UNIVERSITY OF CALIFORNIA SYSTEM	16	0.830 %	
☐	UNIVERSITY OF QUEBEC MONTREAL	16	0.830 %	
☐	BI NORWEGIAN BUSINESS SCHOOL	15	0.778 %	
☐	UNIVERSITY OF PRETORIA	15	0.778 %	
☐	UNIVERSITY SYSTEM OF GEORGIA	15	0.778 %	
☐	UNIVERSIDAD POLITECNICA DE MADRID	14	0.727 %	
☐	NATIONAL UNIVERSITY OF SINGAPORE	13	0.675 %	
☐	UNIVERSIDADE FEDERAL DE SANTA CATARINA UFSC	13	0.675 %	
☐	UNIVERSITY OF TECHNOLOGY SYDNEY	13	0.675 %	

Source: Web of Science, 2019.

Among the Brazilian institutions, the following universities stand out: USP (20.3%), UFSC (11.5%), Nove de Julho (8.8%), UFRN (6.2%), and UFPE (5.3%), together being responsible for 54% of all production and publications in the field of project management from 2009 to 2019 in Brazil, as revealed by the analysis of keywords used in this study. The ranking of these institutions can be seen in Figure 4.

Figure 4 - Ranking of Brazilian institutions with the largest production in the field of project management in the last 10 years.

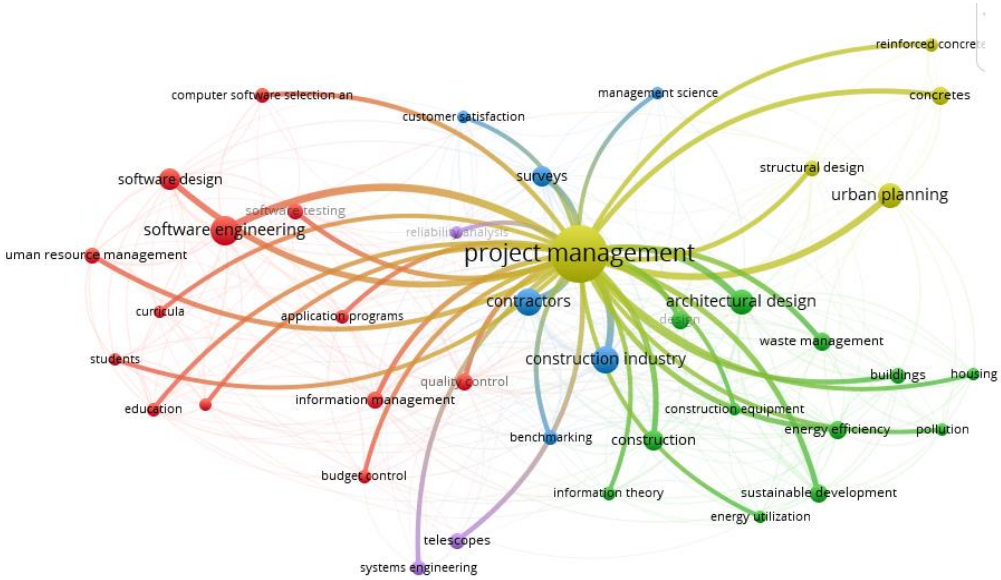
Selecionar	Campo: Organizações - Consolidada	Contagem do registro	% de 113	Gráfico de barras
☐	UNIVERSIDADE DE SAO PAULO	23	20.354 %	
☐	UNIVERSIDADE FEDERAL DE SANTA CATARINA UFSC	13	11.504 %	
☐	UNIVERSIDADE NOVE DE JULHO	10	8.850 %	
☐	UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE	7	6.195 %	
☐	UNIVERSIDADE FEDERAL DE PERNAMBUCO	6	5.310 %	
☐	UNIV FUMEC	5	4.425 %	
☐	UNIVERSIDADE FEDERAL DO RIO DE JANEIRO	5	4.425 %	
☐	UNIVERSIDADE FEDERAL FLUMINENSE	5	4.425 %	
☐	UNIVERSIDADE DE BRASILIA	4	3.540 %	
☐	UNIVERSIDADE FEDERAL DE SAO CARLOS	4	3.540 %	
☐	UNIVERSIDADE METODISTA DE PIRACICABA	4	3.540 %	
☐	CENTRO FEDERAL DE EDUCACAO TECNOLOGICA CELSO SUCKOW DA FONSECA CEFET RJ	3	2.655 %	
☐	GETULIO VARGAS FOUNDATION	3	2.655 %	
☐	PONTIFICIA UNIVERSIDADE CATOLICA DE MINAS GERAIS	3	2.655 %	
☐	UNIVERSIDADE DE CAXIAS DO SUL	3	2.655 %	
☐	UNIVERSIDADE FEDERAL RURAL DO RIO DE JANEIRO UFRRJ	3	2.655 %	

Source: Web of Science, 2019.

