

How Increasing Projectification and Temporality have changed the way we look at Project Management Offices – A Systematic Literature Review ^{1, 2}

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Abstract

Increasingly, projectification and temporality forces project-based organizations to rethink how to set up a sustainable environment that supports projects being likewise able to deal with ongoing organizational changes due to varying needs over time. Project management offices (PMO) can help organizations to increase project-related success and organizational performance. However, PMOs are still under-researched which is why a comprehensive review of our current understanding is required.

This paper examines how the research into PMOs in organizations has evolved over time, seeks to find patterns in the different themes of research covering the past 20 years. A systematic literature review is conducted into the body of literature of PMO research with the specific focus on PMO success. The review provides the reader with a structured overview and insights about the main phases and themes that were researched. whilst raising and answering pertinent questions during the review of the body of literature.

The motivation for this study is to provide clarity to divergent knowledge about PMO design structures and what is considered best-suited to support projects in environments of temporality.

The study result reveals four major clusters of research: the early years phase was followed by (1) the first cluster which was concerned with PMO roles, value, maturity and leadership. (2) The second cluster included strategic fit, organizational dependencies and context and causes for PMO reconfiguration followed by (3) cluster three which covered project-based organizations and organizational design. (4) Finally, cluster four examined services, outcomes, structure and impact of PMOs. All four clusters cover specific and related themes and perspectives. Surprisingly, the environmental/organizational perspective appears twice (cluster two and three), however, the focus is different since the understanding has evolved over time.

The findings demonstrate how our understanding of PMOs has evolved over time. where there is a shift in research focus from a reductional, functional perspective to an organizational and

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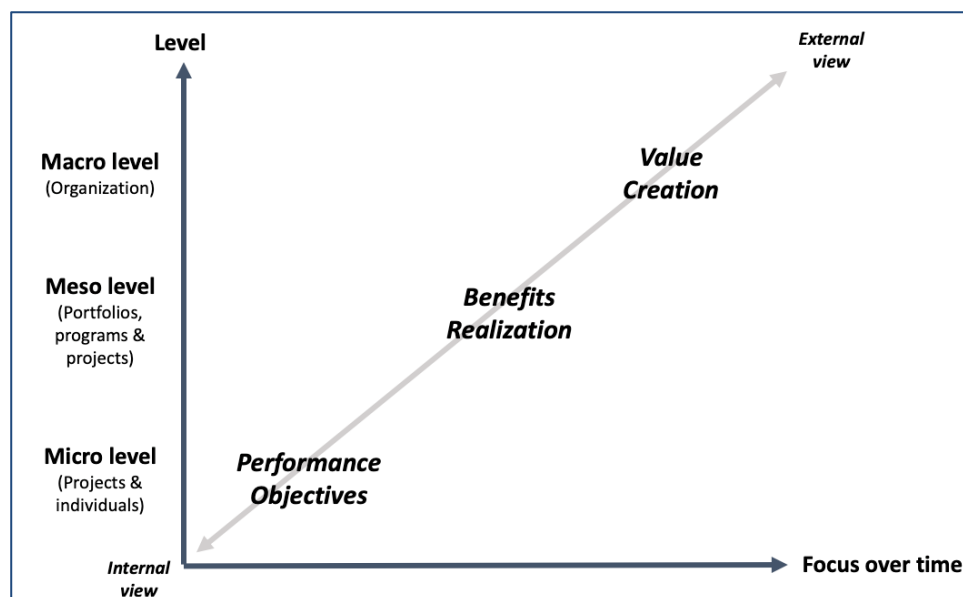
service-oriented perspective. However, the study also reveals a number of gaps and questions to be addressed.

The implications for academia are the contribution to a systematic understanding of PMOs, the major research clusters and the identification of research gaps. The practical implications consist of a structured and condensed overview as well as insights into the body of literature about PMOs.

Keywords: *PMO, success, value, governance, organizational design*
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Introduction

This paper examines PMOs in project-based organizations (PBO) with the specific focus on PMO success. PBOs are defined as organizations or firms in which “the majority of products made or services supplied are against bespoke designs for customers” (Turner & Keegan, 2001, p. 256). PMO success is still under investigation, first papers highlight the multifaceted character of PMO success where the outcome includes performance objectives, benefits and (perceived) value over time (figure 1).



After: Kaul & Joslin (2018)

Fig. 1 Levels of PMO Success

This systematic literature review analyzes selected literature from 1999 to March 2019 to find out key areas of research and discusses key findings. Successful PMOs are located in their organizations and contribute in many different ways to organizational success. It is therefore of particular importance to examine and discuss organizational project management in PBOs (Aubry, 2018; Crawford, 2018; Müller, Drouin, & Sankaran, 2018), however, respective literature and research is still scarce (Miterev, Mancini, & Turner, 2016). This paper follows the recent call for more “Type 3” research on project level by going beyond traditional project research. It attempts to increase our understanding of organizations and project organizing practices more generally (Geraldi & Söderlund, 2018). This paper examines how the understanding of PMOs has evolved over the last 20 years with a specific focus on PMO

success. The research gap consists of the lack of understanding of how to set up and develop successful PMOs in PBOs to increase the likelihood of organizational success.

The respective research questions are formulated as follows:

- RQ1: What are the main areas of research into PMOs, how and why did the emphasis change over the past 20 years?
- RQ2: How has the understanding of PMOs evolved within the last 20 years?
- RQ3: Which are the open topics that still need to be addressed?

