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A PMO Proposition for a Portuguese IT Project-Based Company

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Master in Information Systems Management

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TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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Resumo

Uma gestão de projetos de alta performance, conducente à obtenção de resultados e valor para o negócio é um objetivo para todas as organizações. Embora algumas delas se dotem de Project Management Offices (PMO) para atingir melhores resultados na gestão do seu portfolio, nem todas as organizações, mesmo *project based*, exploraram o potencial de um PMO para suportar a implementação da sua estratégia de negócio. Nesta dissertação, o caso de uma empresa portuguesa de IT , *project-based*, foi utilizado para explorar o papel de um PMO no amadurecimento da de gestão de projetos na empresa, através do desenvolvimento de um artefacto consistindo numa proposta de Modelo de PMO adaptado à realidade empresarial. A metodologia de Design Science Research foi selecionada e adaptada para incluir um *case study* numa fase de avaliação preliminar. Este estudo de caso teve como objetivo a identificação das necessidades organizacionais mais prementes e das funções de PMO mais valorizadas, de acordo com a liderança da organização, e serviu como *input* para o desenvolvimento do artefacto. O artefacto desenvolvido foi validado pelos principais *stakeholders* de gestão de projetos da organização, que consideraram que o modelo proposto tem o potencial para gerar valor acrescentado significativo para a empresa. Efectivamente, os participantes declararam um apoio quase unânime à sua potencial implementação. Pretende-se ajudar a desenhar uma visão para o futuro da gestão de projetos na organização, bem como fornecer contributos para outras empresas de IT *project-based* a operar em contextos semelhantes.

Palavras-Chave: Gestão de Projetos, *Project Management Offices*, IT PMO

Abstract

High-performance project management, leading to the achievement of results and value for the business, is a goal for all organizations. While some organizations establish Project Management Offices (PMO) to improve portfolio management results, not all organizations, even those project-based, have explored the potential of a PMO to support the implementation of their business strategy. In this dissertation, the case of a project-based Portuguese IT company was used to explore the role of a PMO in advancing project management capabilities, by the development of an artifact consisting of a custom PMO Model proposition. Design Science Research methodology was selected and adapted to include case study research in a preliminary evaluation stage. This case study targeted the identification of most pressing organizational needs and most valued PMO functions, according to the leadership of the organization, and has served as input to the artifact's development. The artifact developed was validated by key project management stakeholders in the organization, as having the potential to generate significant added value to the company. Participants finally declared almost unanimous support to its potential implementation. This study aims to help shape a vision for the future of project management in the organization, as well as to provide insights for other IT project-based firms operating in similar contexts.

Keywords: Project Management, Project Management Offices, IT PMO

Index

Tables Index

Figures Index

List of abbreviations

ACoE – Agile Center of Excellence

CHAOS - Comprehensive Human Appraisal for Originating Software

CFO – Chief Financial Officer

COO – Chief Operational Officer

CSR – Case Study Research

CTO – Chief Technology Officer

DEV PM – Software Development Project Managers

DSR – Design Science Research

DSRM – Design Science Research Methodology

EPMO – Enterprise Project Management Office

ExCom – Executive Committee

GDP – Gross Domestic Product

ICB 4.0 – Individual Competence Baseline 4.0

IPMA – International Project Management Association

P3O – Portfolio, Programme, and Project Offices

PM – Project Management

PMBOK – Project Management Body of Knowledge

PMI – Project Management Institute

PMO – Project Management Office

PMOGA – Project Management Office Global Alliance

PPMO – Portfolio/Project Management Office

PRINCE2 - PRojects IN Controlled Environments 2

ROI – Return On Investment

VDO – Value Delivery Office

Chapter 1 – Introduction

1.1. General Context

Change is a constant nowadays, and it has been forcing adaptations in lifestyles, economies, and in the way projects are managed to maximize value for organizations (Kerzner et al., 2022; PMI, 2021). In this context, the importance of projects in the global economy is increasingly undisputed. Projects are replacing operations as the economic engine of today, because of increasingly frequent organizational transformations, new and faster product development as well as adoption of new technologies (Nieto-Rodriguez, 2021).

Projects drive change (PMI, 2017). To take an organization from point A to point B, one will have to resort to projects that support its short, medium, and long-term strategic planning, allowing it to maintain the validity of its value proposition and ensuring its continuity. This is even more important in the case of project-based or project-oriented organizations, that structure their operational activities around customer delivery projects (Dietrich et al., 2010).

In summary, projects are important. Managing them correctly is crucial for companies. However, projects often fail. This can be observed through the systematic low success rate of projects reported by the Standish Group CHAOS reports. This report addresses only software development projects. In the 2018 version of the report, only 36% of completed projects achieved success (Prado & Correio, 2023). In the 2015 version of the report, the failure rates are shown to be relatively stable, as per Table 1.

Table 1 - CHAOS 2015 - Traditional Resolution for all Projects
Source: Standish Group, 2015

	2011	**2012**	**2013**	**2014**	**2015**
Successful	**39%**	**37%**	**41%**	**36%**	**36%**
Challenged	39%	46%	40%	47%	45%
Failed	22%	17%	19%	17%	19%

This reality is also reported in academic literature: Budzier and Flyvbjerg (2011) found that projects in the United States of America exceeded, on average, the estimated costs by about 27%, and one in six projects exceeded the original budget by 200%; Lee et al. (2014) argued that information system development projects notoriously had high failure

rates with as much as 35-40% of them experiencing some level of escalation (Keil et al., 2000); and Ham and Lee (2019) demonstrated that project complexity has increased and is associated with delays, higher costs, and a decline in user satisfaction.

The consolidation of project management methodologies in organizations, supported by the inclusion of Project Management Offices (PMO) in organizational structures, is one of the responses being experimented with by the community of practice to improve project performance and success (Joslin & Müller, 2015). A PMO consists of an organizational unit that supports project delivery (Hobbs & Aubry, 2007). It can do so by performing various functions, with different approaches, at different maturity levels (Pinto et al., 2010).

While some studies suggest a positive impact of PMO to organizational performance (Martin et al., 2007; Liu & Yetton, 2007; Aubry & Hobbs, 2011; Spalek, 2013; Linde & Steyn, 2016) not all organizations, even those that are project oriented or project-based, have implemented PMO (Dietrich et al., 2010). The reasons why this was never attempted, and how the typical PMO functions are being compensated in those organizations (if they are being performed at all), are valid questions.

The case of a Portuguese IT company was identified. This company currently lacks a PMO in its organizational structure but prioritizes project delivery as a fundamental aspect of its operations. As the company increasingly focuses on delivering projects to clients, it faces common project management issues. According to some studies, a PMO can be an important factor in advancing project management capabilities and contributing to organizational performance. Therefore, the goal of this study is to identify the best PMO design to address the company's current needs and challenges. We will gather insights from senior and mid-level leadership to determine whether a PMO would be suitable for the company and which PMO design would best address the most pressing internal project management challenges.

1.2.Motivation and topic relevance

In the study on the global population of PMO by Hobbs and Aubry (2007), a notable finding highlighted the extensive variability and inherent complexity within the PMO phenomenon. PMO come in diverse forms, differing in scope, functions, maturity, organizational location, and nomenclature.

Reaching consensus regarding PMO both in the academy and in the community of practice has proven difficult. Practitioners advocate for PMO implementation through

"how-to" guides, claiming it is a best practice, but several studies do not seem to fully support that conclusion. Martin et al. (2007) found a positive effect of PMO presence in project performance, but only in the cost dimension. Schedule and quality dimensions were not significantly correlated with PMO presence. Ward and Daniel (2013) found that PMO presence correlated negatively with IT senior leadership satisfaction. Lundqvist (2017) found that only a small subset of project management best practices correlated significantly with PMO presence.

However, there are studies that suggest a positive impact of either the PMO or PMO functions on project performance, in the organizations that host them. Dai and Wells, (2004) demonstrated that standardization of project management processes correlated positively with increased project performance. Prado and Correio (2023) confirmed that higher-responsibility PMO correlated positively with medium-term business success.

A PMO proposition tailored to the organization's needs, as voiced by its leadership, could advance project management capabilities and support the company's overall business strategy. This serves as the motivation behind the study.

Additionally, research on this topic in the national context is scarce. Given that this case involves a well-established IT company it could help illustrate the topic within our domestic context. Ideally, this study will provide insights for the company in question and other companies grappling with similar issues, aiding them in their journey toward high-performing and mature project management.

1.3.Questions and research goals

This research will focus on the case of a project-based technology company headquartered in Portugal, with a subsidiary in the United States of America. It is part of a well-renowned group in the domestic market, with a combined operational revenue of several hundred million USD.

The selected company itself is a medium-sized technology provider, with approximately 150 to 200 employees. It has been in business for several decades, delivering systems to both Portuguese and international corporate clients. While Portuguese clients have traditionally represented most of its business, the company has been increasingly strengthening its international client portfolio since 2017. The number of projects, as well as its annual revenue, have been rising. The latter is currently in the tens of millions of USD.

To deal with the increase in number/size of projects, the company began transitioning into a project-based organizational structure (Hobday, 2000), resembling a specific type of project-based company – a project contractor firm. These organizations deliver systems, services and solutions to clients (internal or external), through projects (Dietrich et al., 2010).

Currently, the company does not possess a PMO. We will, after careful consideration of the professionals' views, develop an artifact constituted by a PMO model proposition tailored to the company's requirements and internal stakeholders' needs. Subsequently, we will evaluate the perceptions of employees regarding the PMO artifact put forth.

Research Question 1 - "What should be the functions performed by an IT PMO in this particular project-based IT firm?"
Research Question 2 – "To what level can this IT PMO be an important tool to advance project management in this project-based IT firm?"
Research Function - The research objectives are:

Primary Objective

OBJ 1 - To develop a PMO model proposition with setup recommendations that addresses stakeholders' needs, based on gathered insights and direct observation.

Secondary Objectives

OBJ 2 – To verify if a favourable view of PMO and its functions exist in the company.
OBJ 3 – To examine the importance attributed by professionals in the company to each of the various functions a PMO could typically perform.
OBJ 4 – To determine if the proposed PMO Model would, according to its employees, be able to generate enough value to help the company in its current challenges.
OBJ 5 – To assess organizational context inclination for the creation of such a PMO.

1.4. Brief Description of Methodologic approach

The selected methodology for this study is the Design Science Research Methodology (DSRM) (Peffers et al., 2007), adapted to include a case study in a preliminary evaluation stage (Costa et al., 2016). Design Science Research (DSR) is a widely recognized research paradigm within the Information Systems (IS) field (Costa et al., 2016). At its essence, DSRM focuses on creating an artifact aimed at addressing real-world problems. It is thus, consistent with the applied nature of Information Systems' practice (Peffers et al., 2007).

In this study, we will develop an artifact consisting of a PMO model proposition designed to help the company (solution) address project management challenges during this period of portfolio growth and organizational projectification (identified problem). The methodology will be detailed in a dedicated chapter.

1.5.Structure and organization of dissertation

This dissertation is organized according to the below building blocks.

Chapter 2 - Literature Review: Defines PMO and offers a historical perspective on PMO. Discusses the phenomenon in the community of practice, as well as academic research on the topic. Describes several PMO classifications, functions, typologies, and maturity models of PMO. Explores the relationship between PMO and project outcomes and ways to measure PMO contribution.

Chapter 3 - Research Methodology: Details the methodology adopted for the research, including description of the process used in the systematic literature review and multi-focal literature review and the case study protocol in the *ex-ante* stage.

Chapter 4 - Objectives and *Ex-ante* Evaluation stage: describes the case study research results obtained during the *ex-ante* evaluation stage, targeting the identification of pressing business needs and the evaluation of the importance perceived for every typical PMO function by the company's professionals.

Chapter 5 - Artifact Presentation and Validation Results: Introduces the developed PMO model proposition tailored to the needs of the technology company. Describes results obtained in the ex-post evaluation questionnaire, after the artifact was presented to the study's participants for feedback gathering.

Chapter 6 - Conclusions and Future Studies: Summarizes the key findings and implications. Identifies limitations of the study and suggests avenues for future research in the field.

Chapter 2 – Literature Review

2.1. PMO historical perspective and definition

The concept of PMO has evolved significantly throughout the years, with the progressive realization that practices and functions expected to be performed by the PMO are as varied as the industries and even companies in which they operate (Darling & Whitty, 2016).

Darling and Whitty (2016) have performed an extensive literature review (academic and non-academic literature) aimed at uncovering the documented and undocumented history of the PMO. They have demonstrated that single-project/program PMO have been in existence since the 1800s (mainly in government -led civil infrastructure projects) but have only evolved to become somewhat similar to current day PMO in the 1950s, in very specific public industries, namely space and aerospace.

The software development PMO was first discussed in the early 1980's (Darling & Whitty, 2016) but it was only in the 1990s that PMO gained popularity in the public and private sectors, with business books being increasingly published on the matter.

The academic community took long to address the phenomenon, with the first PhD thesis on PMO, by Christine Dai of George Washington University, being published only in 2002. It was only in 2005 that software development and broader IT field adopted PMO (Darling & Whitty, 2016). Therefore, PMO in the IT field have a history of *circa* 20 years.

PMO definitions were initially provided in business and practice-oriented books (Kerzner, 1992, 1995, 2003; Crawford, 2002). The academic community later incorporated and referenced these books in PMO-related studies (Martin et al., 2007; Liu & Yetton, 2007). With the popularisation of PMO, PMI began offering a PMO definition in the PMBOK Guides (2004). From then on, academics commonly referenced it in studies, alone or in conjunction with others (Aubry et al., 2007; Hobbs & Aubry, 2008; Singh et al., 2009).

In Table 2, we observe a sample of academic studies conducted from 2007 to 2022, along with the PMO definitions adopted or referenced by these researchers. This literature review reveals that commonly referenced definitions stem from the community of practice, particularly from the PMI. Consequently, the PMI's definitions appear to be the most respected and widely adopted.

Table 2 – PMO Definitions adopted by academic researchers (2007-2022)

		Crawford, 2002	**Kerzner, 1992, 2003**	**PMI -PMBOK (2004 and 2008)**	**PMI -PMBOK (2013, 2015 and 2017)**
		An organisational structure established to facilitate PM activities and bring improvements to the organisation's management by managing the portfolio and aligning projects with corporate strategy (Barbalho, 2020).	Formal, centralized layer of control between senior Management and PM (Liu & Yetton, 2007; Martin et al., 2007).	An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain.	A project management office (PMO) is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques.
Martin et al.	2007		X		
Liu & Yetton	2007		X		
Aubry et al.	2007			X	
Hobbs & Aubry	2008			X	
Singh et al.	2009			X	
Spelta & Albertin	2012		X		
Pemsel & Wiewora	2013		X		
Aubry	2015			X	
Jalal & Koosha	2015				X
Aubry & Brunet	2016			X	
Bredillet et al.	2018				X
Barbalho et al.	2019				X
Paton & Andrew	2019				X
Barbalho	2020	X			X
Ershadi et al.	2021				X
Mahair & Pun	2022				X

The PMO definition used by Martin et al. (2007) and Liu and Yetton (2007) and later by Spelta and Albertin (2012) and Pemsel and Wiewora (2013) is reminiscent of Kerzner (2003), incorporating several key dimensions: formalization, centralization, control and a focus on senior management. Crawford (2002) definition focuses on the strategic vocation of PMO as its ultimate *raison d'être*. However, organizational reality is much more diverse (Aubry & Brunet, 2016). PMO can be formal or less formal arrangements (Artto et al., 2011), may privilege a supportive approach versus a controlling one, may have operational and tactical functions if the organizational reality calls for it (Pinto et al., 2010). Also, while senior management is an important stakeholder for PMO, it is not the only one (Hans & Mnkandla, 2022).