4.2. Analysis of the publications selected from the bibliometric map

Figure 5 presents project management studies with a wide research range in several fields of knowledge, notably studies in engineering sectors – such as computer engineering, construction industry, projects and architecture –, and business administration – surveys, stakeholders, and resource and information management.

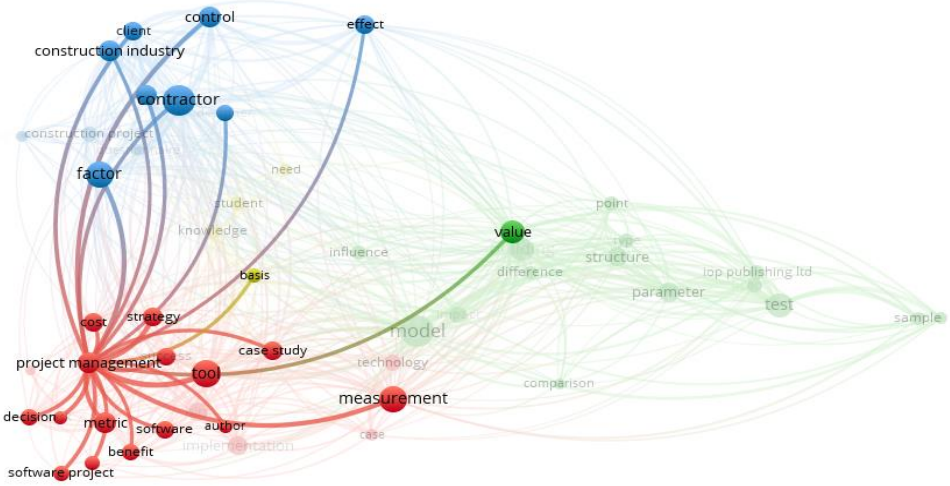
Figure 5 – Project management studies and their research range.



Source: VOSviewer, 2019.

More details on project management studies can be seen in Figure 6. The importance of the research in the field can be noticed in recent publications, especially in studies on measurement, factors, control, tools, strategies, and costs.

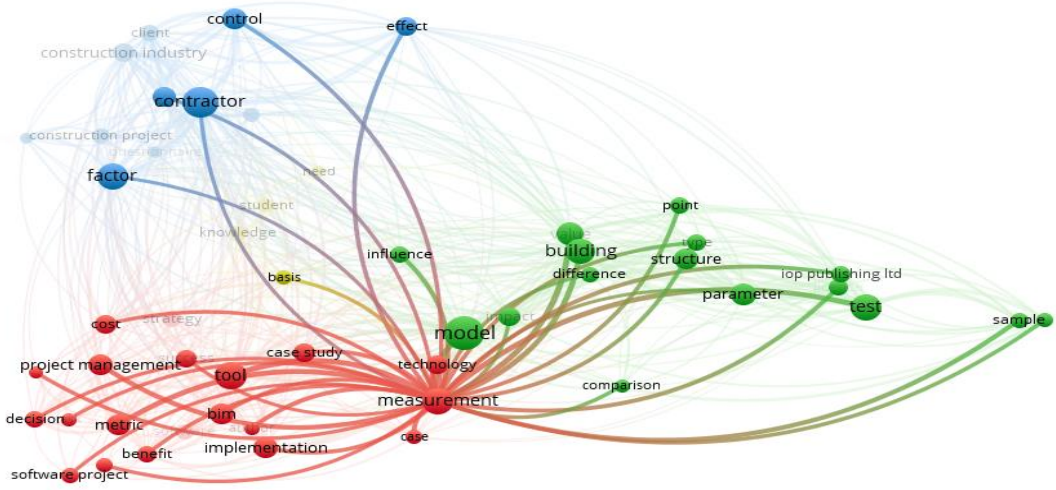
Figure 6 – Project management studies in specific areas.