The study applies systems theory as theoretical lens and adopts critical realism as underlying philosophy, since the focus lies on exploration and explanation of structures and mechanisms (Bhaskar, 2016). The unit of analysis is the PMO within an organizational context.

The implications for academia are the contribution to a systematic understanding of PMOs, the major research clusters, common and related themes, and the identification of research gaps. The practical implications consist of a structured and condensed overview as well as insights into the body of literature about PMOs.

The paper is structured as follows: After the introduction, the applied research method is explained followed by a literature review which discusses the different identified research clusters. The results are discussed in the light of the literature body to answer the research questions. Finally, the conclusion explains strengths and limitations of the study and proposes recommendations for further research.

Research method

A critical realism stance has been applied in this paper according to Bhaskar (2016). The systematic literature approach has been chosen to identify, evaluate and synthesize existing literature (Petticrew & Roberts, 2006), to avoid bias (Hirsch, 2005) and to ensure methodological scrutiny (Tranfield, Denyer, & Smart, 2003). The underlying principles of this systematic literature review comprise replicability and maximized internal as well as external validity (Tranfield & Denyer, 2009). The five process steps applied according to Tranfield & Denyer (2009) and Colicchia & Strozzi (2012) are the following:

1. Papers were searched using the key words PMO, project management, governance, organization, success, roles, functions and typology in multiple variations.
2. The selection of papers was refined according to the research questions (main quality criteria were journal rankings, citation index, and author reputation).
3. Articles published between 1999 and 2019 were selected mainly from the journals focused on project management (International Journal of Project Management, Project Management Journal, International Journal of Managing Projects in Business). Where appropriate, further journals and conference proceedings were also used based on professional judgement (Tranfield & Denyer, 2009).
4. In total, 563 papers were identified during the initial selection. The publications were analyzed and then divided into core and secondary papers. The final list of core literature used in this research contains 125 papers.

5. Analysis and synthesis: A phased-based analysis was used to examine the main themes covered by the papers from 1999 to present. The final papers have been analyzed in terms of research focus. Key words were noted to facilitate the grouping of the papers. To identify different research themes, the papers have been tagged differently four times applying different grouping criteria until no major grouping difference could be identified. The final grouping identified an early years phase followed by four major clusters of research which are presented and discussed in the following section. The detailed analysis can be found in the appendix at the end of this paper.

Results

General findings and early years` research

This literature review about PMOs covers a time span of twenty years from 1999 until March 2019. The grouping process of the papers revealed five different clusters of research, the early years phase followed by four different clusters (table 1). In the early years (1999-2008) research focus was mixed. Some researchers concentrated on examining PMOs as a phenomenon by analyzing PMO roles and the services they offer (Aubry, Hobbs, & Thuillier, 2006; Crossan, Lane, & White, 1999; Desouza & Evaristo, 2006; Dinsmore, 1999; Jugdev & Müller, 2005; Julian, 2008; Kogut, 2000; Kwak & Dai, 2000; Turner & Keegan, 2001; Walker & Christenson, 2005; S. Ward & Chapman, 2003). Another significant research theme was dealing with the question of which competences might be required (L. H. Crawford, 2005; Hill, 2004; Moore, Cheng, & Dainty, 2002; Westera, 2001) and which leadership style best supports project management (PM) activities (Müller & Turner, 2007; Prabhakar, 2005). Finally, the first researchers investigated the strategic fit of PMOs with their organizations and tensions between them (Aubry, Hobbs, & Thuillier, 2007; Hobbs, Aubry, & Thuillier, 2008; Mengel, Cowan-Sahadath, & Follert, 2008; Pettigrew, Woodman, & Cameron, 2001).

This phase was followed by four major research clusters (groups of themes in papers that exceeded the average number of publications in each group), namely:

- Cluster 1: PMO characteristics, roles and functions (2007-2011).
- Cluster 2: Organizational context of PMOs, tensions and causes of reconfiguration (2009-2012).
- Cluster 3: Project-based organizations and organizational design aspects (2016-today).
- Cluster 4: PMO services, performance and structure (2010-today).

Table 1:

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Cluster 1			1	1		1	2	1	4	3	3	2	8		1	1	2	2	1	2		35
Cluster 2	2		1		1		1		1	2	8	5	2	3	1	1	2					30
Cluster 3																1		2	3	6		12
Cluster 4		2	1				1	2	1	1		5	1	2	6	3	7	6	3	3	4	48
Grand Total	2	2	3	1	1	1	4	3	6	6	11	12	11	5	8	6	11	10	7	11	4	125

This paper presents and discusses the four identified clusters in the following sections.

Cluster 1 – Characteristics of PMOs (2007-2011)

The earliest cluster of papers is concerned with the four research topics PMO roles, leadership, organizational value and maturity (table 2). Within this cluster, researchers mainly seek to understand what characterizes PMOs by looking at their roles, contribution and the respective outcome.

