

# Project management in the public context: research field mapping

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The advent of New Public Management introduced the concept of project management until then exclusive to the private sector, paving the way for increased state efficiency. In this scenario, this article aims to locate, synthesize, and identify the theoretical proximity among studies on project management in the public context. The bibliometric methodological approach used relational analysis of citations and the methods of cocitation and coupling to reveal the connections among the studies published. Exploratory factor analysis of cocitation and coupling led to six factors, indicating the intellectual structure, and enabling the generation of a factor integration framework from the most frequent citations. The results indicated the prevalence of studies on project management and e-government competencies. It also amplifies discussions with the presentation of an agenda directed explicitly to the management of public projects.

**Keywords:** public administration; project management; bibliometrics; search schedule.

## Gestão de projetos no contexto público: mapeamento do campo de investigação

O advento da Nova Gestão Pública introduziu o conceito de gestão de projetos, até então exclusivo do setor privado, abrindo caminho para o aumento da eficiência do Estado. Nesse cenário, o objetivo deste artigo é localizar, sintetizar e identificar as proximidades teóricas entre os estudos de gestão de projetos no contexto público. Para alcançá-lo, definiu-se a abordagem metodológica bibliométrica recorrendo à análise relacional de citações, realizada pelos métodos de cocitação e de pareamento bibliográfico, a fim de descobrir relações de conectividade entre as obras publicadas. As análises fatoriais exploratórias da cocitação e do pareamento conduziram a 6 fatores, indicando a estrutura intelectual e possibilitando, também, a geração de um framework de integração dos fatores a partir das citações mais frequentes. Os resultados indicaram a prevalência de estudos sobre competências em gestão de projetos e governo eletrônico. Abre-se, ainda, o leque de discussões com a apresentação de uma agenda especificamente direcionada à gestão de projetos públicos.

**Palavras-chave:** administração pública; gestão de projetos; bibliometria; agenda de pesquisa.

## Gestión de proyectos en el contexto público: mapeo del campo de investigación

El advenimiento de la Nueva Gestión Pública introdujo el concepto de gestión de proyectos, hasta entonces exclusivo del sector privado, allanando el camino para aumentar la eficiencia del Estado. En este escenario, el objetivo de este artículo es localizar, sintetizar e identificar la proximidad teórica entre los estudios de gestión de proyectos en el contexto público. Para lograr esto, se definió el enfoque metodológico bibliométrico mediante el análisis relacional de citas, realizado por los métodos de cocitación y emparejamiento bibliográfico para descubrir relaciones de conectividad entre los trabajos publicados. El análisis factorial exploratorio de la cocitación y del emparejamiento condujo a 6 factores, lo que indica la estructura intelectual, y también permite la generación de un *framework* para integrar factores a partir de las citas más frecuentes. Los resultados indicaron la prevalencia de estudios sobre habilidades en gestión de proyectos y gobierno electrónico. También se amplía la gama de discusiones con la presentación de una agenda específicamente dirigida a la gestión de proyectos públicos.

**Palabras clave:** administración pública; gestión de proyectos; bibliometría; agenda de investigación.

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## 1. INTRODUCTION

Project management has been present for some decades in private enterprise. Initially with an intense technical bias, restricted to the use of specific tools, the practice has been climbing steps in the organization and has consolidated itself as a link between the company's strategy and the materialization of its objectives through the implementation of projects. Consequently, it became an important strategic asset, a source of competitive advantage (Judgev, 2004) for the companies' performance (Mathur, Jugdev, & Fung, 2014).

In parallel, the concept of New Public Management, introduced in recent decades in several countries, has given special emphasis to project management as a viable tool for implementing public policies in contemporary administration. Even with the difficulty of establishing an integrated conceptual system for this area of management, numerous researchers have shown interest in discussing the environment of public projects (e.g., Al-Emadi & Anouze, 2018; Damoah, Akwei, Amoako, & Botchie, 2018; Gomes, Yasin, & Small, 2012; Mihăescu & Tapardel, 2013; Shah, Khan, Bokhari, & Raza, 2011; Shivambu & Thwala, 2019; Wirick, 2009).

As we can see in several studies, project management has demonstrated its results in public administration (Islam, 2016; Williams et al., 2019; Yasin, Gomes, & Miller, 2009) and public resource management (Crawford & Helm, 2009), given the increasing complexity of the required actions (Rego & Silva, 2011). With the introduction of a new culture, pro-projects, in the implementation of public policies, (the way is opened) for a better use of scarce public resources, resulting in greater efficiency (Mendes, 2009), either with the possibility of expanding the services currently provided or with investments in new actions, benefiting the citizens who need the State the most (Saraiva & Chaplain, 2000).

In view of the scenario presented, it is pertinent to ask:

- What is the intellectual structure of public project management?
- What is the intellectual structure of recent/emerging literature?

As a result, the central objective of this article is to find, synthesize and identify the theoretical proximities between the studies on project management in the public context. To achieve this objective, it is necessary to identify the published works and their most influential authors, knowing how the researches and their authors are related to each other, as well as to identify the main themes (addressed). To achieve the proposed objective, the research made use of the techniques of cocitation analysis and coupling used in bibliometry.

As main results, the research described the 6 factors resulting from the analyses of cocitation and coupling, establishing a framework for integrating the factors from the most frequent cocitations and proposing an agenda for future research.