Source: VOSviewer, 2019.

Topics in project management under study in measurement (statistical analyses) can be seen more clearly in Figure 7. The approaches are varied, but model presentation, implementation, metrics, factors, tools, and cases stand out, also being the basis for performance studies.

Figure 7 – Use of statistical analysis in the field of project management.

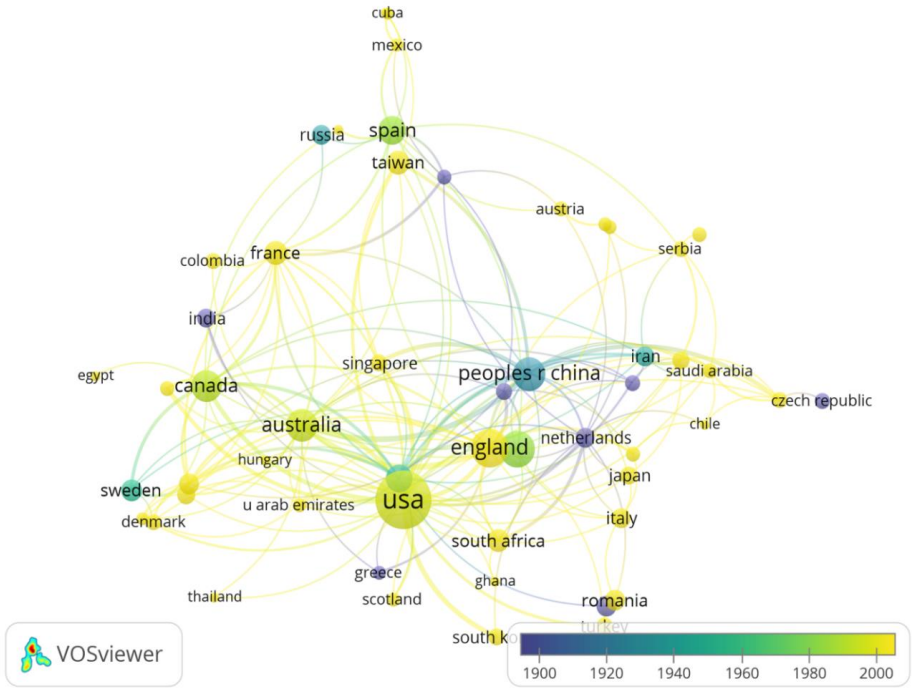


Source: VOSviewer, 2019.

Figure 8 shows countries with partnerships for the publication of papers; the thicker the lines between them, the higher the level of interaction in those publications. Furthermore, countries identified with darker colors, leaning toward blue, have older publications, whereas those with yellowish color have more recent publications.

The analysis indicates that the United States are the main reference in partnerships for the publication of papers in the field of project management. Even though Brazil also stands out for the number of published papers in recent years, the data reveal that Brazilian authors still need to strengthen their partnership networks with other countries. It can also be noted that Brazilian authors publish in partnership with other local authors, thus having a low citation rate at international level, which explains their absence in the layout distribution in Figure 8.

Figure 8 – Partnerships among countries for the publication of papers.



Source: VOSviewer, 2019.

Finally, a keyword cloud was created on the WordArt website (www.wordart.com) using the titles of the works selected for the bibliometric analysis. In the keyword cloud, the larger the keyword, the more times it is used by the sample papers, i.e., it is possible to identify which words had a higher recurrence rate in the papers. As shown in Figure 9, the words *project*, *success*, *measurement*, *factor*, *critical*, and *performance* are the ones that stand out. This leads to the conclusion that the research on the works was effective, as terms with higher incidence belong to the theme under study.

Figure 9 – Cloud with the most recurrent words in the titles of the papers.

Source: The author.

Subsequently, papers were transferred to Excel sheets for the initial analysis content, which considered their titles, keywords, and abstracts.