Table 2

Themes	Number of papers
PMO Roles	9
Organizational value	7
Maturity	1
Leadership style	3

Looking at PMO roles, organizational learning and knowledge management as a predictor for PMO performance and as important link between the temporary part of an organization (projects) and the permanent part (line organization) has been addressed frequently (Hobbs & Aubry, 2011; Lindner & Wald, 2011; Sokhanvar, Trigunarsyah, & Yarlghadda, 2011), Another aspect consists of portfolio management, a strategic task that links organizational strategy to the programs (group of related projects) and projects of an organization (J. K.Crawford, 2011; Crawford & Cabanis-Brewin, 2011): Müller and colleagues further differentiate between PMOs that are either project execution-oriented (control of PM compliance, standards, project and project staff performance) or strategy-oriented, e.g. portfolio control such as selection, reporting and decision making (Müller, Martinsuo, & Blomquist, 2008). Hobbs and Aubry highlight that existing PMO typologies are not empirically validated and propose that a set of characteristics such as organizational context, mandate or authority should serve as the basis for types of PMOs (Hobbs & Aubry, 2008a). Finally, the contribution of PMOs to innovation and entrepreneurship was researched highlighting the potential value PMOs could provide (Cooke-Davies, Crawford, & Lechler, 2009a). It was suggested to involve PMOs as drivers of innovation processes e.g. as coaches, facilitators, groups, boards, innovation strategy, innovation process, coordinators for strategy and process implementation, idea management software systems, idea campaigns, specialized task forces for supporting executives and the staff, and challenge-driven idea generation processes (Arto, Kulvik, Poskela, & Turkulainen, 2011).

Organizational value that PMOs provide is the second research topic of cluster 1. Thomas & Mullaly highlight the difficulty of and little consensus about how to create value for organizations. They propose to measure performance differences (Thomas & Mullaly, 2007), similar to Lepak, Smith, & Taylor (2007) However, in a later paper, they address the distinction between tangible and intangible value (Thomas & Mullaly, 2008). Possible divergent interests of business units and PMOs has been examined several times and revealed a lack of information and collaboration as well as different perceptions about what needs to be done (Aubry, Hobbs, & Thuillier, 2009; Hobbs & Aubry, 2008b). Some researchers already conclude that PMOs must not been seen isolatedly highlighting co-existing values within the organization (Aubry et al., 2009), dependent on context and PMO roles (Aubry, Richer, Lavoie-Tremblay, & Cyr, 2011).

The third theme is concerned with maturity. In contrast to focusing on values, the notion of authentic leadership is introduced and maturity of leadership is suggested by distinguishing

between foundational, nascent, developing and mature leadership (Lloyd-Walker & Walker, 2011).

The last theme in this cluster deals with leadership. In general, a leadership style is suggested which is able to cope with both the organization's administrative structure as orientation and its adaptive capacity to enhance overall flexibility and effectiveness (Uhl-Bien, Marion, & McKelvey, 2007). Müller and Turner remark that literature concentrates on tools and techniques rather than leadership styles proposing a differentiation between application area, project complexity, project importance, contract type or lifecycle stage (Müller & Turner, 2010b, 2010a).

Cluster 2 – Context of PMOs (2009-2012)

The second cluster of papers deals with the fit between PMOs and their organizations, dependencies and context. Another main focus consists of research into the organizational causes of reconfiguration of PMOs (table 3). Within this cluster, researchers concentrate on the interplay and dependencies between PMOs and organizations.

Table 3

Cluster 2 research topics	
Themes	Number of papers
Strategic fit	3
Success criteria	1
Dependencies	3
Organizational context	6
Causes for reconfiguration	5

Strategic fit between PMOs and their organizations was addressed by three papers looking at different perspectives as key drivers (Cooke-Davies, Crawford, & Lechler, 2009b), a positive value direction (Mullaly & Thomas, 2009) and the lack of consensus in this field (L. H. Crawford & Helm, 2009).

Ika examined the construct of success and differentiates between project success and project management success. He concludes that both, short- and long-term criteria and perspectives are required (Ika, 2009).

Dependencies were addressed from different angles: from a stakeholder perspective by differentiating between projects and project management (Li Zhai, Xin, & Cheng, 2009), by identifying 34 challenges out of which the three most important ones were rigid corporate culture and failure to manage organizational resistance to change, lack of experienced project managers and PMO leadership, and lack of appropriate change management strategy (Singh, Keil, & Kasi, 2009). An interesting aspect was provided by Hurt and Thomas who suggest an inflection point of value, a U-shaped relationship of PMO value creation and time. They conclude that over time new visions and goals need to be developed (Hurt & Thomas, 2009).

The organizational context of PMOs has been examined frequently. It is concluded that organizations of PMOs as mostly project-based or project oriented (Aubry, Hobbs, & Müller, 2010). PMOs as part of a power system and politics in organizations are organizing for innovation as well as projects (Aubry, 2011). The variety of objectives, priorities and relationships and constant change is also confirmed by Petit (2012) suggesting continuous oversight and alignment. Internal and external issues and events moderated by organizational

context lead to frequent changes of PMO roles but might also lead to increased project management and business performance and maturity explain Aubry, Hobbs, Müller, & Blomquist (2011). Furthermore, papers addressed different kinds of organizational complexity (Turner, Müller, & Geraldi, 2012) and corporate governance shifts due to new market expectations (Müller & Jugdev, 2012).

Research into causes for PMO reconfiguration was dominated by examining how PMOs are embedded in their host organizations and how they are exposed to constant changes and transitions (Aubry, Müller, Hobbs, & Blomquist, 2010; Crawford, 2010; Pellegrinelli & Garagna, 2009). Aubry et al. found that PMOs and their structures alternate between phases of tensions and relative stability (Aubry, Hobbs, Müller, & Blomquist, 2010). To cope with changes, PMO autonomy is important, a lack of PMO autonomy and PMO mandate may result in serious tensions, conclude Hobbs & Aubry (2010).

Cluster 3 – Organizational design (2016-now)

The third cluster of papers covers research the context of project-based organizations and from an organizational design perspective (table 4). It started in 2016 which indicates that it is the youngest and most current research theme. Literature and research of this cluster has replaced the ones from cluster two by lifting the perspective on a higher level, an organizational design perspective.