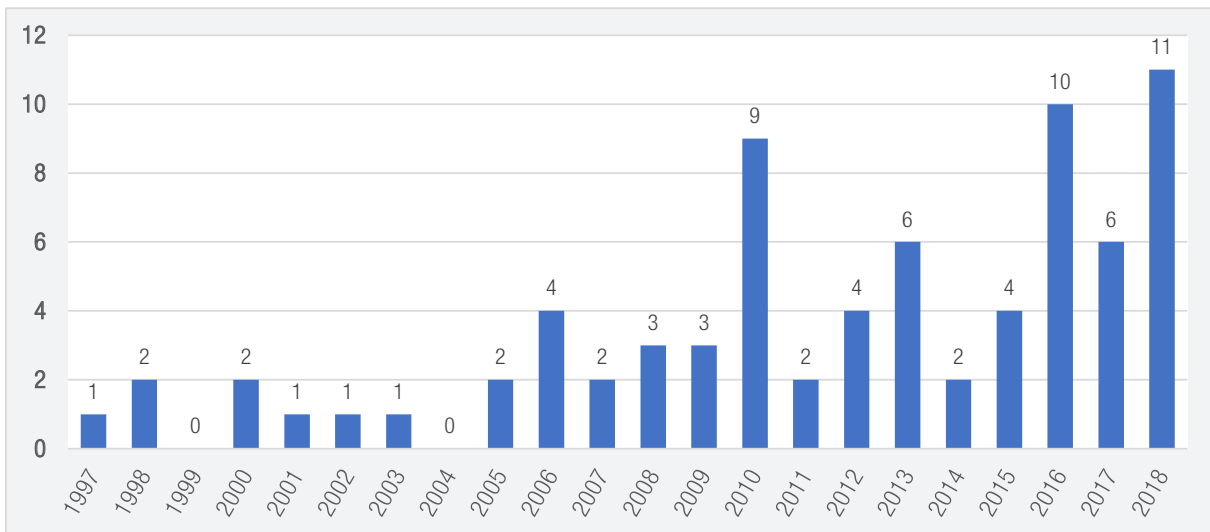
## 2. METHODOLOGICAL PROCEDURES

The main function of bibliometric analysis is to identify patterns and trends in scientific publications over the years (Zupic & Čater, 2015). In this study, the methods of cocitation and coupling were adopted. The first method was used to identify and categorize the major references in studies on public project management, analyzing and describing the structure of the area using the published articles, as recommended by Gracio (2016). The cocitations identified links between 2 documents cited through the frequencies of simultaneous occurrences in reference lists of cited works (Small, 1973). The intensity of cocitations is dictated by the response of researchers to the published articles, which demonstrates a proximity between studies, themes, concepts, or methodological procedures (Smiraglia, 2011). On the other hand, the coupling method groups scientific and technical articles, based on bibliographic coupling units, defined as an item used by both as reference (Habib & Afzal, 2019; Kessler, 1963). It makes it possible to add up and analyze the number of times that a specific work is cited by other authors and aims to identify the most influential works on a given theme (Culnan, O'Reilly, & Chatman, 1990; Jarneving, 2007). The coupling strength between 2 articles does not change with time, since the frequency of this coupling is fixed and cannot easily contribute to the study of changes in scientific fields over time (Gracio, 2016).

The research was initially performed in the Web of Science and Scopus databases, for bringing together the main scientific journals in the studied area. The words project\*, manage\*, public\* sector, public\* administration and government were defined taking into consideration "topic", as they (congregate) the title, key words, and the summary of the researched documents. The search was restricted to articles published until 2018. As a result, the Web of Science returned 6,225 articles, while Scopus returned 15,521 articles.

Because of the quantity of articles found, it was necessary to perform a preliminary analysis, aiming to certify the quality of the sample. The random reading of the abstracts of 20 articles, from both bases, made it possible to verify that most of them, despite containing the words defined in the search in one of the "topic" fields, did not deal directly with the theme of public project management. Following the guidance of Zupic and Čater (2015), the author decided to restrict the search to the title field. When conducting the research since the early years of the bases - Web of Science (1945) and Scopus (1965) - 6 articles were found dating before 1997. The article with available references, immediately prior to the first considered (1997), dates from 1979. Thus, after the exclusion of the 6 articles whose publication dates from 1945 to 1996, a total of 41 articles were found on the Web of Science and 75 articles on Scopus. The search process revealed the overlapping of 33 articles, 8 of which were exclusive to the Web of Science and 42 to Scopus. In addition, 7 articles without references were identified, resulting with 76 distinct articles with references for the final sample. The temporal distribution (Figure 1) shows the evolution of production from 2006. Figure 2 brings a summary of the search procedure in the Web bases of Science and Scopus, as well as the refinement process of the sample.

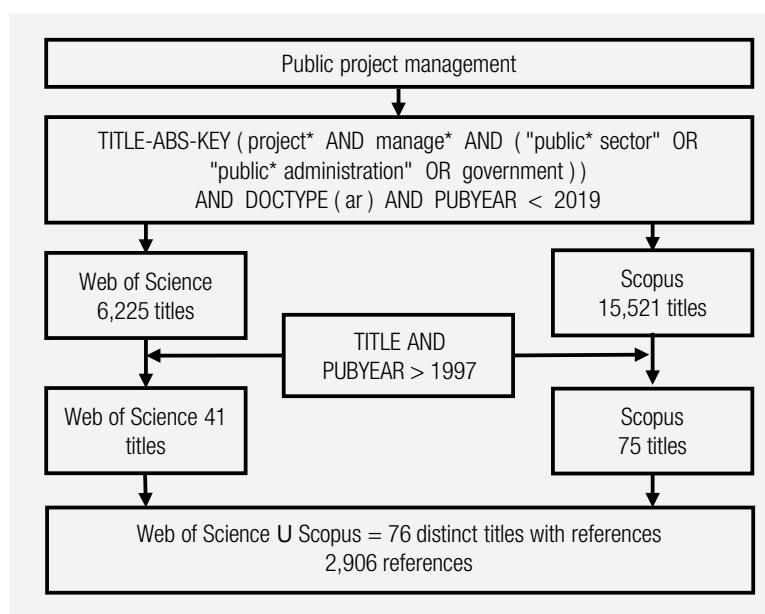
**FIGURE 1 SEARCH RESULTS IN WEB OF SCIENCE AND SCOPUS DATABASES**



Source: Elaborated by the authors.

The files extracted from the databases composed by title, author, abstract, keywords, year, journal, number, volume, pages, and references were concatenated. Then they were treated in BibExcel (Persson, Danell, & Schneider, 2009), together with Microsoft Excel for Office 365 and SPSS, version 25, following the procedure defined in Serra, Ferreira, Guerrazzi, and Scaciotta (2018) and Serra, Cirani and Moutinho (2019), for further formation of the cocitation matrix. The relationship networks between the works were developed using the NetDraw UCINET 6.679 (Borgatti, Everett, & Freeman, 2002).

**FIGURE 2 SUMMARY OF DATA COLLECTION AND SAMPLING**



Source: Elaborated by the authors.

### 3. RESULTS

The results section is formed by the analysis of the cocitations and coupling. For both, exploratory factor analysis (EFA) was performed, presenting the structure of the resulting factors, the relationship networks between the articles and the respective metrics (density and cohesion).

#### 3.1 Cocitation Analysis

The database was classified by decreasing frequency of citations (Table 1). For this study we considered articles with at least 2 citations, totaling 231 citations, which correspond to 7.95% of the sample, in accordance with Lotka’s Law (Lotka, 1926).

The EFA performed consists of a technique that aims to discover and analyze the structure of a set of interrelated variables to build a scale of intrinsic factors (Hair, Black, Babin, Anderson, & Tatham, 2009). The technique uses observed correlations among the original variables to estimate the common factors among the structural relationships that connect the latent factors of the variables. The factors were extracted by the principal components method and with Varimax rotation (Marôco, 2018), with communality  $\geq 0.5$  (Fávero, Belfiore, Silva, & Chan, 2009), which resulted in 77 works. The common factors retained were those that presented an eigenvalue  $> 1$ , in this case, 9 factors.

**TABLE 1** FREQUENCY DISTRIBUTION OF CITATIONS

# Citations	f	Cf	# Citations * f	$\Sigma$ (# Citations * f)	$\Sigma$ (# Citations * f)/sum
10	1	1	10	10	0,34%
9	0	1	0	10	0,34%
8	1	2	8	18	0,62%
7	0	2	0	18	0,62%
6	0	2	0	18	0,62%
5	2	4	10	28	0,96%
4	8	12	32	60	2,06%
3	25	37	75	135	4,65%
2	48	85	96	231	7,95%
1	2675	2760	2.675	2.906	100,00%

**Note:** # Citations = Number of citations for an article; f = Frequency; Cf= Cumulative frequency.

**Source:** Elaborated by the authors.

In the sequence, accuracy and validity were verified. The accuracy was analyzed considering Cronbach’s alpha  $> 0.7$  (Hair et al., 2009). Because the factors 7, 8 and 9 presented Cronbach’s alpha = 0.495; 0.575 and 0.287, respectively, they were disregarded. Table 2 shows the matrix of the resulting rotating component, whose total variance explained corresponds to 72.6% for the 6 factors and

67 works, following the recommendation of Vogel and Güttel (2013). To assess the validity of EFA, the Kaiser-Meyer-Okin (KMO) criterion was considered, with a value of 0.807, as well as Barlett’s sphericity test, which showed  $p < 0.001$ . It was concluded that the sample is adequate for factor analysis and that the variables are significantly correlated. After reading each article, the factors were named following the orientation of Quevedo-Silva, Biagi Almeida Santos, Moll Brandão, and Vils (2016), as shown in Box 1.