PMI (2004, 2008) definitions are broader, allowing them to encompass empirical organizational diversity and complexity. In 2013, with the 5th edition, PMI's definition began equating PMO with the standardization function of PM methodologies. Hobbs and Aubry (2007) described this as a conceptual "trap," and Aubry and Brunet (2016) criticized this shift, continuing to use the 4th edition's PMO definition even after the 5th edition (2013) was published. It is indeed possible that PMO do not perform standardization functions.

For a phenomenon as diverse as PMO, definitions can be flawed. Regardless, studies have consistently referenced PMI's definition in recent years, as per Table 2, which is why we will adopt it in this study as well. A PMO consists of an organizational unit that standardizes project-related processes and acts as a facilitator for the sharing of resources, tools, methodologies, and techniques (PMI, 2021).

2.2.The PMO in the Community of Practice

PRINCE 2 (CCTA, 1996), a PM standard originating from the UK Office of Government Commerce, was the first major professional project management standard to mention PMO. It did so only briefly and in the form of Project Support Offices. These project support offices were mostly transient in nature and dedicated to operational tasks.

The same institution, in 2008, published the P3O - Portfolio, Programme and Project Offices Best Practice. This framework was revised in 2013, after Axelos acquired the PRINCE 2 brand from the UK Government (Axelos, 2013). The framework claims to provide a best-in-class model of support and decision-enablement for organizational business change. This model is supported by structures - PMO, in essence, or P3O, according to the framework. Best practices for design, implementation and operation of P3O are provided.

The International Project Management Association, IPMA, is the oldest professional PM association (1965). However, only in 2023 did it provide a PMO Reference guide in the context of its competence-based standard (IPMA, 2023).

We have not found solid references to these frameworks, nor have we been able to find empirical validation of the models in academic research (Darling & Whitty, 2016). PMI and PMBOK have however, as shown, been referenced directly plentifully.

The first edition of the Guide to the Project Management Body of Knowledge, published by the PMI in 1996, does not mention the PMO concept. Upon analysis, the evolution of the approach to the PMO concept and role in the PMBOK Guides published

by PMI mirrors the road that both academic and professional communities have travelled in their understanding of the phenomenon, as we can see from the Table 3.

Table 3 – Evolution of PMO treatment in PMBOK Guides

Edition	Year	Definition	PMO Types	Main Differences between Versions	Other PMO Mentions
PMBOK First Edition	1996	Not provided	Not provided	Not Mentioned	Not Applicable
PMBOK Second Edition	2000	Not provided	Not provided	The Project Office is explicitly mentioned for the first time in the Preface that describes the updates to the precedent PMBOK Guide. A sub-Section 2.3.4 within Organizational Influences chapter is created to briefly address the phenomenon. The diversity of PMO is briefly recognized: "(...)There is a range of uses for what constitutes a project office (...)".	Not Applicable
PMBOK Third Edition	2004	A project management office is an organizational unit to centralize and coordinate the management of projects under its domain. (…) A PMO oversees the management of projects, programs, or a combination of both. (…)	Not Provided	Wording is expanded and now includes a list of non-exhaustive 10 PMO key features. Includes wording on differences between PM and PMO perspective.	PMO is also mentioned in Stakeholder management chapter.
PMBOK Fourth Edition	2008	A project management office is an organizational body or entity assigned various responsibilities related to the centralized or coordinated management of those projects under its domain. (…) The responsibilities can range from providing project management support functions to actually being responsible for the direct management of a project. (...) **the specific form, function and structure of a PMO is dependent upon the needs of the organization that it supports.**	Not provided	Section 2.3.4 eliminated. PMO wording is moved to Introduction Chapter. Diversity and plasticity of PMO phenomenon, including its form, function and structure, is formally recognized for the first time. Reference to PMO key features disappears, replaced by potential ways to support Project management. Also includes wording on differences between PM and PMO perspective.	PMO is also mentioned in the Stakeholder Management chapter and Integration management chapter.
PMBOK Fifth Edition	2013	A project management office (PMO) is a management structure that **standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and**	Yes **Supportive Controlling Directive**	PMO wording remains in Introduction chapter (1.4.4.). PMO concept is reviewed to include a reference to standardization of project-	Also mentioned in Project Governance Chapter, Integration management (tools) and Communications management

		techniques. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of one or more projects. (...) **the specific form, function, and structure of a PMO is dependent upon the needs of the organization that it supports.**		related processes and facilitation of resources, methodologies, tools and techniques. PMO types, Supportive, Controlling and Directive are introduced in the document.	
PMBOK Sixth Edition	2017	PMO definition from 5th Edition is maintained.	Yes **Supportive** **Controlling** **Directive**	PMO wording is moved from Chapter 1 - Introduction, to Chapter 2 - The environment in which Projects operate. The content of this section was significantly re-written, but the wording related to PMO (2.4.4.3.) remains relatively unchanged. Wording on the differences between PM and PMO perspectives is removed.	Mentioned in Organization Process Assets Section (2.3.) Project Manager's Sphere of Influence (3.3) Integrations Management Chapter Quality Management Chapter Stakeholder Management Chapter Initiating Process Group Project Success and Benefits Management (1.1)
PMBOK Seventh Edition	2021	The project management office (PMO) represents a management structure that standardizes project-related governance processes and facilitates the sharing of resources, tools, methodologies, and techniques. Recognizing that the character and function of a PMO varies between organizations, and even within the same organization, this appendix outlines common attributes among PMO and discusses how PMO support project work.	Yes **EPMO** **PMO** **ACoE** **VDO**	Appendix X3 created, more mentions of PMO in the document than ever. Wording on PMO is significantly re-written, with a focus on value generation and the contribution to the achievement of business outcomes. **Introduced the concept "PMO Value Proposition".** Previous types of PMO are erased from the document. Introduced concepts of: - EPMO - Enterprise PMO - ACoE - Agile Center of Excelence - VDO - Value Delivery office	Reinforcing the link to organizational needs, introducing aspects of PMO evolution and layering, Key PMO capabilities and ways that PMO can support project work.

Through the analysis of Table 3, we can observe that:

- The Project Office was only acknowledged in the Second Edition of the standard (2000), but no definition was offered. A definition is introduced in the Third Edition of the standard (2004), however, it is fairly prescriptive. In fact, according to this definition, a PMO would necessarily oversee the management of projects and programs in an organization, and would observe some key features, that are described in the document.

- In the Fourth Edition of the standard (2008), after the research on the PMO phenomenon had advanced, the diversity of PMO is formally recognised. This is consistent with the results of a study on the global population of PMO carried out by Hobbs and Aubry in 2007, that was also partly funded by the PMI. The reference to PMO key features disappears.
- In the Fifth Edition of the standard (2013), the categorization of PMO into three different types (Supportive, Controlling and Directive) is introduced, and the PMO definition is reviewed. The PMO is then seen as an organization unit at the service of the standardization of project management related processes and facilitation of project management resources, including methodologies, tools and techniques. References to PMO also appear throughout the document. In the Sixth Edition (2017), the wording related to PMO is relatively unchanged, but more mentions to PMO appear.
- In the Seventh and current edition (2021), the document has been totally re-written, going from process-based to principles-based. It is much shorter than the previous version of the standard, however the wording related to PMO is expanded (with a dedicated Appendix X3), and there are more references to PMO than ever. References to the role of PMO in flatter structures, agility-driven, appear. Several new concepts are introduced, such as the PMO Value Proposition (Letavec, 2007), with a focus on value generation and contributions to the achievement of business outcomes. It is stated that the PMO Value Proposition should be defined based on concrete organizational needs identified and is a promise of value to be delivered to the stakeholders. It is against that promise that PMO should be evaluated, based on the value they are able to generate for their respective organizations.

Another clear indication of growing PMO acknowledgment by the PMI is the recent acquisition, in 2023, of the PMO professional association, the PMO Global Alliance (PMOGA), by the PMI[1].

2.3. The PMO in Academic Research

The landmark in the understanding of PMO appears to be the study on the global population of PMO conducted by Hobbs and Aubry (2007), that was later consolidated in a book (Hobbs & Aubry, 2010). In this study, a notable finding highlighted the extensive variability and inherent complexity within the PMO phenomenon. Indeed, PMO come in diverse forms, differing in scope, functions, maturity, organizational

[1] According to https://www.pmoga.world/acquisiton

location, and nomenclature. The study emphasized that despite the community of practice expressing a desire for it, consolidating a 'best practices standard' akin to the PMBOK guide for PMO proved unfeasible. This challenge arose from the understanding that the best practices are contingent upon what is deemed relevant and useful within the unique context of each organization. In essence, the legitimacy and survival of PMO are intricately linked to the value they bring to their respective organizations.

Because of their nature, the PMO have been referred to in literature as “troublesome”, precisely because, since they vary so much in form and function, their impact and performance is difficult to measure with precision, which makes it difficult to justify the investment they require (Darling & Whitty, 2016). In Hobbs and Aubry (2007) earlier study, a whopping 42% of all PMO surveyed was reported to have its relevance or existence seriously questioned in recent years, with the authors indicating that the reality of PMO in organizations would probably be even worse, due to the positive bias of the respondents. In other words, there is difficulty reaching consensus regarding PMO both in the academy and in the community of practice.

However, there are studies that suggest a positive impact of either the PMO or PMO functions on project and organizational performance, in the organizations that host them.

Dai and Wells (2004) particularly, show mixed results regarding the impact of PMO on project performance. The study clearly shows that standardization of project management processes correlated positively in the sample with increased project performance. Similar results, although not as substantial, were observed with the keeping project archives and providing project management training. All of these are PMO typical functions, and as such, the study argues that this can be interpreted as “PMO presence”. In the study, project performance in organizations with and without PMO was also analysed. Project performance was higher in organizations with PMO, but only very slightly, which was not enough for statistical significance. Nonetheless, the study argues that PMO contributes to project performance, even if indirectly.

Unger et al. (2012) quantitatively analysed PPMO (Portfolio-Project Management Offices) in 278 portfolios and discovered a substantial positive effect of PPMO coordinating and controlling roles on performance in terms of project portfolio management quality, which they argued had been demonstrated to be a predictor of portfolio success (Jonas et al., 2010). Project portfolio management quality encompasses the dimensions of information quality, resource allocation quality and (cross-project) cooperation quality.

Prado and Correio (2023), in a study conducted with 100 big (more than 500 employees) private Brazilian companies, have successfully confirmed one of their research hypotheses: “Companies with a PMO entrusted with a higher level of responsibility achieve medium-term success more frequently”. These PMO had governance and portfolio management related responsibilities, and the study thus concluded that these functions contributed to higher chances of project success.

Linde and Steyn (2016) presented a case study to determine the effect of a recently established PMO on project and organizational performance and concluded that it had a dramatic effect on organizational project management maturity as well as a very positive effect on metrics such as capital spending accuracy, indicative of an improved ability of the company to execute its projects.

In the IT industry especially, there are some studies that seem to advocate for the benefits of establishing PMO. Despite the lack of empirical evidence to support the benefits of PMO creation, Liu and Yetton (2007) conclude that deploying PMO could have significant impact on project performance if one is operating in high uncertainty environments, such as IT, since several PMO functions facilitate cross-project learning.

In a study encompassing testimonies from 40 major private Brazilian companies, including 32 CIOs (Spelta & Albertin, 2012), almost all the 20 companies that declared having an IT PMO disagreed with the statement that they were considering terminating their IT PMO. In this study, the variables “(Dis)satisfaction with control over the portfolio” and “Favourable views of PMO” correlated significantly with a favourable context for the setup of IT PMO. This appears to indicate that the perception of lack of control over the company’s portfolio sets the ground for a favourable context to set up an IT PMO with positive outcomes.

In the opposite sense, Lundqvist (2017) examined the IT public sector landscape in Sweden and concluded that IT PMO did not appear to be as important after all for Swedish public authorities, when carrying out successful IT projects, as the existence of a PMO correlated only (medium strength correlation in Cohen’s scale) with 8 out of the 71 variables that represented good project management practices. As such, the author concludes that PMO cannot be seen as a miraculous remedy to fix every problem related to project management, and that it is important not to make decisions based on an overestimation of PMO’s impact.

Ward and Daniel (2013) had previously found that, despite PMO involvement at the beginning and end of the project lifecycle being associated with project success and

stakeholder satisfaction, PMO presence had a negative effect on senior management satisfaction levels. This was attributed to the decreased tolerance for project shortcomings when the company had invested in the establishment of a PMO, and to the greater awareness of project issues as the PMO provided more information, more frequently, throughout the project lifecycle.

Notwithstanding the array of authors quoted, a real theoretical foundation for PMO performance cannot yet be provided by the current project management literature (Darling & Whitty, 2016).

Indeed, there are two ways by which researchers have traditionally approached the demonstration of PMO performance and project management value (Aubry & Hobbs, 2011): the economic way and the pragmatic way.

In the first, researchers try to demonstrate PMO contributions impact to the project baselines (time, cost and scope), or the iron triangle. This line of research has, so far, produced inconclusive results, and rests on the concept of Return on Investment (ROI). This approach also ignores other non-financial contributions of project management and PMO to the organizations (such as innovation or reinforced transparency/control), as per Aubry and Hobbs (2011).

In the second, pragmatic approach, authors attempt to correlate PMO and project management in general to success factors to the projects' and the companies' bottom lines. Success factors refer to conditions that, if met, contribute to positive outcomes. This is the approach behind Unger et al. (2012) study. The results obtained are also not sufficiently conclusive (Aubry & Hobbs, 2011; Darling & Whitty, 2016).

Aubry and Hobbs (2011) identified three main factors that influence PMO performance: the competency of the PMO staff and how it is recognised by the organization, the level of embeddedness in the organization, and how much the PMO mission statement is advertised within the company.

In their 2011 study, to evaluate PMO contribution to organizational performance, they propose a framework inspired by Quinn and Rohrbaugh's Competing values framework. This framework rests on the assumption that there are competing tensions within every organization, as needs, values and perceptions are stakeholder-specific, and can sometimes be paradoxical. The authors then developed a framework composed of three dimensions: the structure dimension (paradox between flexibility and control); the focus dimension (paradox between internal and external focus) and the purpose and orientation dimension. Aubry and Hobbs did not employ this last dimension in their study.

These dimensions formed sets of values that reflect the opposing views of stakeholders and the tensions at play in the organizations. According to the position in the dimension axis (preference for flexibility or control, for example), different performance indicators will be elicited. Thus, the evaluation of PMO performance would depend on the values/preferences of those evaluating it. The figure 1 illustrates the framework.

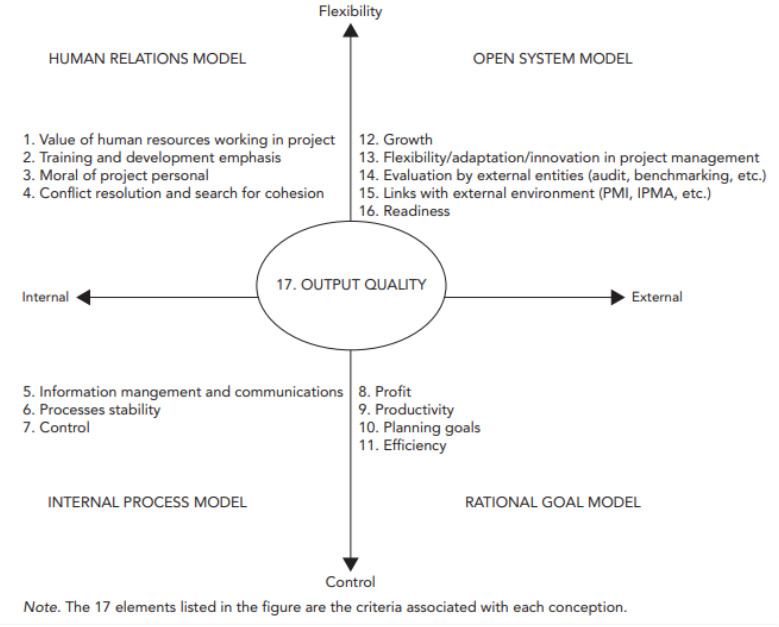

Figure 1 - Models of Org. Performance and its criteria, according to the Competing Values Framework

Source: Aubry and Hobbs (2011)

As per the Figure 1, the two axes (structure and focus dimensions), when intersected, prompted the identification of four organizational performance conceptions:

Rational Goals and Efficiency conception: focus on economic value, profitability, ROI.