Table 4

Cluster 3 research topics	
Themes	Number of papers
Context of projects-based organizations	7
Organizational design	4

The context of project-based organizations is the research focus of most of the papers of cluster 3. Similar to earlier papers, it is concluded that organizations of PMOs are mostly project-based or project oriented organizations (Miterev et al., 2016). This type of organization may be conceptualized as interplay of the three segments values, structures, and people, suggest Gemünden, Lehner, & Kock (2018). One recent contribution about PMOs was provided by Bredillet and colleagues. Their paper conceptualized PMOs as collections of routines whereby the PMO evolves over time to adapt to organizational context influence (Bredillet, Tywoniak, & Tootoonchy, 2018). The inter-organizational network was the unit of analysis Matinheikki et al. who explain that this network can be managed for value creation in the front-end of projects (Matinheikki, Artto, Peltokorpi, & Rajala, 2016). Another important research field deals with governance, e.g. the relationship between governance and success (Müller, Zhai, & Wang, 2017) and multi-level project governing (Brunet, 2018). Finally, it is suggested that future research in the realm of practices, projects and portfolios in project-based organizations should be conducted in the field of practices and tools, leadership and dynamic capabilities (Clegg, Killen, Biesenthal, & Sankaran, 2018).

The second pillar in the third cluster consists of research papers focusing organizational design which has been revealed to be an ongoing process (Aubry & Lavoie-Tremblay, 2017). Instead of looking at organizational units like a PMO isolatedly, this research theme applies a more holistic approach by analyzing organizational motives and structures (Hepworth, Misopoulos, Manthou, Dyer, & Michaelides, 2017). To facilitate understanding of organizations in a structured approach, new models and frameworks have been proposed recently, e.g. a model

for organizational project management, a structured approach to capture structure, motives and activities in organizations (Müller et al., 2018) and a conceptual framework that is determined to show that governmentality, governance and organizational design as a whole is essential to an understanding of organizational project management (Simard et al., 2018).

Cluster 4 – Service-orientation (2010-now)

The fourth cluster of papers is concerned with the four research topics measurable outcomes, PMO impact, PMO structure and PMO services (table 5). Within this cluster, researchers seek to understand which structure and, in particular, which services generate a favorable outcome. It is the largest cluster with the longest time span of nine years.

Table 5

Cluster 4 research topics

Theme	Number of papers
Measurable outcomes	6
PMO impact	1
PMO structure	2
PMO services	31

Research in this cluster can be divided into two groups. The first group looks into the contribution of PMOs in terms of measurable outcomes and PMO impact. The second group analyzes structures and services PMO provide. Aubry et al. point out that PMOs provide tangible benefits to the organization such as project success and customer benefits (Aubry & Hobbs, 2010). Performance was analyzed by Biedenbach & Müller who stress that evaluating performance requires a definition of performance and its context (Biedenbach & Müller, 2012). Additionally, innovative performance aspects e.g. slack, innovativeness, and ambidexterity of PMOs should be considered (Müller, Glückler, & Aubry, 2013). On portfolio level performance results in enhanced project visibility, transparency in portfolio decision making and predictability of project delivery (Patanakul, 2015), on program and project level performance may be supported by a governance framework with the three dimensions efficiency, legitimacy and accountability (Brunet & Aubry, 2016). Recent researchers pointed out that project success cannot be assessed merely in terms of goals reached at the time of project completion but also in terms of benefits compared to costs and value achieved over the project lifecycle compared to original value expectations of various stakeholders (Martinsuo, Klakegg, & van Marrewijk, 2019).

The theme of impact of PMOs was examined by Kutsch et al. They suggested that PMOs might not always have a direct impact on project success and assume that it depends on the satisfaction of its service users (Kutsch, Ward, Hall, & Algar, 2015).

Several researchers looked at structural elements that are associated with PMOs. An organizational perspective was taken by Tsaturyan & Müller who explain that networked PMOs require both formal (regulative) and informal (relational) networks which requires additional PMO characteristics. PMOs act as loosely coupled systems consisting of structural, procedural, relational and regulative dimensions (Tsaturyan & Müller, 2015). Others investigated PMOs as organizational units and tried to identify different types of PMOs. However, since 47 different types were proposed, it might be at least questionable if this helps practitioners (Monteiro, Santos, & Varajão, 2006).