In addition to the EFA, a network of relationships between the papers was created (Figure 3), using the NetDraw UCINET 6,679 (Borgatti et al., 2002). This software uses the cooccurrence frequencies to represent two-dimensional Euclidean distances between the works. While the distances between nodes establish relationships, the intensity is indicated by the thickness of the lines.

**TABLE 2** ROTATED COMPONENT MATRIX<sup>a</sup>

Work	Factors					
	CC1	CC2	CC3	CC4	CC5	CC6
Boyatzis (1982)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Birkhead, Sutherland, and Maxwell (2000)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Fisher (2011)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Brill, Bishop, and Walker (2006)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Skulmoski, Hartman, and Demaere (2000)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Udo, and Koppensteiner (2004)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Virtanen (2000)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Seibert (2004)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Dainty, Cheng, and Moore (2005)	0,941	-0,145	-0,097	-0,058	0,049	-0,048
Swan, Scarborough, and Newell (2010)	0,938	-0,165	-0,111	-0,031	-0,006	-0,019
Barber (2004)	0,938	-0,165	-0,111	-0,031	-0,006	-0,019
Morris (2001)	0,931	-0,153	-0,105	-0,065	0,056	-0,042
Toney (2001)	0,923	-0,142	-0,100	-0,036	0,036	0,066
Young, Young, Jordan, and O’Connor (2012)	0,909	-0,182	-0,128	-0,046	-0,007	-0,016
Rwelamila (2007)	0,906	-0,168	-0,123	-0,051	0,049	0,101
Thamhain (1991)	0,893	-0,144	-0,103	0,005	-0,029	0,188
Meredith, and Mantel (2000)	0,884	-0,194	-0,136	-0,017	-0,016	-0,032
Besner, and Hobbs (2006)	0,872	-0,174	-0,137	-0,050	0,004	0,098
Crawford (2005)	0,871	-0,194	-0,142	0,160	0,018	0,049
Kerzner (2003)	0,827	-0,148	-0,122	-0,040	0,035	0,275

*Continue*

Work	Factors					
	CC1	CC2	CC3	CC4	CC5	CC6
Project Management Institute (2013)	0,813	-0,248	-0,205	-0,122	-0,167	0,053
Crawford, and Pollack (2007)	0,789	-0,213	-0,148	0,392	-0,047	-0,015
Wirick (2009)	0,667	-0,216	-0,180	0,336	-0,029	0,291
Andersen, Grude, and Hague (1987)	-0,183	0,941	-0,092	-0,055	-0,013	0,016
Jaeger, and Thompson (2003)	-0,137	0,922	-0,060	-0,029	0,007	0,059
Heeks (2003a)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
James (1997)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
Collins, and Bicknell (1997)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
Iacovou (1999)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
Jaeger (2003)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
Standish Group (2004)	-0,178	0,918	-0,090	-0,055	-0,012	-0,006
Irani, Love, Elliman, and Jones (2005)	-0,211	0,916	-0,112	-0,067	-0,015	0,008
Gupta, Kumar, and Bhattacharya (2004)	-0,190	0,905	-0,099	-0,062	-0,015	-0,017
Gil-Garcia, and Pardo (2005)	-0,206	0,890	-0,113	-0,052	-0,016	-0,025
Heeks (2003b)	-0,206	0,890	-0,113	-0,052	-0,016	-0,025
Heeks (2006)	-0,219	0,881	-0,122	-0,055	-0,019	-0,019
Moon (2002)	-0,228	0,823	-0,135	-0,094	-0,040	-0,139
Project Management Institute (2008)	-0,222	0,820	-0,120	-0,040	0,008	0,068
Winter, Smith, Morris, and Cicmil (2006)	-0,196	0,773	-0,109	-0,070	-0,048	-0,098
Yeo (1993)	-0,232	0,733	-0,137	-0,089	-0,020	-0,132
Cicmil, and Marshall (2005)	-0,263	0,688	-0,164	-0,111	-0,032	-0,154
Huang, Kwan, and Hung (2001)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Potts (2009)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Vrijhoef, and Koskela (2000)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Love, Irani, and Edwards (2004)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Abd, Mohammad, Mahbub, and Ismail (2011)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Busby, and Hughes (2004)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Ibrahim, Roy, Ahmed, and Imtiaz (2010)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Horvath (2001)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Eriksson, and Nilsson (2008)	-0,179	-0,134	0,915	-0,068	-0,018	-0,043
Ward, and Mitchell (2004)	-0,048	-0,127	-0,094	0,915	-0,052	-0,015
Zimmerer, and Yasin (1998)	-0,082	-0,133	-0,102	0,839	-0,037	-0,016
Brunetto, and Farr-Wharton (2003)	-0,082	-0,133	-0,102	0,839	-0,037	-0,016

Continue



Work	Factors					
	CC1	CC2	CC3	CC4	CC5	CC6
Torres, and Pina (2004)	-0,082	-0,133	-0,102	0,839	-0,037	-0,016
Crawford, Costello, Pollack, and Bentley (2003)	-0,127	-0,106	-0,094	0,741	0,261	0,053
Baldry (1998)	-0,032	-0,178	-0,139	0,684	-0,073	-0,065
Melin, and Axelsson (2009)	-0,017	0,103	-0,089	0,650	-0,070	0,241
Ren, and Yeo (2004)	0,175	0,007	0,016	0,033	0,938	-0,067
Fageha, and Aibinu (2013)	0,119	-0,032	-0,017	0,033	0,875	-0,036
Nonaka (1994)	0,032	-0,077	-0,068	-0,049	0,799	0,065
Nicholas, and Steyn (2011)	0,065	-0,041	-0,024	-0,011	0,736	-0,089
Turner (2008)	-0,070	-0,086	-0,100	-0,062	0,545	0,475
Kwak, and Xiao Yi Dai (2000)	-0,024	-0,066	-0,083	0,008	0,036	0,828
Kerzner (2001)	0,092	-0,063	-0,053	0,021	-0,077	0,794
Cooke-Davies, and Arzymanov (2003)	0,136	-0,069	-0,078	0,036	-0,035	0,760
Thomas, and Mullaly (2008)	-0,170	-0,092	-0,126	0,025	0,171	0,646
Project Management Institute (2003)	-0,044	-0,049	-0,072	-0,063	0,009	0,545
<b>Variance accumulated</b>	<b>26,3%</b>	<b>44,5%</b>	<b>57,3%</b>	<b>63,5%</b>	<b>68,1%</b>	<b>72,6%</b>
<b>Cronbach's alpha</b>	<b>0,990</b>	<b>0,983</b>	<b>0,989</b>	<b>0,910</b>	<b>0,808</b>	<b>0,789</b>

a. Rotation converged in 9 iterations

Source: Elaborated by the authors.