Open systems and effectiveness conception: focus on growth, innovation and project effectiveness.

Human Relations conception: focus on development of human resources, cohesion, staff turnover and motivation.

Internal Processes conception: focus on internal process maturity, knowledge management processes and standard methodologies.

This framework was validated through the application to four different PMO coming from different geographies and backgrounds, and results overall confirmed perceived positive contribution of PMO to organizational performance.

The main bottom line is that performance is a subjective construct and must be examined from several viewpoints. Organizational complexity is too great to be encapsulated in straightforward positivist approaches (Aubry & Hobbs, 2011).

Globally, the notion of "fit" between relevant stakeholders' needs and the PMO contribution proves crucial to determining the PMO configuration and to evaluate its contributions in modern day organizations.

2.4. PMO typologies

The diversity of the PMO phenomenon makes the creation of typologies to describe it a challenging endeavour (Pinto et al., 2010). Any typology or model is essentially a way to simplify and reduce organizational complexity, to support both research and practice (Monteiro et al., 2016). With such a diverse phenomenon, typologies risk not being empirically grounded (Hobbs & Aubry, 2008).

This, however, has not stopped literature from making multiple attempts at theoretically typifying PMO. Monteiro et al. (2016), in a literature review aimed at gathering PMO models, have identified as many as 47 different PMO models, that were then narrowed down to 25 unique model names. Models proposed can pertain to scope, location in company structure, functions performed, decision power or level of competency/maturity in PMO functions.

Below are a few theoretical PMO classifications, useful for the understanding of the artifact, later in the study:

Single /Multi-project (Hobbs & Aubry, 2007; Pinto et al., 2010): A project/program PMO could be established to attend only to the operational needs of a single project/program and is temporary in nature; versus a multi-project PMO of a permanent nature, that attends to a larger scope, associated to a department, Business Unit, or even the whole company. Hobbs and Aubry (2007) focused only multi-project PMO.

Project/program, Department (or Business Unit), and corporate or Enterprise PMO (Pinto et al., 2010): Depending on whether it covers a single project/program, projects/programs inside a specific department, or the whole company. Gartner (2008) has also proposed the Federated PMO, consisting of a corporate PMO and several Unit/Division PMO that share responsibilities.

Strategic, Tactical or Operational (Pinto et al., 2010): depending on the nature of functions performed according to their classification. Hobbs and Aubry (2007) identified 27 typical PMO functions, that can be either strategic, tactical, or operational in nature. Strategic functions involve providing services that support strategic vision or have a connection to strategic issues of the organization (portfolio management, project selection…); tactical functions involve providing services that cater to the needs of

specific groups of projects or individuals (providing PM tools, training functions…) and operational functions involve offering services directed at a single project/program (supporting project planning, project recovery…). As PMO are very complex in nature, some PMO will contain a blend of functions possibly from all three types, and some from only one type, depending on the organizational reality. Some PMO Models proposed in literature identify PMO types in reference to one or more of the possible PMO functions performed: Project Repository PMO and Project Coaching PMO (Kendall & Rollins, 2003), Knowledge Management PMO (Desouza & Evaristo, 2006; Letavec, 2006) or Standards PMO (Letavec, 2006).

Supportive, Controlling and Directive (PMI, 2017): until recently, PMI offered a classification based on approach and decision power. Supportive PMO have little decision power and play a consultative role. Controlling PMO also support teams but require compliance to methodologies, tools, framework, governance, etc., and have moderate decision power. Directive PMO are directly responsible for projects and have high decision power.

Basic, Intermediate or Advanced (Pinto et al., 2010) **or Basic, Standard, Advanced or Center of Excellence** (Hill, 2008): these classifications pertain to the maturity associated to what and how functions are performed. In literature, some functions are associated to a more mature PMO, typically the strategic ones (Garfein, 2005). This logic is contested by Pinto et al. (2010) that propose maturity levels per selected function. Meaning, we could have a mature PMO that deals only with operational functions, if that corresponds to the needs of the organization.

While typologies provide useful tools for understanding PMO, it is important to note that in Hobbs and Aubry (2007), most typologies did not systematically correlate with different PMO characteristics when tested against empirical data from 500 PMO worldwide. For instance, PMO in different positions within organizational structures did not show consistent differences, considering the contextual variables at the organizational level or the structural attributes of the PMO themselves (Hobbs & Aubry, 2008).

2.5. PMO Functions & its classification

PMO perform a multitude of functions as part of their organizational mandate. Dai and Wells (2004), in their innovative study, reported that a standard set of PMO functions could not be agreed upon at the time. They identified six functions through a literature review: developing and maintaining PM standards and methods; maintaining project

historical archives; providing project administrative support; offering HR assistance; and providing PM consulting, mentoring, and training. In 2004, PMI identified ten non-exhaustive key PMO features, including resource management, inter-project coordination, methodology standardization, information repository management, monitoring and control, communication management, and training functions. Desouza and Evaristo (2006) identified two archetypes: administrative and knowledge intensive.

Hobbs and Aubry (2010) were pioneers in identifying an empirically validated list of 27 typical functions that PMO can perform within their host organizations. This list was achieved through progressive elaboration. An initial, smaller version of the list, constructed based on literature review and an investigation into a smaller sample of PMO, was presented to the respondents, from 500 different PMO. They were then asked if the PMO executed other functions or played other roles in their organization. After some iterations, the authors settled on a list of 27 functions, that was deemed complete by a large number of respondents (Hobbs & Aubry, 2010).

The respondents were asked to classify all 27 functions on a scale of importance for their organizations' PMO, going from 1- Not Important at all to 5 – Very Important.

Table 4 presents all functions and the percentage of PMO that ranked the function as "Important" (scoring at least 3.5 in a scale of 1 to 5, in average), in decreasing order.

Table 4 – PMO Functions in decreasing order of importance
Source: Hobbs and Aubry (2010)

#	PMO Function	% PMO rated function important
1	Report project status to upper management	83%
2	Develop and implement a standard methodology	76%
3	Monitor and control project performance	65%
4	Develop competency of personnel, including training	65%
5	Implement and operate a project information system	60%
6	Provide advice to upper management	60%
7	Coordinate between projects	59%
8	Develop and maintain a project scoreboard	58%
9	Promote project management within organization	55%
10	Monitor and control performance of PMO	50%
11	Participate in strategic planning	49%
12	Provide mentoring to project managers	49%
13	Manage one or more portfolios	49%
14	Identify, select, and prioritize new projects	48%
15	Manage archives of project documentation	48%
16	Manage one or more programs	48%
17	Conduct project audits	45%
18	Provide interface between management and customer	45%

19	Provide a set of tools without an effort to standardize	42%
20	Execute specialized tasks for project managers	42%
21	Allocate resources between projects	40%
22	Conduct post-project reviews	38%
23	Implement and manage database of lessons learned	34%
24	Implement and manage risk database	29%
25	Manage benefits	28%
26	Provide networking and environmental scanning	25%
27	Recruit, select and evaluate project managers	22%

Hobbs and Aubry argue that PMO are logically often associated with the functions that are more commonly performed or collectively perceived as more important. However, as all functions are considered important for a significant portion of PMO, this is yet another testimony to how reductionist that view is, and how varied the reality of functions and roles performed by PMO is in the real world.

Hobbs and Aubry (2010) also demonstrated that functions were related to each other, both logically and statistically, in clusters of functions, and could then be grouped. Meaning, if a PMO fulfilled one of the roles in the group, one could reasonably expect that it would perform some or all the remaining functions in the group.

Table 5 illustrates the groups of functions (Hobbs & Aubry, 2010), categorized as operational, tactical or strategic (Pinto et al., 2010).

Table 5 – PMO Functions Groups and Classifications
Source: Hobbs and Aubry, 2010 and Pinto et al., 2010

Hobbs and Aubry (2010)		**Pinto et al. (2010)**
Group 1	**Monitoring and controlling project performance**	**Classification**
	Report project status to upper management	Operational
	Monitor and control project performance	Operational
	Implement and operate a project information system	Tactical
	Develop and maintain a project scoreboard	Strategic
Group 2	**Development of PM competencies and methodologies**	**Classification**
	Develop and implement a standard methodology	Strategic
	Promote project management within organization	Strategic
	Develop competency of personnel, including training	Tactical
	Provide mentoring to project managers	Operational
	Provide a set of tools without an effort to standardize	Tactical
Group 3	**Multi-Project Management**	**Classification**
	Coordinate between projects	Strategic
	Identify, select, and prioritize new projects	Strategic
	Manage one or more portfolios	Strategic
	Manage one or more programs	Operational
	Allocate resources between projects	Tactical
Group 4	**Strategic Management**	**Classification**

	Provide advice to upper management	Strategic
	Participate in strategic planning	Strategic
	Manage benefits	Strategic
	Provide networking and environmental scanning	Strategic
Group 5	**Organizational Learning**	**Classification**
	Monitor and control performance of PMO	Strategic
	Manage archives of project documentation	Operational
	Conduct post-project reviews	Operational
	Conduct project audits	Operational
	Implement and manage database of lessons learned	Tactical
	Implement and manage risk database	Tactical
No Group		**Classification**
	Execute specialized tasks for project managers	Operational
	Provide interface between management and customer	Tactical
	Recruit, select and evaluate project managers	Tactical

There were three functions that did not correlate significantly with any of the five groups identified: execute specialized tasks for project managers, manage customers interfaces and recruit, select and evaluate project managers.

Strategic functions involve providing services that support the strategic vision or address strategic issues of the organization, such as portfolio management and project selection. Tactical functions cater to the needs of specific groups of projects or individuals, like offering PM tools and training. Operational functions focus on services for single projects or programs, like supporting project planning and project recovery (Desouza & Evaristo, 2006; Pinto et al., 2010).

These functions, as well as the respective groups, are constructs that have been validated in multiple subsequent studies by the authors and have been referenced by other authors to this day (Barbalho, 2020; Hans & Mnkandla, 2022). They have also served as a basis for other studies, specifically, Pinto et al. (2010) PMO maturity model proposal, which will be addressed in the next chapter.

Apart from the Strategic Management group, all other groups include a mix of operational, tactical, and strategic functions. This further illustrates that PMO cannot be neatly categorized into rigid conceptual boxes. PMO likely execute a diverse array of functions under a single organizational mandate.

Moreover, one would assume that, if a PMO scope covers a large portion of a company's projects (typically, Enterprise or Corporate PMO), there would be a natural tendency to believe this PMO would perform mostly strategic functions. Yet, organizational reality, as demonstrated, is much more complex.

There is also a tendency in literature to assume that strategic functions indicate a more mature PMO, and that operational functions reflect a less mature or less advanced PMO (Hill, 2008; Garfein, 2005). However, the PMO is essentially a service provider. Its legitimacy and (even) survival are tied to the value it can generate for its clients. As such, the blend of functions performed by each PMO is unique and should cater to the needs/wants required by its clients.

2.6.PMO Maturity models – a brief overview

PMO maturity is a field where the community of practice has been the source of maturity models proposed without substantiated peer-reviewed studies, grounded in previous academic work (Darling & Whitty, 2016). In 2021, the PMI worked with PricewaterhouseCoopers, to develop the Global PMO Maturity Index (PMI & PwC, 2021). According to PwC, this was based on a survey of 4000 project management professionals, of which 2500 worked in organizations with established PMO. A cohort of 230 PMO deemed to be the "Top 10 Percent" was identified, after the analysis of five dimensions: governance, integration and alignment, processes, technology and data and people. Substantiation of how these dimensions and associated criteria were identified, and why these PMO are the top 10 percent was not adequately provided. It is not demonstrated how higher levels of maturity in those functions drive business outcomes in the respective organizations. Also, strategic functions are systematically associated to more advanced PMO (or top PMO, as phrased by the report). Most of the Top 10 Percent PMO are declared to be Enterprise PMO with strategic functions. Global PMO maturity is deemed to be of 61.4 points in 100 (PMI & PwC, 2021). Judging all PMO in the world by one measure is a bold aspiration, with the phenomenon being as diverse as it is.

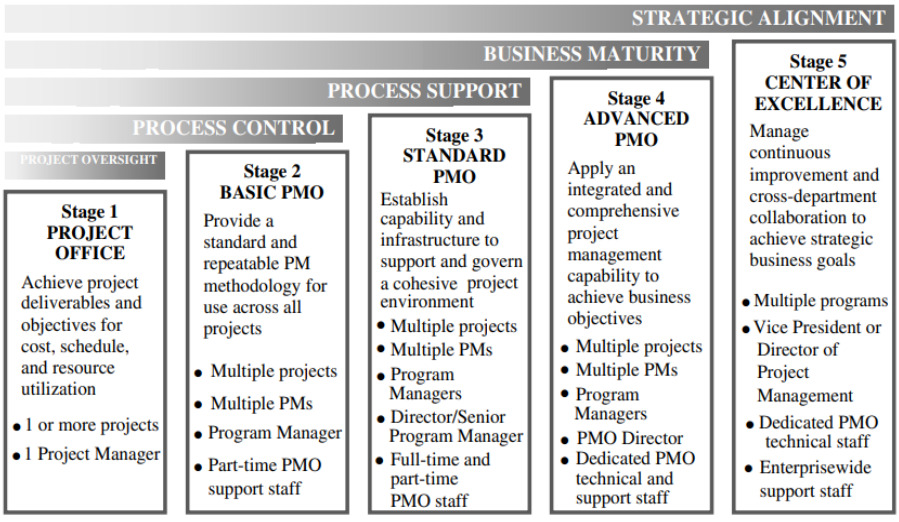

Figure 2 - PMO capabilities in PMO continuum
Source: Hill (2004)

Hill (2004) also proposes a one size fits all maturity model including five stages of competencies, inscribed in a continuum where PMO would be located (as per Figure 2). Here as well, strategic functions are understood as more advanced, and the target of at least most PMO in their road to higher maturity.

The PMO maturity cube, proposed by Pinto et al. (2010) is an alternative proposition, grounded in previous academic research, that allows PMO to perform their own self-assessment. The basic assumption behind the model is that PMO have their own unique missions and should select functions/services as required by their relevant stakeholders (and only those services), focusing on doing those as well as possible. The better they perform the required services, the more value the PMO is likely to be perceived to generate to the organization, and the greater the chances of survival.

Pinto et al. (2010) use a very simple analogy for PMO dealing with operational and tactical functions and PMO dealing with strategic functions: the case of a cleaner (acting operationally), and a president (acting strategically) in a given company. The authors argue that to say that in order to mature, an operational PMO must start adopting a strategic approach, would be the equivalent of saying that a cleaner, in order to perform the functions in a mature way, would need to start acting like a president, instead of focusing on using the best cleaning techniques and practices in order to comply with the operational mission assigned. And, conversely, an immature president would act like a cleaner – instead of someone with little experience or knowledge in the assigned functions, not able to fulfil its strategic mission.

The analogy is simple, but effective – it is possible to have mostly operational mature PMO and immature strategic PMO.