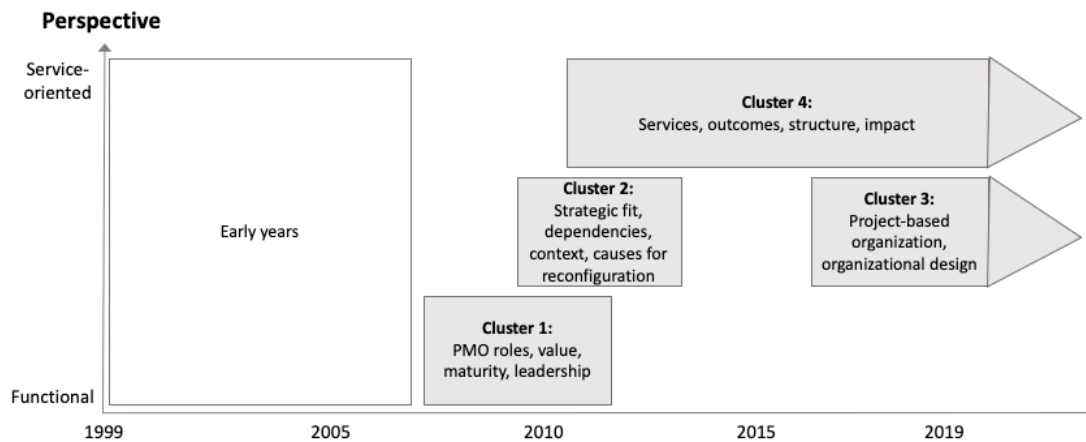
The largest research theme in cluster four consists of research into services PMOs provide. Knowledge management, acting as knowledge broker and gathering lessons learned was addressed frequently (Atencio, 2013; Dutton, Turner, & Lee-Kelley, 2014; Eriksson & Leiringer, 2015; Gemünden, 2016; McClory, Read, & Labib, 2017; Müller, Glückler, & Aubry, 2013; Nadae, Carvalho, & Vieira, 2015; Paton & Andrew, 2019; Pemsel & Müller, 2012; Pemsel, Müller, & Söderlund, 2016; Pemsel & Wiewiora, 2013; PMI, 2015; Sokhanvar, Matthews, & Yarlagadda, 2014). Sokhanvar et al. point out that knowledge management should be part of PMO roles from the first setup onwards. However, the role of knowledge has not yet been addressed in PMO maturity models, emphasis on the improvement of knowledge capturing practices and processes is therefore required (Sokhanvar et al., 2014). Other identified themes include governance in different environments (Brunet & Aubry, 2016), managing and preparing stakeholders for risky and uncertain situations (de Bakker, Boonstra, & Wortmann, 2010; Derakhshan, Turner, & Mancini, 2019), interaction with project participants (Albrecht & Spang, 2014), resource management (Joslin & Müller, 2016) and team building (Gren, Torkar, & Feldt, 2017), coordinator and trainer roles of PMOs (Otra-Aho, Arndt, Bergman, Hallikas, & Kaaja, 2018; Riis, Hellström, & Wikström, 2019), PMOs in the research context of universities (Wedekind, Llp, & Philbin, 2018) and benefit management (Musawir, Serra, Zwikael, & Ali, 2017). Besides concrete services PMOs may provide, several papers addressed the contribution of PMOs more generally. Empowerment, role significance and role clarity was proposed as favorable precondition for successful task execution (Jonas, 2010). Ward and Daniel suggest the involvement of PMOs along all phases of projects concentrating on the review of benefits and changes as well as on the monitoring process (Ward & Daniel, 2013).

Roles as a set of mutual expectations e.g. serving, controlling, partnering or a blend of more than one role were identified by Müller, Glückler, Aubry, & Shao (2013) highlighting that it is still difficult to typify PMOs under one single set of activities. Contradictions were also discussed by Aubry who points out that PMOs supportive role are likely to serve as predictors for project and business performance (Aubry, 2015). In terms of measurable contribution it is not only necessary to define indicators for organizational performance (Aubry & Hobbs, 2010; Hobbs & Aubry, 2010) or return on investment metrics (Kerzner, 2011). It is of utmost importance to align measurement and the services PMOs provide e.g. PMO services related to cost performance (Carvalho, Barbalho, Silva, & Toledo, 2018).

Discussion

The literature review of 125 papers from 1999 to March 2019 revealed the main areas of research. Remarkably, the research focus has changed during the years. In the early years research was conducted in diverse areas. Then it started from a functional perspective (cluster 1) and covered topics e.g. how PMOs are structured and how they operate, became broader (cluster 2 and 3) considering organizational dependencies and organizational design, and finally resulted in a service-oriented perspective (cluster 4). Cluster 3 and 4 research is still ongoing.

Figure 2: Perspectives per research cluster



It is necessary to examine the different phases, clusters and themes of PMO research to understand how our understanding has evolved. Especially in the early years and in cluster 1 and 2, research was not able to provide sufficient answers for PMO success. Researchers during that time were attempting to get an understanding of what is a PMO, what it consists of and what it is doing? (cluster 1). Later, the focus changed because of a better understanding that PMOs should not be analyzed in isolation due to their organizational dependencies (cluster 2). The discussion around services PMOs provide and how these are related to successful outcome started almost ten years ago and it is still not finalized (cluster 4). However, it has become a discussion of measurable contribution, so the focus has changed from a reductional, functional to an organizational and service-oriented perspective. This shift is accompanied by another shift in PMO research from a problem-oriented view (organizational dependencies and causes for reconfiguration) in cluster 2. The most recent discussion (cluster 3) includes aspects like governmentality, governance, organizational design and organizational project management (Müller et al., 2018; Simard et al., 2018) which means it takes the whole organization into account including their organizational units and examines the interaction activities and mechanisms between the permanent part of the organization (line organization) and the temporary parts (programs and projects). This is in line with other researchers who revealed that organizational project management gains predominant importance since today's organizations increasingly transform into/appear as project-based organizations (Kwak, Sadatsafavi, Walewski, & Williams, 2015; Mitrev et al., 2016; Packendorff & Lindgren, 2014).

Organizational project management has emerged from organizational theory and is defined as “the integration of all project management-related activities throughout the organizational hierarchy or network” (Turner & Müller, 2017, p. 10). To understand project-based organizations better, models and frameworks have proven to be helpful (Kaul & Joslin, 2019). Table 6 provides a synthesis of the literature review discussed in the previous section and outlines the main themes, the unit of analysis and the perspective research has taken within the proposed clusters.