### BOX 1 IDENTIFICATION OF COCITATION FACTORS

Factors	
<b>CC1</b>	The factor is formed by works that propose an integrated model of managerial competencies relating management functions and internal organizational environment (Boyatzis, 1982), for strategic management consultants (Seibert, 2004) and for project managers (Birkhead, Sutherland, & Maxwell, 2000), with focus on effectiveness in their workplace (Brill, Bishop, & Walker, 2006). Skulmoski, Hartman, and Demaere (2000) develop a competence profile of project managers and others involved and Barber (2004) indicates difficulties in analyzing the competencies and skills of project managers, as well as Toney (2001) their correct selection. Udo and Koppensteiner (2004) compare the role and competencies of the project manager in different approaches to meet the challenges of the changing environment, in the public environment (Virtanen, 2000; Wirick, 2009) and focusing on performance and maturity level (Rwelamila, 2007). Thamhain (1991), Kerzner (2003), Dainty, Cheng, and Moore (2005) and Fisher (2011) research on the behaviors of effective project managers to improve successful project delivery. Swan, Scarborough, and Newell (2010) investigate problems associated with transferring project learning to the organization as a whole. R. Young, M. Young, Jordan, and O'Connor (2012) investigated systemic weaknesses in the way projects are selected, applying them limitation based on their ability to achieve strategic objectives. Meredith and Mantel (2000), Crawford (2005), Besner and Hobbs (2006) explore project management effectiveness and performance in practice, Morris (2001) and Crawford and Pollack (2007) discuss project management practices, and the Project Management Institute (2008, 2013) establishes a body of knowledge with widely used practices in project management. The CC1 factor has been named <b>Capabilities in project management</b> .

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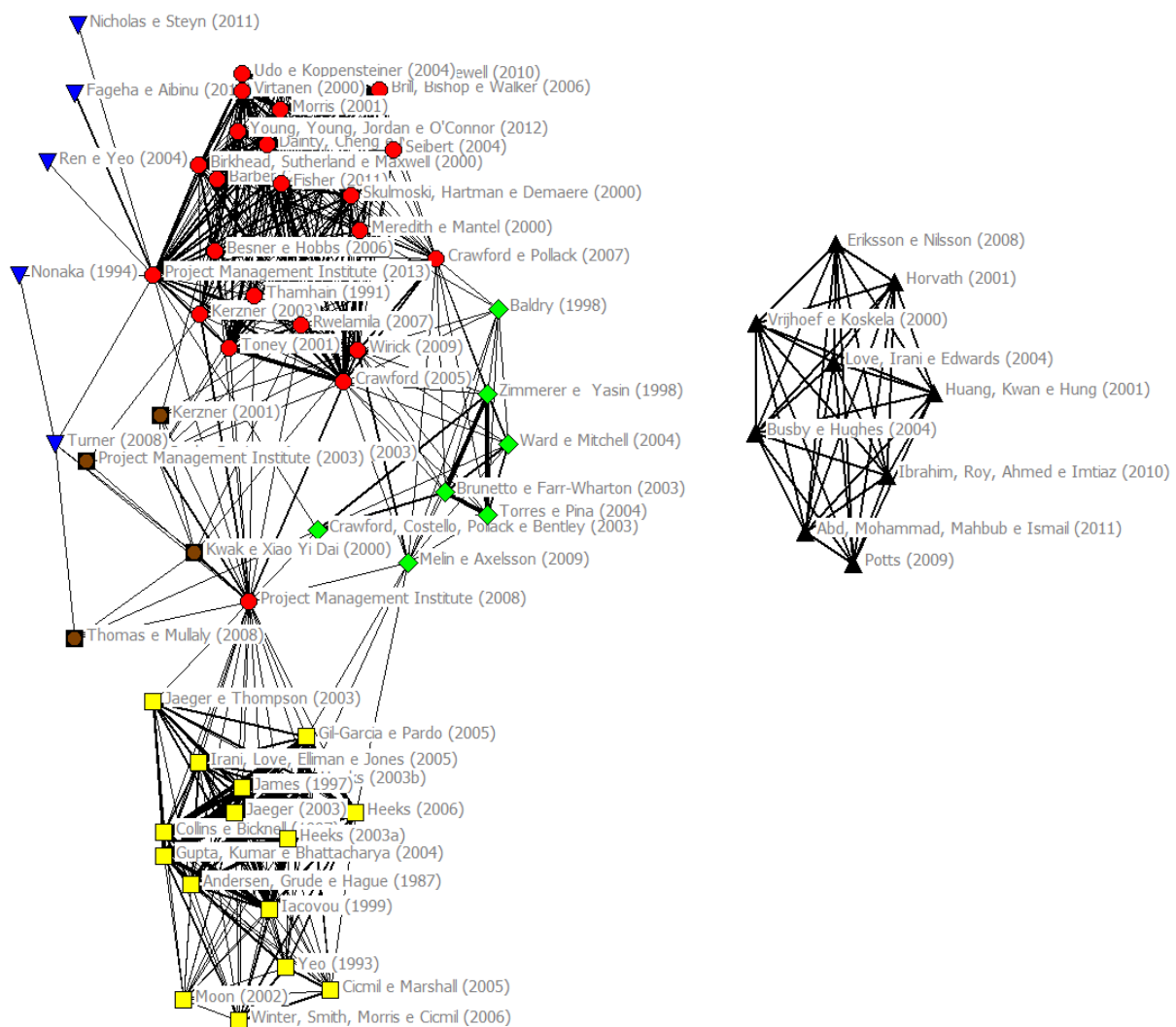