The maturity model proposes, for each of the 27 functions put forth by Hobbs and Aubry (2007), different maturity levels, corresponding to increased levels of sophistication in the execution of those functions (from the most trivial to the most sophisticated). As an example (Pinto et al., 2010), for the service "Implement and manage a database of lessons learned", the maturity levels proposed are:

Level 0 - The PMO does not provide this service.

Level 1 - The PMO stores the lessons learned from projects in an unstructured way.

Level 2 - The PMO consolidates the lessons learned from projects of the organization and has set up a database for them.

Level 3 - In addition, the PMO implements and disseminates a system with a single point of entry to retrieve lessons learned from projects throughout the organization.

The PMO Maturity Cube is one of the frameworks integrated in the PMO Value Ring methodology, proposed by the PMO Global Alliance, acquired late 2023 by the PMI. This appears to contradict PMI's endorsement of the Global PMO Maturity Index, two years earlier. The community of practice is awaiting clarifications on what will be the shared future of both these organizations.

As the PMO Maturity Cube is a maturity model grounded on previous academic research, and proposed by PMOGA (PMO Global Alliance), the largest PMO community in the world[2], it will be the one adopted in the context of this dissertation.

2.7. Related work

Some dimensions of the PMO phenomenon are more commonly addressed by studies. Many focused on evaluating PMO impact on project performance and organizational performance (Martin et al., 2007; Liu & Yetton, 2007; Aubry & Hobbs, 2011; Lundqvist, 2017). Some have focused on issues pertaining to PMO establishment and success (Singh et al., 2009; Spelta & Albertin, 2012; Spalek, 2013), while some focused on PMO functions, especially the knowledge management related (Julian, 2008; Muller et al., 2013; Pemsel & Wiewiora 2013; Wiewiora et al., 2020; Hadi et al., 2021). PMO transformations are also addressed (Aubry, 2015; Barbalho et al., 2019; Barbalho et al., 2021) as well as PMO role in portfolio management (Unger et al., 2012; Bredillet et al., 2018) and organizational project management (Aubry et al., 2007; Jerbrant, 2013; Too & Weaver, 2014). Most studies found focus on scenarios post-PMO implementation, sometimes comparing with companies without PMO, to determine PMO impact.

In the national context, one other study targeted a case-study of an IT company prior to PMO implementation (Pereira & Ferreira, 2015). However, the dimension of project management maturity is the focus of the study. The PMO is referenced to achieve that end, but no detail is offered as to what the functions/structure of such PMO would be to pursue that objective.

In conclusion, in the literature review conducted, there appear to be no equivalent studies to the one being carried out, *in casu*: in the Portuguese IT industry, targeting the outline of a PMO proposition adapted to the needs of a given company.

[2] As per https://www.pmoga.world/about

Chapter 3 – Research Methodology

The proposed methodological approach for this study is outlined in Table 6. It identifies the phases of DSRM (Peffers et al., 2007), but also the tasks executed for each phase, and the methods utilized.

Table 6 – DSRM phases and workflow

	Proposed methodological approach					
DSRM Fases	**1. Problem identification & Motivation**	**2. Objectives and *ex-ante* evaluation**	**3. Artifact Design and Development**	**4. Demonstration**	**5. Evaluation *ex-post***	**6. Communication**
Activities	Analyze context regarding Project management Maturity and Project failure rates. Conduct a Systematic Literature Review (Q1+Q2) and multifocal literature review, regarding Project Management offices, in Portugal and abroad.	**Conducting Case study** with Key Project Management stakeholders to ascertain more valued PMO functions.	**PMO Model proposition**	Offer visibility over PMO model and roadmap proposition through workshop demonstration to key stakeholders within the company	Gain insights on PMO model and roadmap proposition from key stakeholders within the company	Reporting to upper management Publication of results through paper and MSc. Thesis
Methods	Systematic Literature Review Multifocal Literature Review	Observation Questionnaires Focus Groups	Documentation (Questionnaire, Focus Groups) analysis Observation	Presentation	Questionnaire	Report Publications (Paper and MSc. Thesis)

The traditional DSRM phases were modified (Costa et al. 2016) to introduce a case study preceding the artifact design stage. This preliminary evaluation phase is referred to as the *ex-ante* evaluation stage. To distinguish it, the original evaluation stage (Peffers et al., 2007) becomes *ex-post* (Costa et al. 2016).

The fundamental goal of case study research is typically to achieve a comprehensive understanding of the phenomena in question within a real-world context (Dobson, 1999). Indeed, as highlighted in the literature review, designing an effective PMO Model necessitates a thorough comprehension of the organizational environment. Understanding the specific needs of the project management stakeholders within the organization is

equally critical, which makes a case study in the preliminary evaluation phase relevant for this study. Moreover, Hobbs and Aubry (2010) and Pinto et al. (2010) emphasize that a PMO design that fails to adapt to stakeholder needs is likely to be perceived as generating lower value and ultimately has a higher risk of being abandoned.

Through the proposed methodological approach outlined in Table 6, all the previously enumerated research objectives will be addressed:

Primary Objective

OBJ 1 - To develop a PMO model proposition with setup recommendations that addresses stakeholders' needs, based on gathered insights and direct observation.

Secondary Objectives

OBJ 2 – To verify if a favourable view of PMO and its functions exist in the company.

OBJ 3 – To examine the importance attributed by professionals in the company to each of the various functions a PMO could typically perform.

OBJ 4 – To determine if the proposed PMO Model would, according to its employees, be able to generate enough value to help the company in its current challenges.

OBJ 5 – To assess organizational context inclination for the creation of such a PMO.

We will also cover the research questions below:

Research Question 1 - "What should be the functions performed by an IT PMO in this particular project-based IT firm?"

Research Question 2 – "To what level can this IT PMO be an important tool to advance project management in this project-based IT firm?"

3.1. Problem Identification and Motivation

Reported project failure rates are consistently high and project management maturity is persistently low (Hobbs & Aubry, 2007; Prado & Correio, 2023; Budzier & Flyvbjerg, 2011; Lee, et al., 2014; Ham & Lee, 2019).

The case of a project-oriented Portuguese IT company dealing with similar issues was identified. This company had not established a PMO, although this has been claimed to be a best practice in industry literature (Hill, 2008; PM Solutions, 2022; Kerzner et al., 2022). This company dealt with common project management challenges: resource scarcity causing resource allocation difficulties, issues with consolidated project monitoring and control, issues with communication, standardized production of artifacts and difficulties maintaining and re-using knowledge acquired during projects' execution.

Thus, the problem was identified: how to further project management capabilities in the company in question, through the development of a PMO model proposition?

A systematic literature review was conducted to assess the state of the art in the academia, regarding PMO. The goal was to achieve a global view of the phenomenon, especially as an avenue to further project management capabilities and enhance business outcomes. Figure 3 outlines the systematic literature review process.

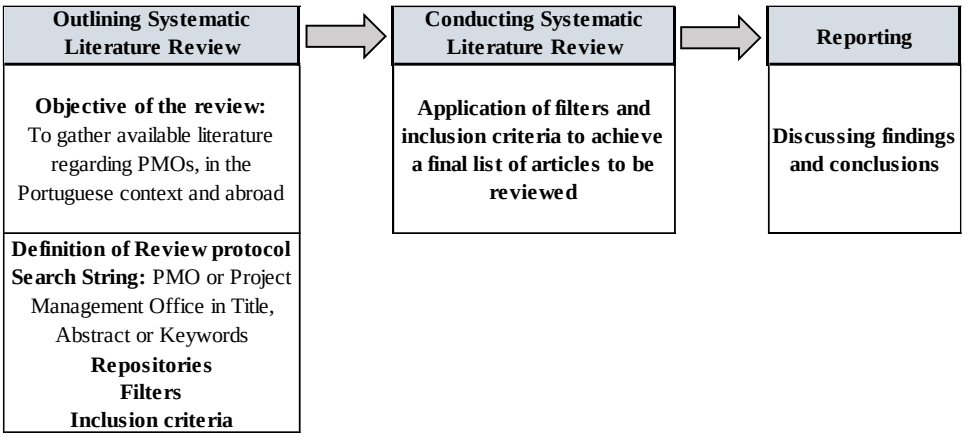

Figure 3 - Systematic Literature Review Process
Source: The PRISMA Statement (Moher et al., 2009)

After the objective of the review was established, the review protocol was defined. The search string used was "PMO" or "Project Management Office" in Title, Abstract or Keywords. Six repositories were chosen: Scopus; Springer, Web of Science, Science Direct, IEEE Xplore and RCAAP, for the national context.

Using only the search string and repositories, a total of 353 studies were returned. There was a sharp increase in PMO related publications starting 2007, as per Figure 4. Between 1987 and 2006 (almost 20 years), only 22 studies were returned. Between 2007 and 2023 (16 years), 331 studies were returned. This supports the notion that the academia was late to address the PMO phenomenon (Darling & Whitty, 2016). Hobbs and Aubry (2007) study may have been decisive to the proliferation of PMO academic literature.

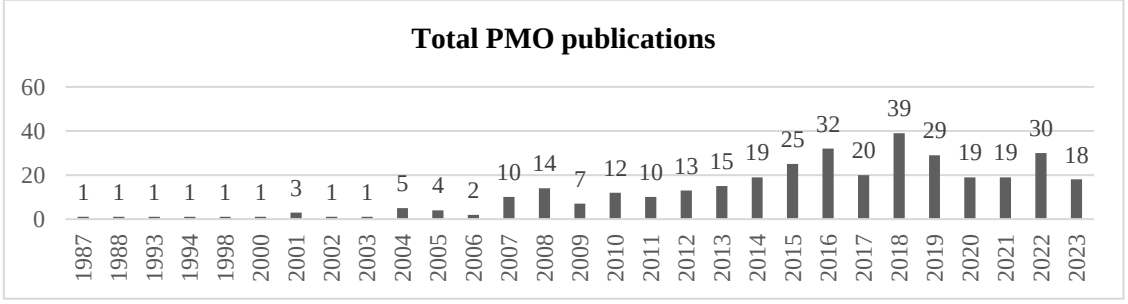

Figure 4 - Number of PMO publications per year, in selected repositories

Since the goal was to achieve a comprehensive view of the phenomenon, all studies from 2007 onwards, from both public and private sectors were considered in scope for the systematic literature review.

Below are the filters that were applied to the total of 331 studies returned since 2007:

1- Articles, from Q1 or Q2 publications according to Scimago Journal Rank;
2- Concerning Multi-Project PMO in private or public sectors;
3- Where PMO and associated dimensions (namely, establishment, impact, transitions, functions, performance, maturity) were the main topic of the study.

Single project/program PMO related studies were considered off scope due to lack of connection with the subject of the current study (multi-project PMO in IT field). It was decided not to limit the scope to publications concerning the IT industry, as it would be a severe limitation on the number of studies to review.

After duplicates were removed, 71 studies met the first criteria. We proceeded to read the title and abstract of publications to determine if the second and third criteria were met. Ultimately, a final count of 36 studies met all the inclusion criteria. The references used by those studies that were of particular interest were also consulted.

After the 36 studies were selected, it was found that some dimensions of the phenomenon that were relevant to the problem identified were not sufficiently covered. Indeed, there was a need to review literature stemming from the community of practice, to identify areas of contradiction, as well as to situate the contribution of the study. As such, it was decided to complement the results of the SLR with a multi-focal literature review, targeted specifically at:

1 - Professional literature regarding different project management and PMO standards.

2 - Professional and academic literature concerning PMO maturity frameworks.

The websites of the three major professional associations were consulted (PMI, IPMA and PRINCE 2) to determine the most up to date versions of the standards proposed for PMO and/or for Project Management, as well as reports on the PMO matter.

For the second topic, a search using the string “PMO Maturity” was conducted in Google Scholar. Only two studies were found to propose PMO Maturity models, already highlighted in the dedicated section, in the literature review.

3.2. Objectives and *ex-ante* evaluation phase

The goal of the objectives stage is to gather the objectives of a solution based on the problem defined (Peffers et al., 2007). These goals can be quantitative or qualitative.

In this case, the objective identified was to, based on academic literature, develop an artifact consisting of a PMO model proposition suited to the company's real context and challenges. Very importantly, the professionals should feel that this PMO if implemented, would generate added value and should support a future implementation of said artifact.

To achieve this, it was decided to conduct case study research (CSR). The research used three different methods to collect data: (i) direct observation, (ii) a questionnaire and (iii) focus groups. This fulfilled the requirement imposed by Yin (2018) to prevent bias in the study by triangulating sources. The professionals' views on PMO and its functions were assessed through a questionnaire (quantitative phase) and a focus group (qualitative phase), including the leadership of the organization. Observation was used to analyze and observe established processes and contextual information regarding the company.

The categories of analysis were mixed. The initial phase was inductive and quantitative to infer existing notions regarding PMO and its associated functions. This was followed by a deductive qualitative phase to confirm the outputs of the questionnaires during focus group sessions.

3.2.1. Quantitative Phase

The questionnaire, submitted to quantitative analysis, was comprised of a header, explaining the exercise and the multi-project PMO concept, as well as two questions:

1 - From your perspective, how important are the following roles or functions in a PMO mandate customized to fit your current company's needs? 27 functions were listed based on Hobbs and Aubry (2007)

2 - Are there any other functions that you would consider important for PMO to execute?

The questions (formulation, scale and list of functions) were adapted from Hobbs and Aubry (2007) study. Respondents were asked to grade PMO functions in a scale of importance (0-Not important at all to 4-Very Important), considering the current needs and challenges faced by their organization.

The leadership layer of the organization is composed of 29 people, excluding the CEO, among which we can find C-levels, Directors, Heads, Senior Techs and Project Managers. Heads, Senior Techs and PMs are hierarchical peers, reporting to different directors or C-levels. Directors report to C-levels, the highest authority in the organization.

A total of 22 people were invited to respond to the questionnaire, including all the above titles as per Table 7, as they were most directly connected to the project delivery. This corresponds to 76% of all organization leadership. Out of those 22 participants, 17

replied to the questionnaire, which is a 77% response rate. The data collection for the questionnaire occurred between March 20th and April 10th.

3.2.2. Qualitative Phase

After the questionnaire, two focus group sessions were held to discuss and validate the findings of the questionnaire – one with the company's senior leadership and another with mid-level managers and project managers. The same 22 participants were invited, as per Table 7. The focus groups occurred on April 23rd and April 29th, respectively.

Participants were separated into two focus groups, based on hierarchy, to maximize the sharing of participants views and limit the number of participants.

Table 7 – Focus Group attendance and relevant metrics

Focus Group 1				**Focus Group 2**			
Participant	**Title**	**Years**	**Attendance**	**Participant**	**Title**	**Years**	**Attendance**
1	C-Level 1	5	**Attended**	12	Head 1	24	Did not attend
2	C-Level 2	5	**Attended**	13	Head 2	8	Did not attend
3	Director 1	6	**Attended**	14	Head 3	2	**Attended**
4	Director 2	20	**Attended**	15	Head 4	16	Did not attend
5	Director 3	1	**Attended**	16	Head 5	14	Did not attend
6	Director 4	2	Did not attend	17	Head 6	20	**Attended**
7	Director 5	2	Did not attend	18	Senior Engineer	8	**Attended**
8	Director 6	5	**Attended**	19	Project Manager 1	2	**Attended**
9	Director 7	12	Did not attend	20	Project Manager 2	1	**Attended**
10	Director 8	1	Did not attend	21	Project Manager 3	2	**Attended**
11	Director 9	21	Did not attend	22	Project Manager 4	2	Did not attend
Total Average seniority (years)			**7,27**	**Total Average seniority (years)**			**9,00**
Attendance Rate			**55%**	**Attendance Rate**			**55%**
Attendees Avg. seniority (years)			**7,00**	**Attendees Avg. seniority (years)**			**5,83**

In Table 8, we address the four validity tests proposed by Yin (2018) to ensure the current case study is a reliable one.