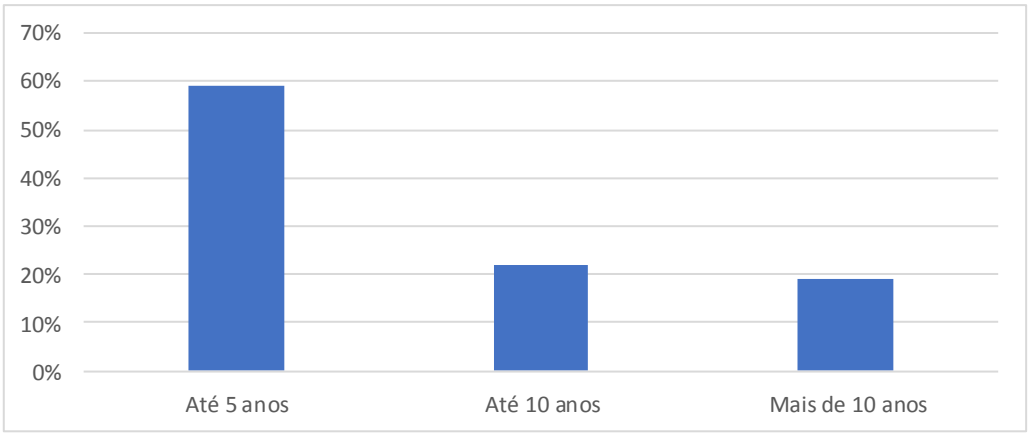
4.3. Statistical analysis of the selected publications

According to Cauchick-Miguel (2012)**,** bibliographic search consists of the identification of important sources for the related research, such as: journal papers, books, presentations in congresses and events, norms, laws, reports, among others. Selection includes verifying and choosing sources that are useful in the development of the theoretical framework of the research. Once the selection process is complete, sources should be organized so as to record important information and retrieve them when needed.

Flick (2013) points out it is necessary to decide on a referencing system of the literature used in the text and its list of references: “you can use bibliographic softwares and should start using them at the start of the work and continue so when examining the literature” (FLICK, 2013, p. 45).

In this research, the Mendeley free software, which is a bibliographic reference manager, was used. Its functions include automatic generation of bibliographic references and online access to relevant papers through free data providers, such as the Web of Science platform. In total, 157 publications were used, 59% of them having up to 5 years of edition, as shown in Figure 10.

Figure 10 – Age of the selected publications.



Source: The author.

With respect to the nature of these scientific works, they can be distributed as follows: 110 national and international papers in the field of project management, 32 books in the field of research methodology and statistics, 6 websites, 5 dissertations, and 4 laws and norms, as indicated in Figure 11.

Figure 11 – Nature of the selected publications.

Source: The author.

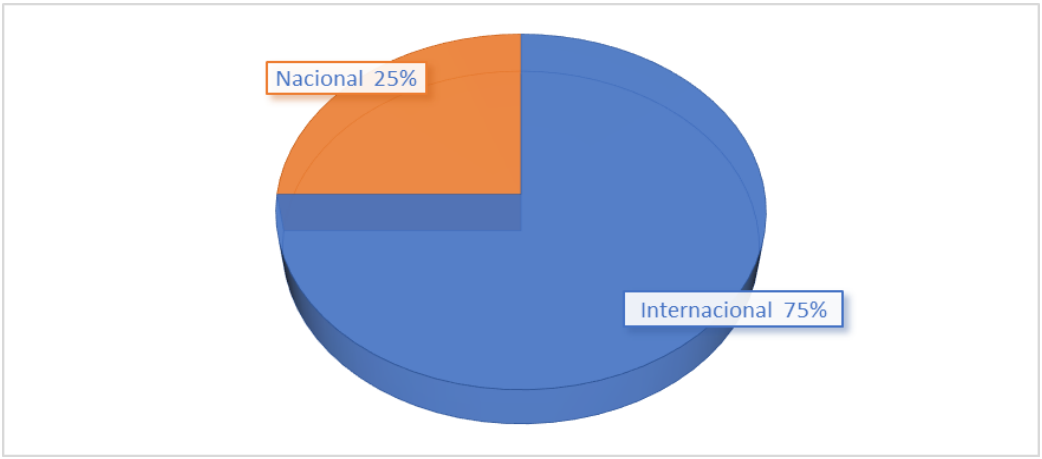
Regarding the age of these scientific works, the national and international papers, published between 2017 and 2019, represent 44% of the total. The oldest papers come from classic authors in the field of project management, as illustrated in Figure 12.

Figure 12 – Distribution of the selected publications by year.