Factors	
CC2	<p>This factor discuss about the global e-government landscape (Jaeger &amp; Thompson, 2003), e-government project development with a focus on risk (Heeks, 2003a), inadequate technology infrastructure (Heeks, 2003b), challenge of classes (Jaeger, 2003), strategy and project management, data security, quality, people, policies and ethical challenges (Heeks, 2006). James (1997) and Standish Group (2004) discuss and point out the failures in IT projects, around government (Collins &amp; Bicknell, 1997) emphasizing the behavior (Iacovou, 1999). Irani, Love, Elliman, Jones, and Themistocleous (2005) record lessons learned in e-government projects, with emphasis on systems evaluation. Gupta, Kumar, and Bhattacharya (2004) present a holistic view of e-governance, outlining a roadmap in terms of strategy and technology to transform existing government into e-government. Gil-Garcia and Pardo (2005) analyze a set of resources that public agents use to guide their efforts to develop e-Government projects, and Moon (2002) considers cultural, demographic, and economic specificities in these same types of projects. Andersen, Grude, and Hague (1987) and Cicmil and Marshall (2005) contribute to the understanding of social processes in multi-organizational environments, aiming to improve integration at project level. Finally, Winter, Smith, Morris, and Cicmil (2006) indicate a research agenda that aims to enrich and extend the subject of project management beyond traditional concepts. The CC2 factor was named <b>Project context and e-government</b>.</p>
CC3	<p>deals with the specificities of supply chain management in construction projects (Vrijhoef &amp; Koskela, 2000), being key to value creation (Horvath, 2001). Love, Irani, and Edwards (2004) propose a project supply chain management model that integrates project processes and the production of construction projects, with an approach to tracking failures in complex projects and their impacts on organizations (Busby &amp; Hughes, 2004). Abd, Mohammad, Mahbub, and Ismail (2011) indicate that effective construction supply chain integration practice needs to be related to the current trend to increase their competitiveness and innovation capacity. Ibrahim, Roy, Ahmed, and Imtiaz (2010) discuss the production processes used by the construction industry, specifically in project management; Eriksson and Nilsson (2008) provide, in their research, theoretical and empirical support for the implementation of partnership procurement procedures in construction projects characterized by high complexity, uncertainty and risk (Potts, 2009). This component is called <b>Integrated construction supply chain management</b>.</p>
CC4	<p>The factor has its emphasis on public project management when Ward and Mitchell (2004) compare strategic priorities of public and private sector resource management executives. Brunetto and Farr-Wharton (2003) researched the effect that government policy has on the way managers of government-funded projects manage. Crawford, Costello, Pollack, and Bentley (2003) studied the complexity and diversity of stakeholders in the public context, as constraints to applying standard project management practices to promote organizational change and risk exposure (Baldry, 1998). Zimmerman and Yasin (1998) analyzed organizational effectiveness in relation to combining the technical skills of project managers with the ability to develop and display leadership. Torres and Pina (2004) evaluated the concepts of modernizing public administration with emphasis on the client and cultural experiences and differences. This component was named <b>Public project management</b>.</p>
CC5	<p>Ren and Yeo (2004) propose a risk management maturity model for complex systems projects. Fageha and Aibinu (2013) develop a procedure to manage the definition of the scope of projects, considering the expectations of stakeholders in planning. Nonaka (1994) discusses a paradigm for managing the dynamic aspects of organizational knowledge creation processes and the critical role played by companies in articulating and expanding this knowledge. Turner (2008) and Nicholas and Steyn (2011) present project management as a tool to achieve strategic objectives. The CC5 factor was named <b>Procedures and project management tools</b>.</p>
CC6	<p>Kerzner (2001) and Project Management Institute (2003) present an organizational maturity model in project management focusing on knowledge, evaluation and improvements and Cooke-Davies and Arzymanov (2003) investigated the nature and extent of maturity variations. Thomas and Mullaly (2008) measured the results of project management recognized by organizations when it is implemented appropriately and Kwak and Xiao Yi Dai (2000) demonstrate the relationship between project management office effectiveness and project success. This factor CC6 was named <b>Maturity in project management</b>.</p>

Source: Elaborated by the authors.







For network analysis the density and cohesion measures of each of the six subgroups were calculated (Table 3). The density is a subnet indicator that represents the level of connection within each analyzed factor (Otte & Rousseau, 2002). As a bibliometric indicator, it reflects the degree to which various currents within the research field pursue their agendas with common ground. Thus, while the first four factors (project management capabilities, e-government and project contexts, integrated construction supply chain management, and public project management) present strong density, the factor called project management procedures and tools has a very low level of connection between the works considered. Complementarily, cohesion relates the density of a factor to its interconnectivity with other factors. In bibliometric applications, cohesion indicates the extent to which a research subfield follows an agenda independent of other discourses (Wasserman & Faust, 1994). In the research, the most intense cohesion is in the factor called project management skills, since it is present in discussions of the work of other factors. On the other hand, integrated construction supply chain management follows its own line that does not interact with the other factors.

**FIGURE 3** COCITATION NETWORK



Source: Elaborated by the authors.

**TABLE 3** COCITATION NETWORK METRICS

Factor	# Works	Explained variance	Density	Cohesion (%)
 1 Capabilities in project management	24	26,30%	0,95	1,90
 2 Project context and e-government	17	18,20%	0,97	0,49
 3 Integrated construction supply chain management	9	12,80%	1,00	0,00
 4 Public project management	7	6,20%	0,90	0,59
 5 Procedures and project management tools	5	4,60%	0,10	0,02
 6 Maturity in project management.	5	4,50%	0,50	0,23
	<b>67</b>	<b>72,6%</b>		

**Source:** Elaborated by the authors.

It is also worth mentioning the centrality of the network. It is defined in terms of the degree of each node as the number of links between this work with others considered (Freeman, 1978). In the study, the works of Crawford (2005) and the Project Management Institute (2013) have degrees 47 and 43, respectively. This is due to the themes of the works that address project performance and establish a body of knowledge with widely used practices in project management.

### 3.2 Coupling

The bibliographic coupling was generated from the matrix of cooccurrence of references. Documents with at least 3 loops and 2 nodes were considered, resulting in 1 matrix composed of 51 articles. EFA allowed the identification of 14 factors for the 51 works. The reliability of each factor was analyzed resulting in the exclusion of 8 factors, as they were below the minimum value (Cronbach's alpha < 0.7). Thus, the matrix of the rotating component (Table 4) is composed of 27 articles and 6 factors with total explained variance of 71.2%, following the recommendation of Vogel and Güttel (2013). Box 2 shows the identification of each matching factor.

**TABLE 4** ROTATED COMPONENT MATRIX<sup>a</sup>

Papers	Factors					
	PA1	PA2	PA3	PA4	PA5	PA6
Amoatey and Hayibor (2017)	0,847	-0,008	-0,099	-0,157	-0,052	0,058
Tileubayeva, Dabyltayeva, Makasheva, Medukhanova, and Bekmukhametova (2017)	0,808	-0,004	0,001	0,175	-0,045	-0,041
Pilkaite and Chmieliauskas (2015)	0,782	-0,028	-0,042	-0,201	-0,248	-0,065
Rosacker and Rosacker (2010)	0,768	0,071	-0,019	-0,071	0,123	-0,095
Souza, Teixeira, and Moura (2014)	0,767	-0,010	-0,023	0,341	-0,085	-0,057
Javani and Rwelamila (2016)	0,760	0,028	0,031	-0,006	0,003	-0,070
Khalema, Van Waveren, and Chan (2015)	0,758	-0,003	0,225	0,192	0,113	-0,059
Darrell, Baccarini, and Love (2010)	0,669	0,033	0,404	0,304	0,250	-0,086
Mihăescu, Demeter, and Țapardel (2013)	0,605	-0,068	0,048	0,056	0,197	-0,004
Aubry and Brunet (2016)	0,524	-0,049	0,431	-0,167	-0,232	-0,262
Sarantis, Charalabidis, and Askounis (2011)	0,105	0,872	-0,029	-0,038	-0,034	0,244
Melin and Wihlborg (2018)	0,024	0,848	-0,082	-0,077	-0,078	0,198
Sarantis and Askounis (2009)	-0,052	0,829	-0,041	-0,055	-0,051	0,450
Sarantis, Smithson, and Charalabidis (2010)	0,017	0,778	-0,115	-0,104	-0,074	-0,304
Furlong and Al-Karaghoul (2010)	-0,013	0,729	-0,065	-0,054	-0,012	0,025
Sarantis, Charalabidis, and Askounis (2010)	-0,028	0,619	-0,055	-0,050	-0,071	0,478
Baharuddin and Yusof (2018)	0,004	-0,093	0,898	0,020	0,056	-0,014
Al-Rubaiei, Nifa, and Musa (2018)	0,004	-0,093	0,898	0,020	0,056	-0,014
Karagoz, Korthaus, and Augar (2016)	0,085	-0,108	0,874	0,006	0,047	-0,009
Adighibe, Skitmore, and Wong (2010)	-0,078	-0,019	0,313	0,783	0,118	-0,120
Brent (2005)	0,164	-0,110	-0,075	0,736	0,065	-0,088
Salaheldin, Sharif, and Alami (2010)	-0,205	-0,153	-0,206	0,669	-0,224	0,124
Brunetto and Farr-Wharton (2003)	-0,009	-0,109	-0,020	-0,034	0,860	0,008
Dey (2002)	-0,028	-0,095	0,029	0,016	0,842	0,034
Medeiros, Danjour, and Sousa (2017)	-0,028	-0,010	0,126	0,136	0,746	-0,106
Winter, Smith, Morris, and Cicmil (2006)	-0,128	0,183	-0,022	-0,106	0,028	0,882
Winter, Smith, Cooke-Davies, and Cicmil (2006)	-0,179	0,354	-0,046	0,008	-0,097	0,786
<b>Variance accumulated</b>	19,7%	34,3%	45,4%	54,3%	63,1%	71,2%
<b>Cronbach's alpha</b>	0,903	0,784	0,901	0,701	0,781	0,808