Table 8 – Case Study validity tests
Source: Yin (2018)

Test	**Objective**	**Tactics by Yin (2018)**	**Research Validation in Current Study**
Construct Validity	Implementation of tactics to mitigate researcher's subjective bias	Use multiple sources of evidence Establish a chain of evidence Key informants should review case study findings	Multiple sources of evidence were used (observation, questionnaire, focus group) Stakeholders were asked to review case study findings in ex post evaluation stage
Reliability	Ensure replicability of case study by documenting procedures	Detailed documentation of case study protocol Creation of case study database	Case study protocol is detailed for replication Results obtained in questionnaires, Slide decks for focus groups, videos and transcripts are available for consultation

Internal Validity	Logical test to ascertain soundness of causal relationship	Pattern Matching Address rival explanations Using logic models	Not applicable to current study, as this is not an explanatory case study
External Validity	Ensure analytic generalization from case study is possible	Use theory in single case Study	Literature review revealed no prior research specifically focusing on the outline of a PMO proposition targeted to the needs of a given company. This gap underscores the originality of the study and its contribution to the field.

3.3. Artifact Design and Development phase

In this phase, we proceeded to design the PMO Model proposition, grounded on the preliminary evaluation stage, existing literature and observation of the company. Based on organizational needs and challenges identified, the PMO proposition was composed of: (i) Recommended PMO Functions; (ii) Suggested PMO Value Proposition (iii) Identified PMO Opportunities; (iv) Identified PMO Objectives and Expected Benefits; (v) Suggested target and tactical maturity levels for PMO functions; (vi) Proposed immediate PMO location in organizational structure and finally, (vii) Proposed PMO scope and associated phasing. Topics (ii), (iii) and (iv) were established based on Letavec (2007) and PMI (2021). Topic (v) was based on Pinto et al. (2010) maturity framework.

3.4. Demonstration phase

Following artifact design, the 22 participants were invited to a 1-hour presentation of the PMO Model proposed. The objectives were to provide visibility over said artifact, and to ensure that participants were, as much as possible, fully aware of the artifact's characteristics. This would be essential to their ability to evaluate the PMO proposition.

There were two instances of said presentations, on May 10th. Only 9 attended (41%), the remainder invoking agenda difficulties. The 9 participants included 1 C-Level, 3 Directors, 2 Heads and 3 Project Managers. To maximise the visibility of the artifact, the slide deck for the presentation was circulated among all 22 participants, as well as an explanatory video, corresponding to the presentation held.

3.5. Evaluation phase

At this stage, the goal was to gather insights from participants on the assumptions behind the artifact's creation, the artifact itself, and its characteristics. Measuring organizational support was also necessary. This was done by means of a questionnaire, that collected answers between May 10th and June 10th. This questionnaire contained 23 questions, split into sections to cover all aspects of the artifact proposed:

Respondent Profiling (2 questions) – to determine category/job role and seniority.

Business needs identified during focus groups (4 questions) – for participants to confirm CSR findings corresponding to most pressing organizational needs.

Business needs versus identified target PMO functions (2 questions) – to confirm if participants considered suggested PMO functions addressed organizational needs.

PMO Target Value Proposition and Mission Statement (2 questions) – to confirm if participants agreed with recommendations for PMO Value Proposition and Mission Statement, or if they had anything to add.

PMO Target Opportunities and Objectives (3 questions) – to confirm if participants agreed with recommended PMO Opportunities and Objectives or if they had comments.

PMO Target Function Maturity levels (4 questions) – to confirm if participants agreed with recommended Tactical and Target Function Maturity levels (Pinto et al., 2010).

PMO Organizational location and scope phasing (3 questions) – to gather insights on proposed PMO location and scope phasing.

Stakeholders support (3 questions) – to measure participants insights regarding the value the PMO would generate and their support to the initiative.

Although only 9 participants (41%) attended the Demonstration sessions, the supporting material (including video) was circulated to all participants. This allowed participants to evaluate the artifact without attending the session. A total of 12 participants (55%) responded to the artifact validation questionnaire, as per Table 9.

Table 9 – Respondents job role and seniority distribution in ex-post evaluation

Category / Job Role	Frequency	%	Seniority in organization (years)	Frequency	%
Project Manager	3	25	1 year or less	1	8,3
Head	4	33,3	1 to 3 years	4	33,3
Director	4	33,3	3 to 5 years	1	8,3
C-level	1	8,3	5 to 10 years	2	16,7
			More than 10 years	4	33,3

There are 6 people under 5 years seniority and 6 people over 5 years seniority. There are 5 senior leaders and 7 PM and Heads. The sample is thus reasonably well balanced.

3.6. Communication phase

Finally, the results of the empirical research were diffused to appropriate audiences: the ExCom and the academic community. The ExCom was addressed by means of a report focusing on practical outcomes. Communication to the academic community is done through the publication of a paper in the PROJMan 2024 – International Conference on Project Management, as well as the publication of the MSc. dissertation.

Chapter 4 –*Ex-ante* evaluation and Objectives Definition stage

Case study research was done to assess preliminary components of the artifact, otherwise known as meta-artifacts (Costa et al., 2016). In this case, the meta-artifacts correspond to PMO functions, that must align with the actual organizational needs, for the PMO to be successful and survive (Hobbs & Aubry, 2010; Pinto et al., 2010; PMI, 2021). The primary objective of the research is to develop a PMO model proposition that addresses those very stakeholders' needs. The outputs of the case study will serve as input for the artifact's construction and support the artifact validation stage. The case study results are presented below.

4.1. Direct Company Observation and Analysis

It was observed that although there was no organizational unit akin to a PMO, most project managers were assembled in one department, reporting to a Director that in turn reported directly to the Chief Technology Officer (CTO). This location indicates privileged access to the Executive Committee (ExCom) and makes project managers hierarchical peers to the Heads in the organization, that are the hierarchical resource managers. These PM are software Development PM (Dev PM).

Other project managers exist outside this department, that deal with projects where other types of work are required (example, procurement, assembly and installation of hardware components). These are called the Delivery PM. They report to a different Director, that in turns reports to the Chief Operational Officer (COO), and not to the CTO.

The project managers in this organization are multi-located, working remotely in different parts of the country or even abroad. There are time zone differences between them as well. They do not follow the same project management practices, nor do they follow a standard methodology, although there is an effort to align communication through *ad hoc* formal periodical meetings, including members of the ExCom.

The Heads are generally much more senior than Dev PM in the company, with an average 14 year seniority in the company versus 2 years average seniority for PM. Most PM have been hired recently to deal with the increase in projects.

The authority of Dev PM and the Heads appears to be partially concurrent. Although Heads are theoretically the hierarchical superior of project resources, they should not overstep the PM on work priorities, holidays, absences and overall planning if the resource is allocated to a given project. Heads ensure the technical management of work.

The company has been dealing with an increased number of projects due to a recent aggressive commercial strategy. As such, the projects and its PM compete for a pool of increasingly limited resources, with associated communication difficulties.

4.2. Quantitative Phase - Questionnaire Results

The questionnaire was sent to 22 invited participants. Out of 22, 17 valid responses were obtained, which amounts to a 77% response rate. The Cronbach Alpha in the sample was 0.814, an acceptable internal reliability indicator (Pallant, 2020). Table 10 depicts the results obtained for all functions (from 0- Not important at all to 4-Very Important).

Table 10 – *Ex-Ante* Questionnaire Results (N=17)

PMO Function	Mean	Std. Deviation
Monitor and control project performance	**3,71**	,470
Develop and implement a PM standard methodology	**3,59**	,618
Conduct post-project reviews or postmortems	**3,29**	,849
Coordinate between projects	**3,29**	1,047
Monitor and control the performance of the PMO	**3,24**	,664
Implement and manage a database of lessons learned	3,24	,752
Report the status of projects to upper management	3,18	,951
Provide Mentoring for Project Managers	3,06	,827
Recruit, Select and Evaluate Project Managers	3,06	1,088
Execute specialized tasks for PMs	3,06	1,144
Develop the competency of project personnel (training)	3,00	,707
Implement and operate a project information system	3,00	,935
Promote project Management within the organization	3,00	1,000
Implement and manage a risk database	3,00	1,000
Provide advice to upper management	3,00	1,061
Manage archives of project documentation	2,94	,748
Supply a set of PM tools without an effort to standardize	2,94	1,249
Develop and maintain a project scorecard	2,88	,928
Allocate Resources between projects	2,88	1,111
Conduct project audits	2,76	,903
Manage Project Benefits	2,59	,939
Manage one or more programs	2,47	1,125
Manage customer interfaces	2,47	1,375
Participate in Strategic Planning	2,35	,996
Environmental scanning and networking for Projects	2,35	1,222
Manage one or more portfolios	2,18	1,334
Identify, select and prioritize new projects	1,94	1,249

In total, 15 (56%) out of the 27 functions scored 3 or higher in the importance scale, and were deemed to be, on average, either of Considerable Importance or Very Important for the organization, given its current challenges. No function scored lower than 2 – "Of Some Importance", in average. The bottom 12 (44%) functions scored either 2,94 or lower. This suggests that there is a favorable view of PMO across the leadership layers of the referenced company, and that there is an organizational resolve towards enhancing project management maturity. Table 11 details the top 5 most valued PMO functions, ranked according to their average score. When determining the ranks, the average was used. If two or more functions shared the same average perceived importance results, the standard deviation was used, as it indicated consensus around a particular PMO function.

Table 11 – Detail of Top 5 most valued PMO functions

Rank	1	2	3	4	5
Function	Monitor and control project performance	Develop and implement a PM standard methodology	Conduct post-project reviews or postmortems	Coordinate between projects	Monitor and control the performance of the PMO
Average	**3,71**	**3,59**	3,29	3,29	3,24
Median	4	4	4	4	3
Mode	**4**	**4**	**4**	**4**	3
Std Dev.	0,47	0,62	0,85	**1,05**	0,66
Min	3	2	2	**0**	2
Max	4	4	4	4	4

Two functions gather very high scores, with generalized consensus: "Monitor and control project performance" and "Develop and implement a PM standard methodology", with scores of 3,71 and 3,59 respectively. The almost unanimity of the top scores related to the monitoring and control function could imply that this is a field that leadership strongly feels needs to be reinforced. This echoes Spelta and Albertin (2012), that concluded that "(Dis)satisfaction with control over the portfolio" and "Favorable views of PMO" were key variables that set the ground for a PMO implementation, with positive outcomes.

The standardization of project management related processes and implementation of a standard methodology comes second, which also demonstrates the will to advance in process maturity. The function "Conduct post-project reviews or postmortems" scored 3.29, which suggests that organizational learning is very much a concern for leadership.

The "Coordinate between Projects" function scored 3,29, but had a big standard deviation, due to a respondent that scored it as 0 – Not important at all. As the pool of

respondents is quite small (N=17), this alone is capable of skewing results. Even so, the function made the Top 5, because most respondents scored this function as 3 or 4.

The "Monitor and Control the Performance of the PMO" function comes in at 5th place, indicating leadership would favor a regular review of PMO performance.

Table 12 details the results obtained by the functions that ranked between 6th and 10th place in the scale.

Table 12 – Detail of 6th-10th most valued PMO functions

Rank	6	7	8	9	10
Function	Implement and manage a database of lessons learned	Report the status of projects to upper management	Provide Mentoring for Project Managers	Recruit, Select and Evaluate PMs	Execute specialized tasks for PMs
Average	3,24	3,18	3,06	3,06	3,06
Median	3	3	3	3	3
Mode	4	4	3	4	3
Std Dev.	0,75	0,95	0,83	1,09	1,14
Min	2	1	1	0	0
Max	4	4	4	4	4

The results of the functions placed between the 6th and 10th positions suggest that the tendency towards the favoring of knowledge brokerage functions and information dissemination is affirmed (lessons learned management, PM mentoring), as suggested by the high ranking of the Conduct post-project reviews function (Top 3). The 9th and 10th ranked functions have higher standard deviations and lower minimum scores, which could indicate these functions would not gather enough consensus to be included in an initial PMO model proposition.

Regarding the second question, when asked: "Are there any other functions/roles that you would consider important for a PMO to execute?", the respondents replied: "Quality control", "Facilitating negotiations/prioritizations among internal areas of the company, given the challenges of projects and scarce shared resources", "Focus on and for all programs/projects: Develop and implement a PM standard methodology; Coordinate between projects: enable optimal utilization of resources" and "The PMO could support tools and partner selection within projects".

The resource scarcity issue is referenced in the written comments, but the PMO resource allocation function scores lower on average (coming in at 19th place out of 27 functions with an average score of 2,88). Indeed, if, as per the comments, a facilitating role between

the different departments is preferred, then the PMO would not directly allocate resources from a pool, according to its own judgement.

Comparing these results with Hobbs and Aubry (2007), from which questions formulation, scale and list of functions were adapted, we can observe some contrasts. Table 13 presents a summary of observed differences.

Table 13 – Top 10 Functions Rank Differences compared to Hobbs and Aubry (2007)

Function Description	**Category Pinto et al., 2010**	**Hobbs and Aubry Function Group (2007)**	**Current Study Rank**	**Hobbs and Aubry Rank (2007)**	**Diff. Ranks**
Monitor and control project performance	Operational	Monitoring and Controlling Project Performance	1	3	2
Develop and implement a PM standard methodology	Strategic	Development of project management competencies and methodologies	2	2	0
Conduct post-project reviews	Operational	Organizational Learning	3	22	19
Coordinate between projects	Strategic	Multi-Project Management	4	7	3
Monitor and control performance of PMO	Strategic	Organizational Learning	5	10	5
Implement and manage database of lessons learned	Tactical	Organizational Learning	6	23	17
Report project status to upper management	Operational	Monitoring and Controlling Project Performance	7	1	-6
Provide Mentoring for Project Managers	Operational	Development of project management competencies and methodologies	8	12	4
Recruit, Select and Evaluate Project Managers	Tactical	No Group	9	27	18
Execute specialized tasks for PMs	Operational	No Group	10	20	10

Focusing on the top 10 functions in the current study, we can observe the first two functions in the rank, “Monitor and control project performance” and “Develop and implement a PM standard methodology”, have low or zero rank differences when compared to Hobbs and Aubry (2007) results. However, this is not the case for most of the functions studied, with very large rank differences, especially for Organizational Learning group functions – “Conduct post-project reviews” and “Implement and manage database of lessons learned”. The former ranks third out of 27 functions in a scale of importance, and the latter ranks sixth. In Hobbs and Aubry study (2007), they had come in at 22nd and 23rd places out of 27 functions. The function Recruit, Select and Evaluate Project Managers also registers a significant gap, coming in at 9th place in this study, versus 27th place in the former.

Table 14 analyses the three strongest correlations for the top 10 functions, determined based on Spearman's rho, the adequate test to determine correlation when working with categorical variables (Pallant, 2020). Only large correlations, above 0,5 or below -0.5 were considered relevant (Cohen, 1988). All correlations are significant at the 0,05 level.