Source: The author.

Since most citations come from papers, it is important to describe their distribution: 75% are international and 25%, national, as shown in Figure 13.

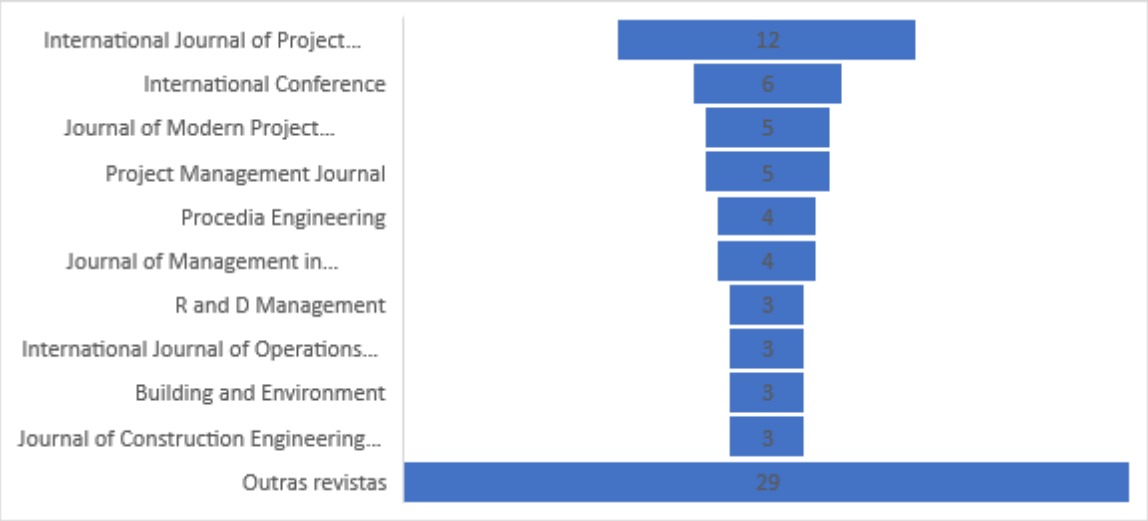
Figure 13 – Distribution of papers.



Source: The author.

Regarding the international papers, Figure 14 presents the journals with higher publication rate of the selected works, most of them related to the field of project management.

Figure 14 – International journals with higher publication rate on project management.



Source: The author.

It can be noticed that the International Journal of Project Management and the papers published in the International Conference had more publications cited. Nevertheless, the data also show that the field of project management includes a variety of publications and specialized journals, which explains the high density and expansion of the related academic production in many countries.

5. CONCLUSION

This bibliometric study has resulted in a methodological support and has helped in the analysis of major publications on critical success factors and project management performance.

The research also shows the relevance of the theme, which was featured in a large number of publications in the span of 10 years. Out of all the selected works, the main topic of study is management (33%). The United States (25.37%) are the country that produces and publishes most in the field, and the majority of works (56%) are written in English. Among Brazilian institutions, USP stands out (20.35%), representing 1.19% of international publications.

Studies indicate that the main publications in the field of project management are related to engineering sectors, especially computer engineering, followed by construction industry, and including architecture and business administration.

The research data reveal that these approaches emphasize studies on measurement, critical factors, tools, strategies, and costs, but model presentation, implementation, metrics, and cases are also important, being the basis for performance studies.

In what refers to the partnership for writing papers, the research shows that the United States is the main reference. Brazil, for its turn, also stands out for the number of publications in recent years, but Brazilian authors usually publish in partnership with local authors. To change that, it is necessary to create partnership networks with more integration, collaboration, and exchange among publications made by researchers in the country. The data reveal a low citation rate of Brazilian researchers at international level, most likely due to a lack of cooperation among research groups.

As for the content, the most relevant keywords in the word cloud created were: *project, success, measurement, critical factors*, and *performance*. The International Journal of Project Management and the papers published in the International Conference had the highest number of cited publications. The research also shows that the field of project management comprehends a variety of publications and specialized journals, which explains the high density and expansion of the related academic production in many countries.

It is expected that the results of this work, which carried out a bibliometric analysis on Critical Success Factors and project management performance, can contribute to the expansion of related studies, the continuous improvement of project management research, and the discussion on the quality of the scientific production in the field.

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