<sup>a</sup> Rotation converged in 6 interactions

**Source:** Elaborated by the authors.

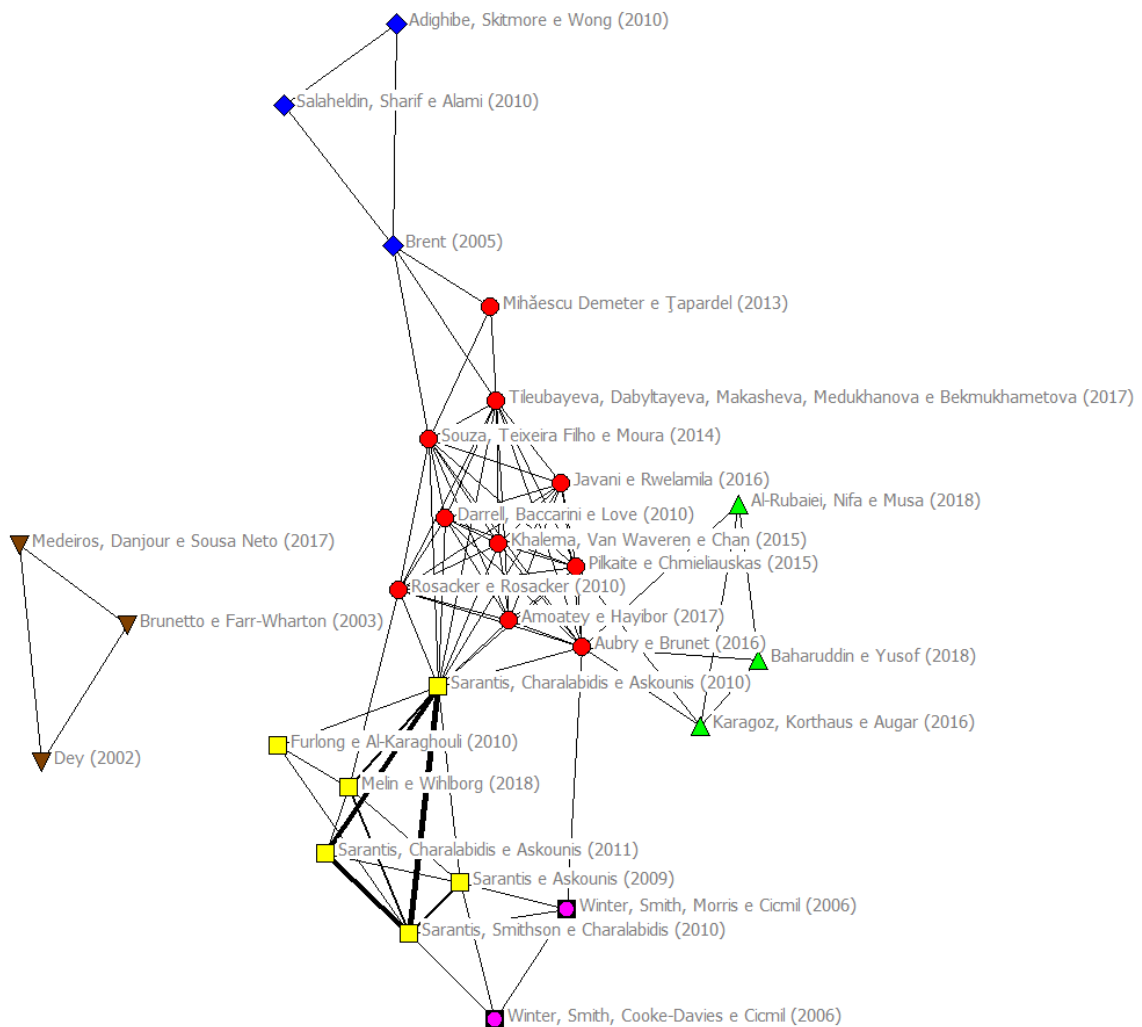
## BOX 2 IDENTIFICATION OF COUPLING FACTORS