Table 6

Synthesis of the literature review

Research focus	Cluster 1 2007-2011 Characteristics	Cluster 2 2009-2012 Context	Cluster 3 2016-now Organizational design	Cluster 4 2010-now Service-orientation
Themes	<ul style="list-style-type: none"> • PMO roles (9) • Organizational value (7) • Maturity (1) • Leadership style (3) 	<ul style="list-style-type: none"> • Strategic fit (3) • Success criteria (1) • Dependencies (3) • Organizational context (6) • Causes for reconfiguration (5) 	<ul style="list-style-type: none"> • Context of project-based organization (7) • Organizational design (4) 	<ul style="list-style-type: none"> • Measurable outcomes (6) • PMO impact (1) • PMO structure (2) • PMO services (31)
Unit of analysis	PMO as phenomenon	PMO and its context	Project-based organization	PMO and its contribution to organizational success
Perspective	Inside-out: PMO as organizational unit	Outside-in: PMO and its organizational dependencies	Outside-in: Project-related structure and capabilities from organizational perspective	Inside-out and outside-in: PMO service perspective

It is worth noting, that the perspective has changed significantly. Cluster 1 followed an inside-out or functional approach by looking from the PMO to the outside, cluster 2 and 3 take the opposite approach, they examine PMOs from an outside-in perspective. In cluster 4, both perspectives could be identified, inside-out (discussion of services PMOs may provide) as well as outside-in (impact and measurable outcome of successful PMOs).

The suitability and necessity to concentrate on cluster 3 and 4 research jointly has been confirmed several times by academia (Aubry, 2018; L. H. Crawford, 2018; Simard, 2019) as well as by leading practitioners (Mark Price Perry, 2017).

In summary, this literature review reveals the major clusters and themes of research into PMOs and PMO success. Patterns and trends could be detected, however, there is still room for more research into PMO success. Missing definitions and terminology variances are some of the most obvious signs. To make PMOs and their organizations more successful and sustainable, this needs to be overcome to cope with increased projectification (Jensen, Thuesen, & Geraldi, 2016) and temporality (Simard et al., 2018).

Conclusions

This paper seeks to investigate how the understanding of successful PMOs has evolved over the last 20 years. A comprehensive systematic literature review has been conducted with a specific focus on PMO success. Out of 563 related scientific papers, 125 papers have been analyzed, grouped and discussed.

To answer the first question, four main clusters of research have been identified and proposed reflecting common and related themes:

- Cluster 1: PMO characteristics, roles and functions (2007-2011).
- Cluster 2: Organizational context of PMOs, tensions and causes of reconfiguration (2009-2012).
- Cluster 3: Project-based organizations and organizational design aspects (2016-today).
- Cluster 4: PMO services, performance and structure (2010-today).

The emphasis has changed from considering the PMO as organizational unit to looking at organizations and its project management capabilities more holistically.

The understanding has evolved over the last 20 years from a reductional, functional view (cluster 1) to an organizational view (cluster 2 and 3) and finally to a service-oriented view (cluster 4). Research in cluster 3 and 4 is still ongoing. This answers RQ2.

To answer the last question, this paper suggests areas of obvious gaps and misalignments future researchers may want to look at. Many topics are still open and need to be addressed.

The main questions that remain unanswered to date are the following:

1. It still remains unclear for a project-based organization how to become more mature in terms of organizational project management. Current maturity models have proven to be misleading since they do not cover the whole range of PMO services nor do they consider PMOs and their organizations jointly (Kaul, Joslin, & Brand, 2018).
2. The literature review reveals many aspects PMOs are dealing with and the close relationship between PMOs and their organizations. It is at least remarkable that, after 20 years of research into PMOs, it still lacks an understanding of what makes a PMO successful. Neither is there a commonly agreed definition of PMO success nor is it clear which PMO services (may be direct or indirect contributions) are closely related to which successful outcomes. In addition, it is still unclear what constitutes the enablers of PMO success (Kaul & Joslin, 2018, 2019). Applying organizational models and more qualitative research, e.g. case studies are required to provide answers to those questions as proposed by recent papers (Kaul & Færge-Broberg, 2019; Miterev, 2017) to examine the interplay between PMOs and their organizations.
3. The question whether an organization requires a single PMO or multiple ones lacks an answer. The existence of networks of PMOs has been detected and researched (Matinheikki, Arto, Peltokorpi, & Rajala, 2016; Tsuruyan & Müller, 2015), however, the criteria have not been determined yet which leaves practitioners with uncertainty about when and how to consider multiple PMOs in their organizations.
4. It is also not clear how to compare PMOs since there are hundreds of different services accompanied by ongoing organizational changes. Should a comparison of PMOs be conducted using an organizational structure or from a service perspective? A combination of cluster 3 and 4 research might provide suitable answers in the future.

The strength of this paper lies in its structured approach. First, literature was gathered systematically. Then it was grouped into clusters of related literature and themes. The four clusters have been discussed and it could be demonstrated how the understanding evolved over the last 20 years.

As every paper, this research provides limitations. The first one is the paper selection and the key words that were used to identify the literature. However, this research followed recommendations from leading authors to ensure high quality and a transparent selection process. A second limitation consists of the grouping of the papers into four clusters. Although the grouping process has been performed several times to ensure consistency, it remains subjective in nature. It is not unlikely that other researchers would have grouped the papers

differently. However, by the means of grouping the literature into four clusters, the evolving understanding of PMOs could be demonstrated and discussed consistently.

It is suggested that future research looks at the open questions raised to close some of the obvious gaps this paper reveals.