Table 14 – Functions Strongest Correlations in the study (Spearman's rho)

		Top 3 strongest correlations		
Rank	**Function Description**	**Strongest Correlation**	**2nd Strongest Correlation**	**3rd Strongest Correlation**
1	Monitor and control project performance	Manage one or more Programs (0,643)	Report the Status of Projects to upper Management* (0,566)	Recruit, Select and Evaluate Project Managers (0,519)
2	Develop and implement a PM standard methodology	No large correlations		
3	Conduct post-project reviews	Recruit, Select and Evaluate PM (0,526)		
4	Coordinate between projects	Implement and manage a risk database (0,769)	Manage one or more Programs* (0,580)	Manage one or more Portfolios* (0,567)
5	Monitor and control performance of PMO	No large correlations		
6	Implement and manage database of lessons learned	Develop and maintain a project scorecard (0,532)	No other large correlation	
7	Report project status to upper management	Provide advice to upper management (0,726)	Recruit, Select and Evaluate Project Managers (0,572)	Monitor and Control Project Performance* (0,566)
8	Provide Mentoring for Project Managers	Develop the competency of project personnel (training)* (0,751)	No other large correlation	
9	Recruit, Select and Evaluate Project Managers	Report project status to upper management (0,572)	Develop the competency of project personnel (training) (0,568)	Conduct post-project reviews (0.526)
10	Execute specialized tasks for PMs	No relevant correlation		

*Also correlated in Hobbs and Aubry study (2007)

The correlation results reinforce the conclusion that there is no general alignment between this sample and results obtained from a very large PMO population (Hobbs & Aubry, 2007). This emphasizes the notion that each organization is unique, and as such must be treated (PMI, 2021).

Differences could also be because this study evaluates the importance attributed to PMO functions before the PMO is established, while Hobbs and Aubry (2007) evaluated importance within current PMO mandates.

4.3. Qualitative Phase – Focus Groups Results

At the opening of both focus groups, a summary of the results obtained in the questionnaire was presented and some questions were asked to the participants. Table 15 reflects some takeaways from the focus group sessions for Question 1.

Table 15 – Focus Group Results Question 1

Question 1 - Why has a PMO never been created in the company?	
Focus Group 1 - Senior Leadership	**Focus Group 2 - Mid-Level Leadership**
Director 1 - *"Creating a separate organic PMO? There have never been dedicated resources for that… It seems like there hasn't been the will or recognition. The importance of a potential PMO hasn't been understood yet."*	***Head 3 -*** *"It seems to me that the people (in this survey) are people who are a little more sensitive to the need for a PMO. So, when you ask why it was never established, maybe all of us here feel that need a little more and can understand the importance, more than, perhaps, the rest of the company. Sensitivity is a little different in other areas. (...) it is seen as something that is expensive and if people self-organize, not so necessary."*
C-Level 2 – *"But I think here we may not have the figure of a PMO, but we end up fitting these components within the delivery areas, right?"* ***Director 1 -*** *"I'd say we're not quite there yet."*	***Project Manager 3*** *-"(...) if you don't turn to projects, there isn't as much need to have a PMO to then manage or help manage the project part. Probably now with this change and because more projects are starting to appear, maybe that mindset will change."*

In Focus Group 1, there were references to single project/program PMO established in the past, but no multi-project PMO. In Focus Group 2, a previous role of a client relationship manager with some portfolio management responsibilities for one client only was invoked. The role had meanwhile been discontinued in the company.

This first question prompted a discussion in which it became apparent that there was some confusion regarding the PMO concept and that its outlines were not yet fully understood by all the senior leadership. Overlap of multi-project PMO concept with department that groups project managers or single-program dedicated unit were manifest: "*(...) historically, I only saw PMO in things of enormous relevance that were programs...".* This happened, despite the concept of PMO having been described as part of the questionnaire header. During Focus Group 1, the concept of PMO was reminded to participants. It would appear then, that part of the reason why a PMO was never established within the company is the fact this was not something that was witnessed by most of the participants during their careers, as it may not be very common in the Portuguese tech landscape. By not being exposed to multi-projects PMO, some of the

participants did not have a full understanding of the concept, and, in consequence, could not have championed such an initiative.

Also, the acceleration in number of projects is quoted as a reason why this could change, promoting awareness in the organization regarding the importance of a PMO.

Table 16 – Focus Group Results Question 2

<table>
<tr><th colspan="2">Question 2 - How are the Top 5 functions executed now in the organization, if at all?</th></tr>
<tr><th>Focus Group 1 (Senior Leadership)</th><th>Focus Group 2 (Mid-Level Leadership)</th></tr>
<tr><td>Director 1 - “(…) No, clearly, they are not being done...”</td><td rowspan="2">Head 3 - "Well, I'll say it. I think none of this is being done. Zero. And you might say: oh, the other PMs do it in other areas, but I don't know anything, and I'm not in the other areas."</td></tr>
<tr><td>Director 1 - “Sort of. I'd say we're not quite there yet. (…). We once tried to develop templates, common practices... but it never really became autonomous.”</td></tr>
<tr><td>Director 3 - “(…) Oh, but no, we're not doing everything... In fact, we're doing very little of what's listed here, even... (laughter)”,</td><td rowspan="2">Project Manager 1 - "I agree 100% with you, we feel the same here. Zero. The other colleagues know exactly what we're talking about. The only coordination that actually exists often happens informally among the PMs themselves."</td></tr>
<tr><td>C-Level 1 - “I would say the part we do worst is the Coordination between projects...”.</td></tr>
</table>

From the feedback obtained, reflected in Table 16, it seems apparent that not all the functions are being performed, if at all, apart from the responsibilities assigned to the Project Managers. There is however widespread consensus in senior leadership that we should advance in each of those areas, especially the drive towards project management processes standardization. One participant was inclined to believe that some of the PMO functions outlined in the top 5 most valued were being done in some internal departments, but this was promptly contradicted by other participants.

The standardization of methodologies especially is a subject that had already been identified: *Director 3 - “The standardization of the methodology is one of the initiatives that came out of the latest feedback from people, that this is an issue in the organization (…) when we (…) asked for feedback from people, this is a point with enormous, enormous strength.”*, *C-Level 2 - “I agree, and I couldn't agree more. (…)”.*

The aspects linked to capture and dissemination of knowledge, all the way since project set up, were reinforced during the session, by multiple participants, including C-levels: *“Director 1 - (…) having a PMO that takes care of that (postmortems and lessons learned) could be very interesting. To share among projects, right? In other words, to ensure the capture and dissemination of the knowledge that is being developed.”.*

The role anticipated for a potential PMO appears to be of a supportive nature: *"Director 1 - a PMO can be very important in setting up a project (…) the setup is to ensure people are following the right methodologies, that we adjust the methodology (…), that we align everyone from the beginning, and that we also set up these data collection and dissemination structures, and that we bring into discussions what we have already learned from other projects. (…)."*

An overall very positive outlook regarding the functions of a PMO comes across during the discussion, as all participants explicitly agreed that *"(…) there are a lot of virtues in having a PMO working from the beginning side by side with the PM, in that support perspective".*

Table 17 – Focus Group Results Question 3

<table>
<tr><th colspan="2">Question 3 - From the standpoint of the PMO functions scope of application, do you see it as being universal across all projects and in all areas?</th></tr>
<tr><th>Focus Group 1 (Senior Leadership)</th><th>Focus Group 2 (Mid-Level Leadership)</th></tr>
<tr><td>Director 3 - "Universal"</td><td rowspan="2">Head 3 - "I think it has to be global. There may be areas where, for some reason, it doesn't apply in an internal project or in an external project, but I think it should be global."</td></tr>
<tr><td>Director 1 - "Universal, but imagine you have all areas and all projects, then maybe you have to prioritize (giving priority to the external ones...)."</td></tr>
<tr><td>C-Level 1- "Yes, it will be more intense in some than in others, but yes."</td><td>Project Manager 2 - "Universal, I agree (...) But, since we don't have a PMO today, and eventually, if we do, it'll have to be a small team (maybe just one person) ... maybe one person handling several projects in the company would be too much... and prioritization is necessary.</td></tr>
</table>

The scope of application results are shown in Table 17. In Focus Group 1, the question prompted a discussion regarding the need to extend PMO functions scope application to internal client projects, as well as external client projects. The discussion eventually led to a consensus that external and internal projects should be under the scope of a PMO, but that external projects should be prioritized if there are capacity issues. In Focus Group 2, participants considered there could be multiple aspects to prioritize projects for PMO surveillance. Indeed, internal projects could be strategically very important to the company and should in that case be monitored by a PMO.

As most companies face multiple projects, and must decide on resource allocation, this topic is very much a concern for this company, especially at a time of project acceleration. Table 18 addresses the related question.

Table 18 – Focus Group Results Question 4

<table>
<tr><th colspan="2">Question 4 - How can a PMO help in facilitating resource allocation?</th></tr>
<tr><th>Focus Group 1 (Senior Leadership)</th><th>Focus Group 2 (Mid-Level Leadership)</th></tr>
<tr><td>C-Level 2 - "If they're all in the same structure, I think it should have that obligation of coordination, of ensuring alignment."</td><td>Project Manager 1 - "If you have a control PMO, it has actual responsibility in organizing the projects and defining priorities among them. So, the role of resource managers would automatically transition to a PMO department."</td></tr>
<tr><td>Director 2 - "I'm not sure if that works...(...) the importance of projects has to be seen at a level that is not the PMO level. It's not the PMO that will decide alone in case of resource scarcity what is more important. It can prepare, structure the issue for someone above to make a decision."</td><td>Moderator - "Do you see the PMO as an entity that would actually have the authority to determine what is prioritized and what is not?"
Project Manager 1 - "Yes."</td></tr>
<tr><td>Director 1 - "The PMO would be someone who provides data, not making decisions."</td><td>Head 3 - "a PMO with visibility over all projects can allocate efficiently from one side to the other."</td></tr>
<tr><td>Director 2 - "Doesn't decide."</td><td rowspan="2">Moderator - "This group sees the PMO as an entity that would actually have hands-on responsibilities in defining resource allocation, and resolving conflicts between projects, in a very directive and hands-on way. In other words, making decisions if necessary?"
All - "Yes."</td></tr>
<tr><td>Director 3 - "It's going to be a technical support, and in essence, it's someone who ensures that whoever needs to decide has all the information if there's a decision to be made regarding resource allocation when there's a conflict of interests."</td></tr>
</table>

In Focus Group 1, the senior leadership felt that a useful PMO role would be as a facilitator, or conflict-resolution center providing support for resource allocation conflicts within projects. This support should be provided in the way of a discussion enabler, information gathering and data consolidation provider for PMs and upper management. Leadership felt very strongly that the PMO should not make resource allocation decisions by itself. However, in Focus Group 2, with mid-level leadership, participants felt very differently. They felt that the PMO should have the authority to make decisions based on a set number of criteria, with the goal of decreasing latency and taking effective action.

4.4. Overall Case Study Findings

Overall, the results indicate that there is consensus that a lot of the PMO functions, as per Hobbs and Aubry (2007) would generate significant value for the organization. Whilst some PMO functions gather widespread consensus, others do not. Nonetheless, a very positive view of a PMO comes across during the focus groups. Two functions gather very high scores, with generalized consensus: “Monitor and control project performance”

and “Develop and implement a PM standard methodology”. The almost unanimity of the top scores related to the monitoring and control function and standard methodology implies that this is a field that leadership strongly feels needs to be reinforced. Moreover, organizational learning functions score a lot higher in this case when compared to the results in Hobbs and Aubry (2007) study.

PM are mostly split in two separate departments, Dev PM and Delivery PM, and are multi-located. In the absence of a structure that guarantees uniformization, no project management methodology is consistently followed, with the governance of each project being left to the judgement of the assigned PM. This, in conjunction with the number of projects competing for a finite pool of company resources, creates communication difficulties between stakeholders (between PM themselves and between PM and Heads).

Most participants claim that the Top 5 functions identified in the questionnaire are not being adequately compensated in the organization. However, there appears to be a strong organizational resolve towards advancing project management practices.

The organization appears to be at a time when the sharp increase in the number of projects is forcing a re-evaluation of organizational structure, procedures, and even organizational identity (product based versus project based).

A supportive/operational nature for a potential PMO also appears to be favored by senior leadership, as opposed to a controlling or directive one. Mid-level leadership, however, favors a more hands-on directive type PMO for resource allocation functions.

In conclusion, four main Business Needs were identified as a result of the case study research conducted. These needs will need to be addressed by the artifact developed.

- Need to ensure uniform project control and monitoring
- Need for predictability through standardization
- Need to enable organizational learning
- Need for organized and mediated coordination between projects.

We can observe that the focus groups’ output confirmed the results obtained from the questionnaire, as the most valued functions are aligned with the business needs identified. In the next chapter, we will describe how this has shaped the proposed artifact.

Chapter 5 – Artifact Presentation and Validation Results

In this chapter, the artifact proposed to stakeholders will be presented in the multiple dimensions that constitute its value proposition (Letavec, 2007; Pinto et al., 2010): Mission Statement, Target Functions and associated maturity levels, as well as related PMO Opportunities and Objectives. The proposed PMO location in company structure and the proposed scope of application for the PMO are also covered.

Subsequently, the results obtained in the validation stages will be presented. The artifact validation encompassed a demonstration phase and an evaluation phase. The latter was done through a questionnaire. The Cronbach alpha obtained in the questionnaire was 0,797, which is a satisfactory reliability score (Pallant, 2020).

5.1. PMO Model Proposition

The Value Proposition framework was created by Letavec (2007) to maximise the understanding of the value a newly established PMO can provide, connecting organizational needs with PMO Opportunities and Objectives that generate organizational benefits. This understanding is vital for PMO establishment and sustainment (Letavec, 2007; Pinto et al., 2010). Figure 5 illustrates the artifact dimensions and how they are related, for a better understanding of the artifact developed.

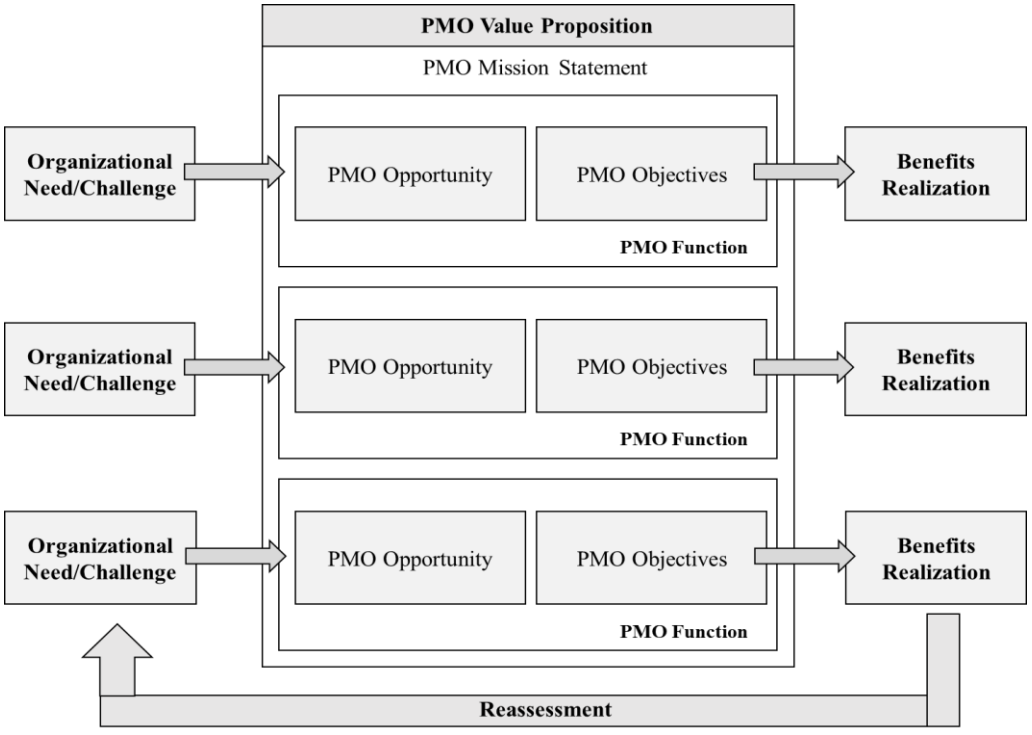

Figure 5 - PMO Value Proposition Framework
Source: Adapted from Letavec (2007)

In this study, the PMO Opportunities and Objectives are identified in the context of target PMO functions (Hobbs & Aubry, 2007) at specific recommended maturity levels (Pinto et al., 2010), substantiating a clear PMO Mission Statement (Letavec, 2007).