Fatores	
PA1	The transfer of project management practices from the private to the public sector does not take place directly, having specific characteristics that are not present in private enterprises (Souza, Teixeira, & Moura, 2014). A typical example indicates that it is inappropriate to apply lessons learned from private sector organizations in the public arena without investigating their applicability empirically (K. M. Rosacker & R. E. Rosacker, 2010) or to think that stakeholder management is performed in the same way in both types of environments (Amoatey & Hayibor, 2017). The profile of project managers is still a highlight when it comes to public projects (Darrell, Baccarini, & Love, 2010). Given the characteristics of public administration, the use of project management represents an approach of efficiency and modernity, contributing to the development of organizational and management skills (Mihăescu & Țapardel, 2013) creating conditions for the successful implementation of project management practices in governments (Tileubayeva, Dabylytayeva, Makasheva, Medukhanova, & Bekmukhametova, 2017). The formalization of PMOs materializes the recognition of the importance of projects in government organizations (Pilkaite & Chmieliauskas, 2015), rising a specific classification for this environment (Aubry & Brunet, 2016). Its development stage indicates a positive relationship with maturity in project management (Khalema, Van Waveren, & Chan, 2015). The factor received the name <b>Project management in the public sphere</b> .
PA2	Sarantis and Askounis (2009) and Sarantis, Charalabidis, and Askounis (2011) indicate that successful eGovernment projects, through a specific management methodology, result in a more effective and efficient government. On the other hand, it cannot be overlooked that inadequate implementations of project management procedures and processes in ambitious e-Government projects have failed to deliver on their promises (Furlong & Al-Karaghoul, 2010), showing the need to develop the current conceptual basis and create a research agenda in eGovernment project management (Sarantis, Smithson, & Charalabidis, 2010). Reusing successful practices, through lessons learned, tends to support the overall viability of projects of this nature (Sarantis et al., 2010). Thus, public policy formulation and public project management must go holding hands for e-Government projects to be made viable and produce the expected results with consequent benefits for governments and the population (Melin & Wihlborg, 2018). The factor has been given the name <b>E-government projects</b> .
PA3	The relationship between public project management and knowledge management indicated strong emphasis on informal structures and personal interactions (Karagoz, Korhous, & Augar, 2016) influencing knowledge areas and impacting project results (Al-Rubaiei, Nifa, & Musa, 2018). Specifically, risk management is performed as an incipient way, representing a strong threat to the performance and outcome of public projects (Baharuddin & Yusof, 2018). The factor is called <b>Informality in the management of public projects</b> .
PA4	Due to the inherent characteristics of the public sector, the process of project evaluation does not always pay attention to the costs involved in implementing public policies. Cost management needs to go through an improvement process, and the training of managers is the main point of attention (Adighibe, Skitmore, & Wong, 2010). As in the private sector, governments are under increasing pressure to incorporate economic, environmental, and social performances into decision-making processes (Brent, 2005). The factor has been given the name <b>Performance of public Projects</b> .
PA5	Even with the reforms in public administration that have improved the efficiency of processes, the lack of a structure detailing the responsibility and authority of each government entity involved in the projects stands out (Brunetto & Farr-Wharton, 2003). In this sense, the adoption of project management practices by government institutions has contributed to the improvement of project governance (Medeiros, Danjour, & Sousa, 2017) as well as to the communication process in the public environment (Dey, 2002). This factor is called <b>Government policies and project management</b> .
PA6	The works of Winter et al. (2006) and Winter, Smith, Cooke-Davies, and Cicmil (2006) rethink project management and point to a structure composed of directions aiming to develop the intellectual field. The authors indicate the tendency to deal with the theory of complexity in projects, projects as social processes, creation of value in projects and exploration of the concept of reflexive practitioners. The sixth factor received the name of <b>Research agenda in project management</b> .

Source: Elaborated by the authors.

The network of bibliographic coupling (Figure 4) was created for the researched works, divided into the 6 factors. As can be observed, the factor PA1 - Project Management in the Public Sphere - is central and shares several references with the other factors, except with the PA5 - Government Policies and Project Management -, which seems to follow its own agenda. The works that make up the PA2 cluster - e-Government Projects - present an intense reference sharing. They focus the discussion on e-Government projects, with emphasis on the flaws that have occurred, and on the need to expand the empirical-conceptual discussions (Sarantis et al., 2010, 2011; Sarantis, Smithson, & Charalabidis, 2010).

**FIGURE 4** COUPLING NETWORK









Source: Elaborated by the authors.



Similarly, to what was done for the study of cocitations, the measures of density and cohesion of each of the six factors that make up the network were calculated, as shown in Table 5. All factors have strong density, i.e., a high degree of connection within each factor analyzed. As a bibliometric indicator, such result indicates a high degree with which several currents within the research field pursue their agendas with common bases. The most intense cohesion is in the factor called project management in the public sphere because it is present in discussions of the work of other factors. On the other hand, the factor called government policy and project management seems to follow its own line, since it does not interact with the other factors.

**TABLE 5** COUPLING NETWORK METRICS

Factor	# Works	Explained variance	Density	Cohesion (%)
 1 Project management in the public sphere.	10	19,7%	0,844	3,31
 2 E-government projects	6	14,6%	0,867	2,14
 3 Informality in the management of public projects	3	11,1%	1,000	0,62
 4 Performance of public projects	3	8,9%	1,000	0,46
 5 Government policies and project management	3	8,8%	1,000	0,00
 6 Research Agenda in project management.	2	8,1%	1,000	0,74

Source: Elaborated by the authors.

#### 4. DISCUSSION

The results of the research make it possible to improve the contextualization and understanding of the connections between the authors and the main concepts they approach in the management of public projects. Based on the analysis of the 76 articles present in the Web of Science and Scopus, for the period between 1997 and 2018, the factorial analysis revealed 6 factors.

The first factor, called **Capabilities in project management**, is the broadest. It addressed issues related to skills, success, performance, and learning. These themes, in fact, present a relationship as in the work of Gruden and Stare (2018) on behavioral competencies and project performance, indicating the need to deepen their discussion, since, according to the authors, it may make sense to study the importance of individual competencies in relation to the types of projects. Alam, Gale, Brown, and Kidd (2008) explored the relationship between project management competencies, benefit metrics and learning outcomes. Their conclusions are in line with the study conducted by Crawford (2000)



on the profiling of project managers' competencies and their relationship to project success. Such divergences point the need for further research.

The second factor is called **Project context and e-government**. Anthopoulos, Reddick, Giannakidou, and Mavridis (2016) indicate the existence of a gap between e-Government project design and its effective implementation, leading to the investigation of such reasons. They explore the context by creating a taxonomy tool, which summarizes the reasons and factors for failures in public projects of this nature. The work of Yahya, Al-Munawar, and Tuan (2015) indicates association between critical success factors and e-Government project performance and, complementarily, points to the need for additional studies involving association between technical project management tasks and e-Government project performance in different contexts.

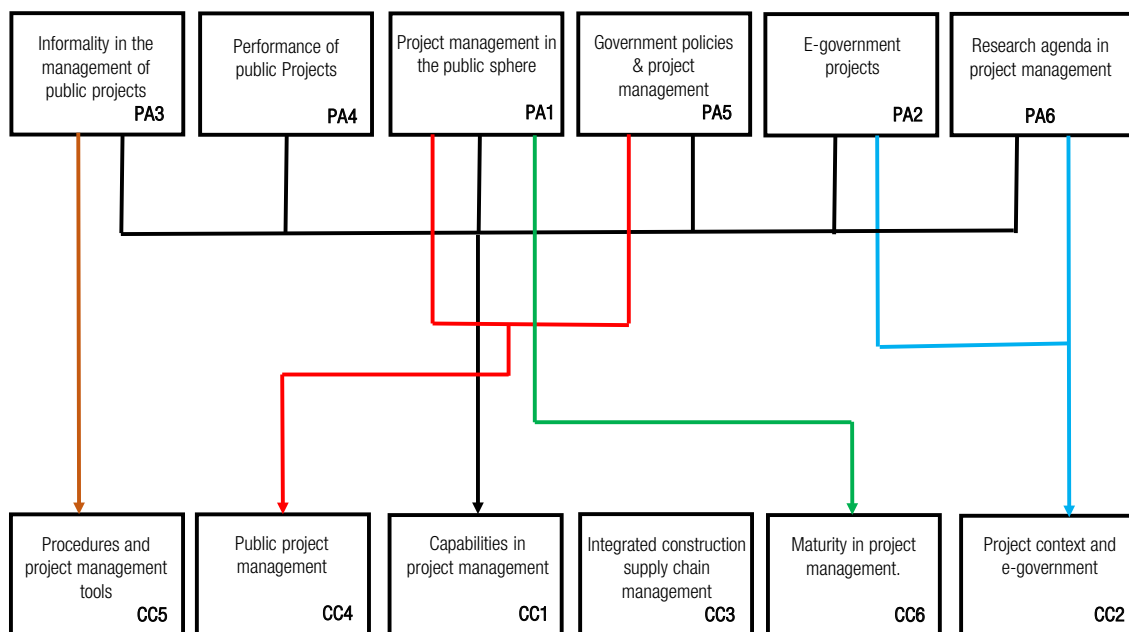
Factor 3 was named **Integrated construction supply chain management**. Rahimia, Tavakkoli-Moghaddam, Shojaie, and Cheraghi (2017) present a design of an agile model for the management of the construction supply chain using a hybrid method involving Analytic Hierarchy Process (AHP), Data Envelopment Analysis (DEA) and Fuzzy Logic, and recommend the application with the same model for project portfolio. The work of Brinkhoff, Özer, and Sargut (2014) on supply chain project success stories indicates that confidence, although a stronger predictor compared to asymmetric dependence, is necessary but not sufficient for supply chain project success, providing insights on how to effectively manage supply chain projects and alliances between companies.