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Robert Joslin, PhD, PMP®, PgMP®, CEng, is a portfolio/project/program management consultant, professor at Swiss Business School and co-founder of AIPMO. He has 20 plus years in designing, initiating management delivery of business transformation, reengineering, infrastructure, strategy development including winning prizes for ideas and product innovation. Previously, a consultant in telecom, banking, insurance, manufacturing and direct marketing whilst working for McKinsey & Co, Logica and his own consulting company. Robert has published book chapters and research papers in the field of project, program and portfolio management and presents his research at conferences such as PMI research and EURAM. Robert is a peer reviewer of the top three research journals in project management and the founder and organizer of the annual PMI Swiss program management conferences. He developed an information structuring methodology aligned and complementing PMI Standards. Robert is in the process of writing a new PMO international standard for AIPMO as well is in the process of authoring books on Portfolio, Program and Project management. He can be contacted at robert.joslin@faculty.sbs.edu

Appendix

Cluster 1 2007-2011 Characteristics		
PMO roles	Hobbs & Aubry (2011)	Organizational learning roles as strong predictors of PMO performance; neither monitoring nor strategic activities provide positive contribution to PMO performance
	Crawford, J. K. (2011)	PMOs can improve the entire management of an organization through the strategic task of project portfolio management; PMO can link corporate strategy to the programs and projects of an organization.
	Crawford, J. K., & Cabanis-Brewin, J. (2011)	PMOs can improve the entire management of an organization through the strategic task of project portfolio management; PMO can link corporate strategy to the programs and projects of an organization.
	Müller, R., Martinsuo, M., & Blomquist, T. (2008)	PMOs either project execution-oriented (control of PM compliance, standards, project and project staff performance) or strategy-oriented, e.g. portfolio control such as selection, reporting and decision making
	Sokhanvar, S., Trigunarsyah, B., & Yarladda, P. K. (2011)	KM part of PMO roles from the first setup onwards of a PMO; role of knowledge has not yet been addressed in PMO maturity models; emphasis on the improvement of knowledge capturing practices and processes
	Lindner & Wald (2011)	PMOs are able to ensure continuity and professionalism supporting individuals to participate in knowledge management activities which serves as a link between the temporary and the host organizations
	Artto, K., Kulvik, I., Poskela, J., & Turkulainen, V. (2011)	PMOs involved in and driver of innovation processes e.g. as coaches, facilitators, groups, boards, innovation strategy, innovation process, coordinators for strategy and process implementation, idea management software systems, idea campaigns, specialized task forces for supporting executives and the staff, and challenge-driven idea generation processes
	Cooke-Davies, T. J., Crawford, L. H., & Lechler, T. G. (2009)	PMOs can be of value for innovation and entrepreneurship
	Hobbs, B., & Aubry, M. (2008)	Existing typologies are not empirically validated; set of characteristics such as organizational context, mandate or authority should serve as the basis for types of PMOs
Organizational value	Hobbs, B., & Aubry, M. (2008)	Possible divergent interests of business units and PMOs on strategic, portfolio level but also on project level due to a lack of information and collaboration, different perceptions about project health or the wish for more flexibility instead of standards
	Aubry, M., Hobbs, B., & Thuillier, D. (2009)	Possible divergent interests of business units and PMOs on strategic, portfolio level but also on project level due to a lack of information and collaboration, different perceptions about project health or the wish for more flexibility instead of standards
	J. Thomas & Mullaly (2008)	Tangible and intangible value
	Hobbs & Aubry (2007)	Significance of PMOs in cultural sense; PMO giving guidance and orientation
	Lepak, Smith, & Taylor (2007)	Little consensus about how to create value for organizations; propose recognizable performance difference; alignment with social and cultural context
	Thomas & Mullaly (2007)	Little consensus about how to create value for organizations; propose recognizable performance difference; alignment with social and cultural context
	Aubry et al. (2009)	PMOs cannot be considered as isolated islands; coexisting values within the organization
	Aubry et al. (2011)	PMOs are subject to a pluralism of values on performance dependent on their context and roles
Maturity	Lloyd-Walker, B., & Walker, D. (2011)	Maturity of leadership: foundational, nascent, developing and mature leadership; notion of authentic leadership
Leadership style	Uhl-Bien, M., Marion, R., & McKelvey, B. (2007)	Propose a leadership style which copes with both the organization's administrative structure as orientation and its adaptive capacity to enhance overall flexibility and effectiveness
	Müller, R., & Turner, J. R. (2010)	Literature concentrates on tools and techniques rather than leadership styles; differentiation between application area, project complexity, project importance, contract type or lifecycle stage
	Müller & Turner (2010)	Leadership competency profiles depend on project type; indicates that PMOs in charge of project management-related activities might have to adapt leadership style and leadership development according to the specific organizational and project context as contingency theory suggests