PMI (2021) explicitly introduced the PMO Value Proposition in PMBOK Guide 7th edition. The PMI standards have been shown to align closely with academic research and are frequently cited in scholarly studies.

5.2. Business Needs identified and Target PMO Functions

The case study research in the *ex-ante* phase has enabled the identification of organizational needs and most valued PMO functions (Hobbs & Aubry, 2007). We have been able to observe that there is a very good alignment between the most valued functions as per the questionnaire, and the business needs expressed in the focus groups. As such, these functions integrate the proposed artifact. This is represented in Figure 6.

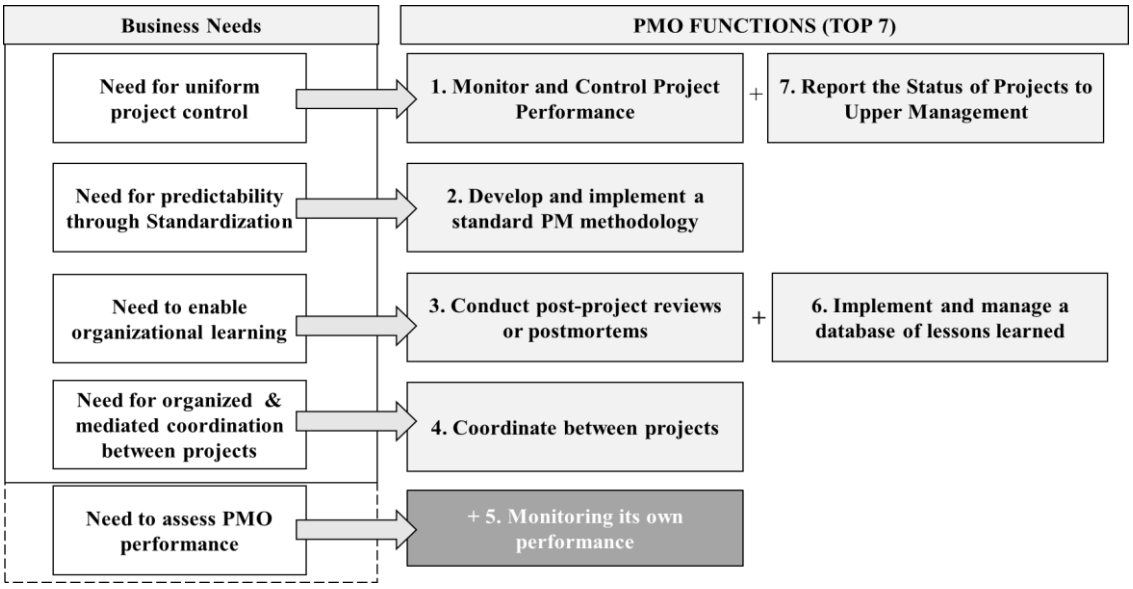

Figure 6 - Business Needs and Target PMO Functions

In Figure 6, business needs identified are shown to match exactly the four most valued functions as per the questionnaire. The 5th need/function, the "Need to assess PMO performance", was added with a dotted line, as it was not directly addressed in the focus groups. It was decided to include this as a target function, as it has ranked quite high in the questionnaire (Top 5), and it is a pre-requisite of the Value proposition framework (Letavec, 2007). Indeed, the constant re-evaluation of the value generated by the PMO is essential for it to maintain its legitimacy and ensure its survival (Hobbs & Aubry, 2010; Pinto et al., 2010; PMI, 2021).

As per Figure 6, the functions "Implement and manage a database of lessons learned" and "Report Project status to upper management" have also been included as target functions. The former, "Implement and manage a database of lessons learned", is logically and statistically correlated with the 3rd function "Conduct post-project reviews" according to Hobbs and Aubry (2007), even though, in this sample, it is only moderately correlated (0,429). The latter, "Report Project status to upper management" is largely correlated in the sample (0,566) with the most valued function, "Monitor and Control Project Performance", and was also correlated in Hobbs and Aubry (2007). Both functions registered very high scores as well (6th and 7th place, respectively).

The "Develop and Implement standard PM methodology" showed no significant correlation with any of the remaining functions in the sample. The "Coordinate between projects" showed correlation with functions that ranked lower in the questionnaire (namely "Implement and manage a risk database", at 14th place).

Table 19 – Target PMO Functions

Rank	PMO Function	Function Group (Hobbs & Aubry, 2007)	Classification (Pinto et al., 2010)	Mean	Std. Deviation
1	Monitor and control project performance	Monitoring and Controlling Project Performance	Operational	**3,71**	0,47
2	Develop and implement a PM standard methodology	Development of PM competencies and methodologies	Strategic	**3,59**	0,618
3	Conduct post-project reviews or postmortems	Organizational Learning	Operational	**3,29**	0,849
4	Coordinate between projects	Multi-Project Management	Strategic	**3,29**	1,047
5	Monitor and control the performance of the PMO	Organizational Learning	Strategic	**3,24**	0,664
6	Implement and manage a database of lessons learned	Organizational Learning	Tactical	3,24	0,752
7	Report the status of projects to upper management	Monitoring and Controlling Project Performance	Operational	3,18	0,951

In the Table 19, the unique blend of functions for this company PMO is represented. Strategic, operational and tactical functions are represented, as well as functions from several function groups. The Organizational Learning group represents 3 out of the 7 functions and the Monitoring and Controlling Project Performance represents 2 out of 7.

5.2.1. Business Needs and Target PMO Functions Evaluation Phase Results

Participants were asked to rate, from 0 to 4, if they believed that the business needs identified in the *ex-ante* stage were pressing business needs in the company. They were also asked if they believed the recommended functions corresponded to the business needs identified. As per Table 20, all functions gather very high scores, especially the one

pertaining to inter-project coordination, with the highest average score and the lowest standard deviation. The recommended PMO functions are also generally believed by the participants to correspond to the business needs identified, with the related question achieving an average agreement score of 3.33 out of 4.

Table 20 – Business Needs and Recommended PMO Functions Results

	Need for predictability through PM Standardization	Need for uniform project control	Need for organized and mediated coordination between projects	Need to enable organization learning	**Do you believe that TOP 7 PMO functions identified correspond to the business needs identified?**
Mean	3,5	3,75	**3,83**	3,33	**3,33**
Mode	3[a]	4	4	3	3
Std. Dev.	0,522	0,452	**0,389**	0,651	0,651
Minimum	3	3	3	2	2
Maximum	4	4	4	4	4

a Multiple modes exist. The smallest value is shown

When asked if other functions should have been included in the artifact, three respondents stated: support to project set-up, implementation and management of a risk database and integrated management of resources (not just conflict management).

5.2.2. Business Needs and Target PMO Functions - Results Discussion

To recommend that PMO play a direct role in resource allocation in a first iteration would contradict the logic of incremental increase in responsibility that has been shown in literature to increase chances of PMO success (Singh et al., 2009; Aubry 2015). A transition this sudden would also risk aggravating workplace tensions in a moment of accelerated growth, which could be detrimental to PMO establishment success (Barbalho, 2020). Given that this is the most pressing business need identified by participants, as per Table 20 (3.83 out of 4), it could make sense to re-examine the issue and think about evolving PMO capabilities to directly allocate resources in a future iteration.

The "Execute specialized functions for PM" (support to project set-up) function and "Implementation and management of a risk database" have scored lower in the questionnaire (10^{th} and 14^{th} place) but could be included in the PMO mandate in a future iteration, if more stakeholders deem it useful.

These dimensions of the artifact are thus considered validated without alterations. All Business needs achieved high agreement scores and are deemed by the participants to be addressed by the recommended seven target PMO functions.

5.3. PMO Mission Statement

Based on organizational needs identified and target PMO functions, the proposed Mission Statement for the PMO was drafted and is represented in Figure 7.

Proposed PMO Mission Statement (Letavec, 2007; PMI, 2021)
The PMO offers **centralized project oversight** and **standardized project management processes** to enhance decision-making capabilities. It fosters **dialogue and coordination among projects**, consolidating resource-related conflicts and mediating inter-project issues. The PMO serves as a **catalyst for organizational learning** and functions as a knowledge broker focused on minimizing project risks.

Figure 7 - Proposed PMO Mission Statement

The mission statement should be unique to the organization and should broadly summarize the intended mission of the PMO (Letavec, 2007). The mission statement developed here includes all dimensions deemed lacking as per the focus groups – centralized project oversight, standardization of processes, dialogue fostering and catalysation of organizational learning.

5.3.1. Mission Statement Evaluation Phase Results

Using the same scale, participants were asked regarding mission statement proposed. Results are shown in Table 21.

Table 21 – PMO Mission Statement Results

	Frequencies			**Stat. Indicators**	
	Strongly Agree	**Agree**	**Somewhat Agree**	**Mean**	**Std. Dev.**
Do you agree with the proposed PMO Mission Statement?	6	4	2	**3,33**	0,778

Overall, participants agreed with the proposed Mission statement. However, two comments were received, one saying that the term “control” should be mentioned, and another that the ability to directly allocate resources should be included.

5.3.2. Mission Statement - Results Discussion

The reasons why we did not include the direct allocation of resources in the first iteration of PMO mandate were already addressed in 5.2.2. As for the suggested mention of the term “control”, the authors have opted against it, based on the preference expressed in Focus Group 1 for a supportive approach and based on the literature review conducted.

Indeed, Aubry (2015) found that enhancing the PMO supportive role boosts project performance, business performance, and project management maturity. In contrast, strengthening the PMO control role did not lead to performance improvements.

This dimension of the artifact is thus also considered validated without alterations.

5.4. PMO Opportunities and Objectives

The following step in the development of the artifact was to identify potential areas where the PMO could deliver value, considering the organization's needs and challenges that arose from the *ex-ante* phase (Letavec, 2007). This was done for the organizational needs identified through the case study research, as per table 22.

Table 22 – PMO Opportunities and Objectives

Challenge	**Business Need**	**Target PMO Function**		**Expected Benefits**
		PMO Opportunity	**PMO Objectives**	
Inability for Senior or Mid Leadership to have a consolidated view of project statuses in all the organization	Need to ensure uniform project control and monitoring	**Function: Monitoring and Controlling Project Performance** **Reporting status to Upper Management**		Guaranteeing reporting on all projects increases transparency, visibility and control Promotion of top-down alignment Enhancing Decision Making capabilities
		Provide consolidated central Project Reporting **Establish Project Reporting Standards** **Normalize Reporting Systems utilization**	**1.** Gather and document all ongoing projects within PMO Scope **2.** Implement standardized templates for monthly project reporting **3.** Centralize high level statuses of all projects within scope to send to Senior Leadership **4.** Establish reports repository archive	
Each Project is managed differently, PM artifacts are not defined, which is a challenge for monitoring, cross project coordination, onboarding and resource re-allocation	Need for predictability through standardization	**Function: Develop and implement a PM standard methodology**		Standardization ensures repeatability, comparability, better follow up, and overall productivity gains
		Develop and implement PM methodology	**1.** Gather all existing documented PM processes, build them into a standard custom PM Methodology **2.** Create ways to adapt methodology to the different kinds of projects, based on set criteria (dimension, type) **3.** Create lists of artifacts to be produced by projects	

Challenge	Business Need	Target PMO Function		Expected Benefits
		PMO Opportunity	PMO Objectives	
Projects cannot self-coordinate in an environment of resource scarcity, cannibalization of resources occurs	Need for organized and mediated coordination between projects	**Function: Coordinate between projects**		Decreasing internal company conflict, increasing transparency and rational utilization of resources
		Act as a resource conflict concentrator and resolution center, facilitating discussions and escalating data supported issues	**1.** Gather all existing resource related conflicts **2.** Provide visibility on overall project milestones to all company's stakeholders, monthly **3.** Keep and maintain a Project List with scores in dimensions (Strategic Impact, Image exposure, Market significance, Dimension....) **4.** Assist in conflict resolution by acting as a mediator	
Knowledge is being lost, lessons learned potential for re-utilization is wasted	Need to enable organizational learning	**Function: Conduct post-project reviews + Implement and manage a lessons learned database**		Increased productivity, enhanced planning and decision-making abilities
		Act as a knowledge broker to facilitate organizational learning	Gather all existing outputs from lessons learned conducted in the past Conduct post-project reviews where still possible Implement and manage a lesson learned database plus process to reuse lessons learned.	

PMO opportunities are linked to the challenges that the PMO will tackle and the specific value it can bring to resolve them. The PMO Objectives refer to the set of PMO deliverables identified to realize these opportunities (Letavec, 2007).

5.4.1. PMO Opportunities and Objectives Evaluation Phase Results

Using the same scale, participants were asked regarding PMO opportunities and objectives identified. Results are shown in Table 23.

Table 23 – PMO Opportunities and Objectives Results

	Frequencies			Stat. Indicators	
	Strongly Agree	Agree	Somewhat Agree	Mean	Std. Dev.
Do you concur with the identified PMO Opportunities?	1	10	1	3,00	0,426
Do you concur with the identified PMO Objectives?	2	8	2	3,00	0,603

Overall, participants agreed with the proposed PMO Opportunities and Objectives. Regarding the participants that somewhat agreed, one did not add any other useful PMO opportunity or objective when given the chance, in the open-ended question. The other stated that PMO could “Help PMs keep systems updated”.

5.4.2. PMO Opportunities and Objectives - Results Discussion

The PMO opportunity referred "Help PMs keep systems updated" could either be interpreted as the PMO replacing PM in updating systems with project statuses, or in the sense of oversight, alerting PM when a specific project needs to be updated. We believe the latter is included in the proposed PMO mandate. The former cannot be included, as it is a resource-intensive task that pertains to the PM responsibility scope.

These dimensions of the artifact are thus also considered validated without alterations.

5.5. Target Functions Maturity Levels

For the target functions identified (Table 19), tactical and target maturity levels were proposed to the stakeholders, as per Table 24. These levels correspond to the ones identified in the PMO maturity cube, proposed by Pinto et al. (2010). The fundamental premise of the model is that each PMO has its own distinct mission and should choose functions and services based on the needs of its stakeholders, focusing exclusively on these areas. By excelling in these selected services, the PMO is more likely to be seen as valuable, thereby enhancing its chances of long-term success.

In Table 24, the tactical and target recommended maturity levels are presented, per function. The tactical level is the level the organization should aim for first, and the target maturity level represents what the organization should aim to achieve. These levels were recommended based on the researchers view of organizational PM maturity, size and low tolerance to bureaucracy. If implemented, the PMO initially implemented would be at an intermediate level of maturity (tactical) and would evolve to an advanced level (target).