The fourth factor deals with the **Management of public projects**. It addresses several issues related to project management in the public environment, with emphasis on results and efficiency, also discussing modernization and organizational change. Tileubayeva et al. (2017) describe the principles of project management and its peculiarities in the governmental sphere, showing a set of requirements for efficiency, productivity, and process control to achieve the defined goals and objectives. They suggest ways to create favorable conditions for the successful implementation of project management in government, paving the way for new research in this environment.

Factor 5 deals with **Project management procedures and tools**. Seeks to identify means (procedures and tools) to achieve favorable organizational results. In this sense, Doskočil (2016) examines the level of use of methods, techniques and tools in management and their impact on the success of the project, also concluding that the use of modeling techniques is not well disseminated.

Factor 6, **Project management maturity**, has its focus on management evaluation and continuous improvement, measuring the organizational results achieved through the implementation of project management practices. According to Langston and Ghanbaripour (2016), organizations are more likely to deliver successful projects if they have a mature project environment based on a culture of continuous improvement. For this reason, they encourage the adoption of maturity measurement models in pursuit of increasing project success.

The cocitation and coupling networks, as well as the respective factor analyses, made it possible to generate a framework for integrating factors from the most frequent citations (Figure 5).

**FIGURE 5** FACTOR INTEGRATION

**Source:** Elaborated by the authors.

The PA3 factor deals with informality in the management of public projects and relies predominantly on project management procedures and tools (CC5). It indicates the prevalence of the conversion mode named, by Nonaka (1994), as socialization as the main (informal) process for the transmission of knowledge (tacit-tacit) in public projects. It uses the procedure developed by Fageha and Aibinu (2013) to manage the project scope and Ren and Yeo (2004), who proposed a risk management maturity model for complex projects. It indicates the need for public project managers to adopt formal processes, which, according to Nicholas and Steyn (2011) and Turner (2008), are fundamental for the achievement of the pre-established objectives.

The PA2 factor deals with e-Government. It is based on, mainly, to the CC2 factor, called Context of projects and e-Government. The literature points out different types of e-Government projects (Bhatnagar, 2007; Heeks, 2006), which requires specific managerial approaches, under penalty of failure (Collins & Bicknell, 1997; Heeks, 2003b; Iacovou, 1999; James, 1997). Although there is disagreement on how success is measured (Collins & Bicknell, 1997; James, 1997), there are indications that a high percentage of projects have partial or total failures (Heeks, 2003a). Thus, managerial, political, and legal factors have been identified as important elements to be taken into consideration in the elaboration and development of e-Government initiatives (Gil-Garcia & Pardo, 2005). As a characteristic of this nature, they require flexibility and capacity to deal with change (Gupta et al., 2004).

The PA6 factor, called the Project Management Research Agenda, is also anchored in CC2, which deals with the Context of projects and e-Government. The low success rate brings elements for reflection. Experience shows that people are the one who deliver successful projects, not methods and tools. The ability of people to engage intelligently and creativity with the complexity of projects

is fundamental for positive results (Cicmil & Marshall, 2005). In this way, the agenda draws attention to ontological and epistemological studies in project management. There is a need to develop new models and theories that recognize and illuminate increasingly complex projects (Winter et al., 2006).

The PA1 factor - project management in public administration - is the most comprehensive component of the study. It uses CC1 when discussing the competencies of project managers (Birkhead, Sutherland, & Maxwell, 2000; Boyatzis, 1982; Brill, Bishop, & Walker, 2006; Dainty, Cheng, & Moore, 2005; Fisher, 2011; Toney, 2001; Udo & Koppensteiner, 2004) and particularities of public project managers (Virtanen, 2000). It also deals with project management practices (Crawford & Pollack, 2007; Kerzner, 2003; Morris, 2001; Project Management Institute, 2008, 2013) in the public environment (Wirick, 2009). It addresses the issue of project management skills (Crawford, 2005), linking to project management in the public sector (Rwelamila, 2007; Thamhain, 1991). This factor is also used in CC4 articles when expanding the discussions on the evolution of public project management, involving information technology (Crawford et al., 2003; Melin, & Axelsson, 2009). The articles that make up the CC6 factor are also referenced when discussing maturity in project management (Cooke-Davies & Arzymanov, 2003; Kerzner, 2001; Project Management Institute, 2003) and value of PMOs (Kwak & Xiao Yi Dai, 2000).

The PA5 factor addresses issues of government policy and project management. A study on management competencies presents the political competence of public project managers as a value in the implementation of project management culture in the new public management environment (Virtanen, 2000) present in the CC1 factor. The PA5 factor highlights the relationship between the two mentioned themes. As a highlight, it discusses the performance of the public project manager in the political environment (Rwelamila, 2007; R. Young et al., 2012).

## 5. CONSIDERATIONS

This research aimed to analyze public projects management publications by searching the Web of Science and Scopus databases. The study revealed that the number of publications increased year after year, which indicates growing concern and interest of researchers in this topic. In a practical way, the study presents two main contributions. First, presents the research trends, as well as the main topics under discussion. Then indicates the conceptual structure on which the most recent articles were anchored. It draws attention to the considerable percentage of studies on project management skills, since it directly impacts project results and organizational strategies. Also, noteworthy the amount of work dealing with e-government, given the number of projects that fails.

Inevitably, this study presented some limitations. The first can be defined in terms of the scope's research. As disadvantage, two databases were defined, possibly not considering periodicals that could also approach the subject in focus. Hence, if the journal's scope were expanded, there would be the possibility of presenting broader results (factors), both in the analysis of citations and in the analysis of coupling. However, it is certain that the chosen bases (Web of Science and Scopus) gather the most relevant journals when talking about project management. The second limitation is a direct consequence of the bibliometric technique. The method is anchored in the quantitative aspects of the production, dissemination and use of the registered information (vision of amplitude), although an analysis of the texts has also been carried out to understand their relationship. Additionally, a

qualitative analysis could be recommended, by means of a systematic review of the literature, to complement the discussions on public project management.

The research made it possible to identify the need for reflection on some specific points in public project management. It opens possibilities for new studies involving the appropriation of existing theories in other areas of knowledge and to apply them to public project management. It enlarges the discussion on the complexity of public projects, vision of public projects as social processes, value creation in projects, sustainability of public projects, proposition of maturity model for public project management, evaluation of effectiveness of public projects, management of stakeholders of public projects, management of portfolio of public projects and learning and knowledge management in public projects.

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