Cluster 2 2009-2012 Context		
Strategic fit	Cooke-Davies et al. (2009)	Different perspectives as key drivers; PM and strategic direction; strategic fit
	Mullaly & Thomas (2009)	Strategic "fit" based on contingency theory; positive "value" direction
	L. H. Crawford & Helm (2009)	Little consensus about how to create value for organizations; propose recognizable performance difference; alignment with social and cultural context
Coexisting values	Aubry et al. (2009)	Coexisting organizational values due to unstable nature of innovation and change
Success criteria	Ika (2009)	Differentiate between project success and project management success; short- and long-term criteria and perspectives needed
Dependencies	Li Zhai, Xin, & Cheng (2009)	Differentiation between value of projects and value of project management
	Singh, Keil, & Kasi (2009)	34 challenges: resources, stakeholder commitment, mandate, context, culture, project management issues, PMO value
	Hurt & Thomas (2009)	Suggest inflection point of value, U-shaped relationship of PMO value creation and time; develop new visions and goals needed
Organizational context	Aubry, M., Hobbs, B., & Müller, R. (2010)	Organizations of PMOs as mostly project-based or project oriented organizations
	Aubry, M. (2011)	Duality of organizing for innovation as well as projects; PMO as part of the power system and politics
	Petit, Y. (2012)	PMOs deals with variability of objectives, priorities and relationships between project parties; constant change which requires continuous oversight and alignment
	Turner, J. R., Müller, R., & Geraldi, J. G. (2012)	Different kinds of project complexity; Complexity of faith (dealing with high uncertainty within projects), complexity of fact (structural complexity in projects) and complexity of interaction (relationship and organizational change).
	Aubry, M., Hobbs, B., Müller, R., & Blomquist, T. (2011)	PMO transition are caused by internal and external issues and events moderated by organizational context and change of PMO roles leading to increased project management and business performance and maturity
	Müller & Jugdev (2012)	Differentiation between success factors and success criteria; corporate and governance shifts due to new market expectations; subjectivity
Causes for reconfiguration	Aubry, M., Hobbs, B., & Thuillier, D. (2009)	Organizational tensions primarily drive PMO reconfiguration; organizational politics and power are of predominant importance
	Aubry, M., Hobbs, B., Müller, R., & Blomquist, T. (2010)	PMOs are embedded in host organizations exposed to constant changes and transitions; tensions with the host organization and the roles the PMOs
	Crawford, L. (2010)	PMOs are embedded in host organizations exposed to constant changes and transitions; tensions with the host organization and the roles the PMOs
	Hobbs, B., & Aubry, M. (2010)	PMOs work autonomously; Lack of PMO autonomy and PMO mandate may result in serious tensions
	Pellegrinelli, S., & Garagna, L. (2009)	PMOs are embedded in host organizations exposed to constant changes and transitions; tensions with the host organization and the roles the PMOs
	Aubry, M., Hobbs, B., Müller, R., & Blomquist, T. (2011)	PMOs work autonomously; PMO autonomy and PMO mandate may result in serious tensions
	Aubry, M. (2011)	Organizational tensions primarily drive PMO reconfiguration; organizational politics and power are of predominant importance
	Aubry, M., Müller, R., Hobbs, B., & Blomquist, T. (2010)	PMOs and their structures alternate between phases of tensions and relative stability

Cluster 3 2016-now Org. design		
Co-evolution	Bredillet, C., Tywoniak, S. & Tootoonchy, M., (2018)	Co-evolution of PMOs
Context of project-based organization	Miterev, M., Mancini, M., & Turner, R. (2016)	Organizations of PMOs as mostly project-based or project oriented organizations
	Müller, R., Zhai, L. & Wang, A., (2017)	Relationship between governance and success
	Gemünden, H.G., Lehner, P. & Kock, A. (2018)	Concept of the project-oriented organization consisting of the three segments values, structures, and people
	Clegg, S. et al. (2018)	Discusses new trends including various aspects of practice, including its discursivity, representation, dynamic capabilities, leadership and materiality.
	Bredillet, C., Tywoniak, S. & Tootoonchy, M. (2018)	Why and how do project management offices change - PMO and PFM co-evolve over time to adapt to organizational context influence
	Brunet, M., (2018)	Multilevel project governing
	Matinheikki, J. et al. (2016)	Identification of four activities and five network attributes that explain how inter-organizational network can be managed for value creation in the front-end of projects
Organizational design	Aubry, M. & Lavoie-Tremblay, M. (2017)	Organizational design as an ongoing process
	Simard, M., Aubry, M. & Laberge, D. (2018)	Conceptual framework that shows that governance, organizational design and governmentality are all essential to an understanding of projects
	Müller, R., Drouin, N. & Sankaran, S. (2018)	Model for Organizational Project Management
	Hepworth, A. et al. (2017)	Organisational structure that is more suitable to adopting ad- hoc approaches for project portfolio management

Cluster 4 2010-now Service-orientation		
Measurable outcomes	Aubry, Müller, et al. (2010)	Benefit of PMOs results in measurable results .g. project success, customer benefit
	Biedenbach & Müller (2012)	Evaluating performance requires definition of performance and its context
	Müller, Glückler, & Aubry (2013)	Consider innovative performance aspects e.g. slack, innovativeness, and ambidexterity of PMOs
	Patanakul (2015)	Project portfolio management performance; results in enhanced project visibility, transparency in portfolio decision making and predictability of project delivery
	Aubry & Brunet (2016)	Enhanced project and project management performance through governance framework (with the dimensions of efficiency, legitimacy and accountability)
	Martinsuo, M., Klakegg, O.J. & van Marrewijk, A. (2019)	Project success, therefore, cannot be assessed merely in terms of goals reached at the time of project completion but also in terms of benefits compared to costs and value achieved over the project lifecycle compared to original value expectations of various stakeholders.
PMO impact	Kutsch et al. (2015)	PMOs might not have a direct impact on project success; depends on satisfaction of its service users
PMO structure	Tsaturyan, T., & Müller, R. (2015)	Multiple networking PMOs require both formal (regulative) and informal (relational) networks, they require additional characteristics. PMOs act as loosely coupled systems “consisting of structural, procedural, relational and regulative dimensions”
	Monteiro, A., Santos, V., & Varajão, J. (2016)	47 different PMO types discovered