Table 24 – Recommended PMO Functions Maturity Levels
Source: Pinto et al., 2010

Function	**How does the PMO monitor and control project / program performance?**			
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Function Detailed Description	The PMO does not perform this function	The PMO monitors and controls the project / program performance considering time, cost, quality and customer satisfaction, and provides follow-up reports without analysis upon request	The PMO monitors and controls the performance of projects / programs considering time, cost, quality and customer satisfaction and analyzes the available data	PMO monitors and controls the performance considering time, cost, quality and customer satisfaction, analyzes data, and takes preventive and corrective actions working proactively with PM and senior management
Tactical Level		X		
Target Level				X

Function	How does the PMO develop and implement the project management methodology?				
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Functions Detailed Description	The PMO does not perform this function	The PMO has developed a basic methodology for the project/program, but it is not used consistently	The PMO has developed a standard methodology for the project/program, and it is used in most of the time	The PMO has developed a standard methodology for the project/program, and it is mandatory unless a specific waiver is requested and approved	The PMO has developed and improved the standard methodology for the project focusing on best practices and continuous improvement.
Tactical Level			X		
Target Level			X		

Function	How does the PMO conduct post-project reviews or postmortems?			
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Functions Detailed Description	The PMO does not perform this function	The PMO facilitates the process of capturing lessons learned, as it is directly involved in project meetings and events	The PMO facilitates the process, analyzes, consolidates and submits proposals for continuous improvement on projects	In addition, the PMO provides a process to reuse the lessons learned in future projects across the organization
Tactical Level		X		
Target Level				X

Function	How does the PMO coordinate and integrate the organization's portfolio?			
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Functions Detailed Description	The PMO does not perform this function	The PMO identifies interdependencies between the projects and programs of the department, but it does not keep track of the changes in interdependencies and resource needs	The PMO identifies and tracks interdependencies and resource needs between the projects and programs, informing and triggering the managers of projects/programs and stakeholders in case of need.	The PMO identifies and tracks interdependencies and resource needs between the projects and programs of the department, acting proactively to ensure the realization of the portfolio and providing preventive and corrective actions as required.
Tactical Level		X		
Target Level			X	

Function	How does the PMO implement and manage a database of lessons learned?			
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Functions Detailed Description	The PMO does not perform this function	The PMO stores the lessons learned from projects but does so in an unstructured way	The PMO consolidates the lessons learned from projects of the organization and has set up a database for them	In addition, the PMO implements and disseminates a system with a single point of entry to retrieve lessons learned from projects throughout the organization
Tactical Level			X	
Target Level				X
Function	**How does the PMO provide information to senior management of the status of projects?**			
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Functions Detailed Description	The PMO does not perform this function	The PMO collects status information, prepares reports and distributes them to senior management but is not responsible for analysis nor does it take corrective action	The PMO receives status information, analyzes it and provides reports to senior management / sponsors and informs them if there are specific problems in which their assistance is needed	The PMO receives status information, analyzes it, and provides reports to senior management / sponsors of the organization, informs them if there are problems and assists them in resolving problems as requested.
Tactical Level			X	
Target Level				X

Function	How does the PMO monitor and control its own performance?				
Maturity Levels	**Level 0**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Functions Detailed Description	The PMO does not perform this function	The PMO informally asks its customers to feedback on its performance	The PMO formally ask its customers for feedback on its performance	The PMO formally asks its customers to gain feedback on its performance and to obtain performance indicators for the processes under its responsibility, continually demonstrating its performance.	The PMO formally asks its customers to gain feedback on its performance and to obtain performance indicators for the processes under its responsibility, continually demonstrating its performance. It shares goals with its customers and structures itself to promote continuous improvement and increases in its maturity, assessing the need for removal, maintenance, or creation of new services
Tactical Level			X		
Target Level			X		

5.5.1. Target Functions Maturity Levels Evaluation Phase Results

The participants were asked, through an open-ended question, whether they agreed with each function suggested tactical/target maturity levels. Results follow in Table 25.

Table 25 – Maturity Level Results (%)

	Monitor and Control Project Performance	Develop and implement PM Std Methodology	Conduct Post Project reviews	Coordinate between projects
% Did not respond	17%	17%	17%	17%
% Agreed	75%	83%	83%	67%
% Disagreed	8%	-	-	17%
	Implement and manage a lessons learned database	Report the status of Projects to Upper Mngnt.	Monitor and Control PMO Performance	
% Did not respond	17%	17%	25%	
% Agreed	83%	67%	58%	
% Disagreed	-	17%	17%	

Most participants agreed with all function target and tactical maturity levels. Participants who disagreed with levels for "Coordinate between projects" and "Monitor and Control PMO Performance" were senior leaders, who felt the targets should be more ambitious. In "Monitor and Control Project Performance" and "Report status to upper management", the ones who disagreed are mid-level leaders that felt these functions should be the PM responsibility, not the PMO. They argued the PMO should enable accurate project status tracking without engaging with senior management.

5.5.2. Target Functions Maturity Levels - Results Discussion

The comments received pertaining to the inclusion of monitoring and reporting to senior management represent a minority (2 in 12). They contradict expectations for the PMO manifested by senior management in Focus Groups, and the questionnaire results, as the monitoring function was the most valued by 17 participants. The authors have thus decided against changing the artifact based on this input. As for the participants (senior leaders) that felt two target levels should be more ambitious, they are also a minority (2 in 12). As explained, a "PMO-light" configuration is advised for the 1st PMO iteration (Singh et al., 2009), but this is input that should be considered in future iterations.

This dimension of the artifact is thus also considered validated without alterations.

5.6. Proposed PMO Location and Scope Phasing

Most project managers in this company are already assembled in one department, reporting to a Director, that reports directly to the CTO. This location was chosen for the PMO as per Figure 8.

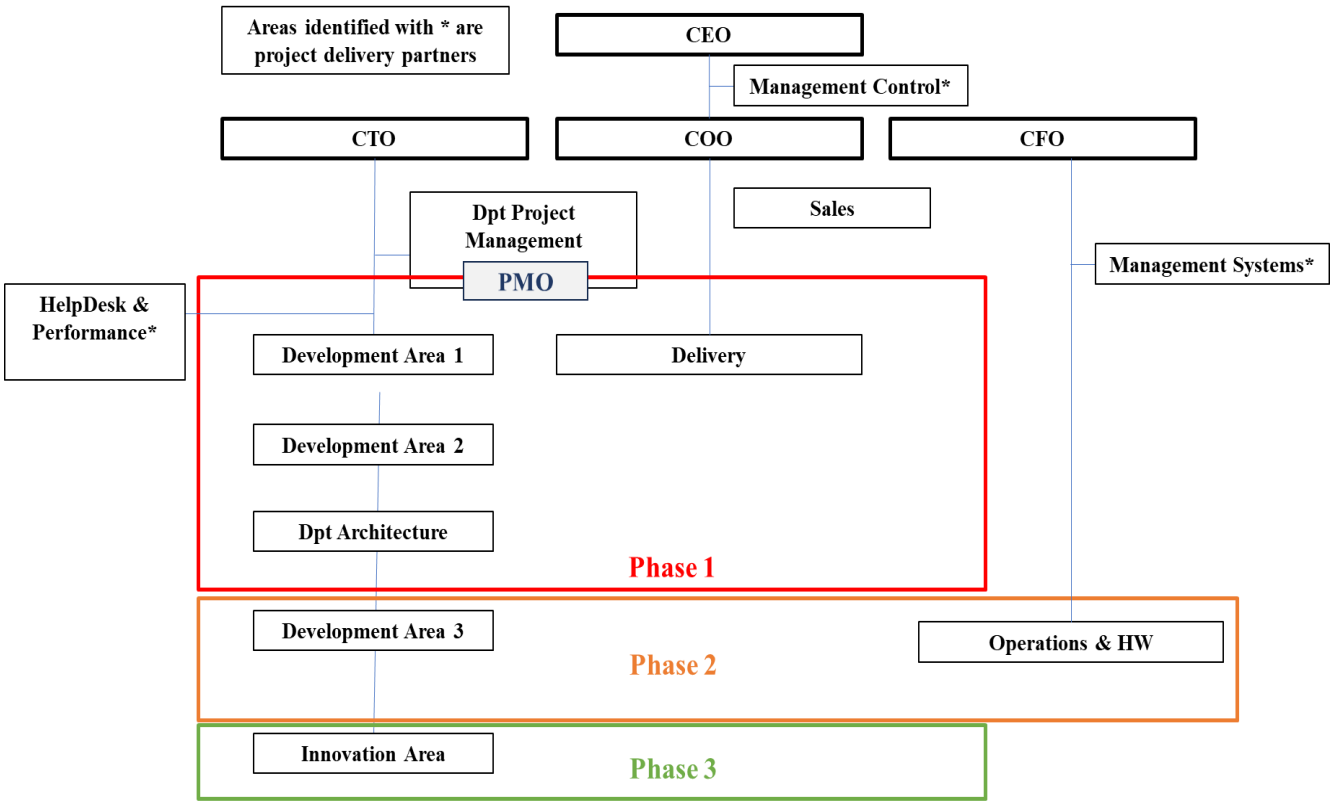

Figure 8 - Proposed PMO Location and Scope Phasing

The PMO would become a sub-unit to the PM department, composed of dedicated staff, but reporting to the same Director as PM. There are several reasons why this location was proposed: (i) most project managers are already assembled in that particular unit, which will favour proximity and minimize disruption; (ii) most development areas, from which the projects stem, also respond to the CTO and are in organizational proximity to the proposed location, which is useful given the supportive approach and operational nature of some of the functions that would be performed by the PMO; (iii) the Director has both the skills and experience to manage project management activities and (iv) to place the PMO in this first implementation stage reporting directly to the CEO could create an added risk of resistance from relevant organizational stakeholders.

The PMO scope proposition developed is also presented in Figure 8. The approach is split in three phases. Higher priority projects (external development) that stem from Development areas 1, 2 and Delivery are considered for Phase 1. The remaining areas are internal project providers and are thus considered for Phases 2 and 3. Participants generally agreed that the PMO should have a universal scope, encompassing all development areas and both internal and external projects. However, they emphasized the need to prioritize projects based on attributes such as strategic impact, image exposure, market significance, and size. This prioritization is necessary due to the likely limited

resources available to the PMO. Given the aggressive commercial strategy pursued by the company, external development projects are very likely going to be deemed high priority, despite there being multiple internal projects also ongoing.

5.6.1. PMO Location and Scope Phasing Evaluation Phase Results

Participants were also surveyed on PMO location and Scope Phasing proposed, based on the 0-4 agreement scale, and results are shown in Table 26.

Table 26 – PMO Location and Scope Phasing results

	Frequencies			**Stat. Indicators**	
	Strongly Agree	**Agree**	**Somewhat Agree**	**Mean**	**Std. Dev.**
Do you agree with the proposed PMO location?	5	4	3	**3,17**	0,835
Do you agree with the proposed PMO Scope and associated Phasing?	2	6	4	2,83	0,718

PMO location achieved consensus with a mean score of 3.17. Some participants suggested in the written comments that, although they understood the tactical choice, the PMO should eventually be an independent area, like Management Control, reporting directly to the CEO, as shown in Figure 8.

The PMO Scope Phasing gathered the least consensus among the examined artifact dimensions, with a mean score of 2.83. Written comments suggested that participants felt other areas, such as Helpdesk and Performance, should be included in Phase 1. This area implements small system changes related to evolutionary maintenance or bug fixing.

5.6.2. PMO Location and Scope Phasing - Results Discussion

Regarding PMO location, although the authors recognize that in time, as the Business Unit PMO initially proposed evolves into a Corporate PMO, a change of the location to have the PMO report directly to the CEO could make sense for the organization, proposing so now would go against the incremental nature of the proposal. It could, also, very seriously risk antagonizing some very senior leaders on a first PMO iteration.

Regarding PMO scope phasing comments received: the Helpdesk area's activity is exclusively internal client-focused and deals only with bug fixing. No significant project stems from the Helpdesk area without being transferred to a Development area, which is why it was not included in the phasing proposal. While the PMO scope should ideally be universal, priority should be given to project size, external nature, and market impact in the likely case of limited PMO resources. Development Areas included in Phase 1 manage almost all significant external projects, justifying their earlier inclusion.

Changes to expand the scope phasing proposed should be considered at the time of detailed PMO implementation planning and are contingent upon the number of resources assigned to the PMO, which is likely to be small, on a first iteration. Thus, the authors also consider PMO Location and scope proposal validated.

5.7. Overall Organizational Support

The final two questions in the *ex-post* questionnaire aimed to assess the overall validation of the proposed artifact and the organizational support for its implementation. The results shown in Table 27 are very positive. Most participants believe the proposed PMO would significantly add value to the organization, with a mean score of 3.25. The mean score for organizational support for implementation was even higher, at 3.58, reflecting near-unanimous support. This is coherent with the high scores registered generally for the artifact dimensions.

Table 27 – Overall Organizational Support results

	Frequencies			**Stat. Indicators**	
	Strongly Agree	**Agree**	**Somewhat Agree**	**Mean**	**Std. Dev.**
Do you believe that the PMO proposed would be of significant added value?	6	3	3	3,25	0,866
Would you support the implementation of such a PMO?	8	3	1	**3,58**	**0,669**

The two variables are logically strongly correlated (0.834). If one believes the PMO would generate significant value, it is likely to support its implementation, and vice versa. The two variables were then investigated for correlation with seniority and job role.

Table 28 – Overall Organizational Support correlation with seniority and job role

	Do you believe that the PMO proposed would be of significant added value?	**Would you support the implementation of such a PMO?**
How long have you been working in your current organization?	-0,118	**-0,358**
	Sig. (2-tailed) 0.714	Sig. (2-tailed) **0,253**
What is your category/job role in your organization?	0,238	-0,077
	Sig. (2-tailed) 0,457	Sig. (2-tailed) 0,812

As per Table 28, there is a moderate negative correlation between seniority and PMO support (-0.358), suggesting more senior staff are relatively less likely to support PMO implementation in the sample. The statistical significance is low ($p > 0.05$), but this is not unusual in small samples (Pallant, 2020). Thus, it should be considered during PMO implementation, by reinforcing involvement of senior staff.

5.8. PMO Set up Recommendations

PMO exist in a continuum, where "light" configurations, including supportive and knowledge brokering roles are at one end of the spectrum, and "heavy" configurations, where the PMO has direct responsibility for projects, are at the other end of the spectrum (Singh et al., 2009). Singh et al. (2009) found that "light" and supportive PMO were more likely to be implemented successfully. These results suggest that an incremental approach to building on PMO capabilities (starting with a PMO-light configuration) should be the way to move forward. Aubry (2015) also found that enhancing PMO supportive role, and not the control role, boosted project performance, business performance, and project management maturity. This is why several artifact dimensions are built from a supportive standpoint, and why the maturity levels include a tactical and a target stage.

Barbalho et al. (2019) found that organizational political tensions, rather than project management performance, explained PMO transitions. As such, these should be identified as well as project performance issues and stakeholder satisfaction to guide PMO changes and sustain best project management practices. Although this company is evolving to a more project-oriented nature, there are still natural tensions between the resource managers and the project managers. The former still maintain some of the resource allocation prerogatives. Change must happen thus, incrementally, which explains why the direct allocation of resources by the PMO wasn't proposed in this first implementation proposal.

It is worth noting that despite the positive outlook by this company's leadership on PMO, the study by Ward and Daniel (2013) found that PMO presence correlated negatively with leadership satisfaction. Spalek (2013) found a strong correlation between top management support and the survival rate of PMO. Therefore, it is crucial for a PMO, if established, to closely monitor senior management satisfaction levels to ensure its legitimacy and survival. Spalek (2013) also found that in the medium term, the ability to demonstrate added value and top management support is crucial for the survival of the PMO. As such, PMO must engage with its internal clients frequently, especially the top management, and address their changing needs, continuously demonstrating value.

Additionally, although participants in this study highlighted the desirable role of the PMO in reinforcing communication and cooperation, PMO presence did not significantly correlate with communication and cooperation-related best practices in Lundqvist (2017). This area must then be especially monitored by this PMO, going forward.

Chapter 6 – Conclusions and future studies

Consensus on the role and impact of PMO is challenging in both academia and practice. While some studies suggest PMO positively affect project and organizational performance (Martin et al., 2007; Liu & Yetton, 2007; Aubry & Hobbs, 2011; Spalek, 2013; Linde & Steyn, 2016), many organizations have not adopted them (Dietrich et al., 2010). The diversity and complexity of PMO (Hobbs & Aubry, 2007), along with a lack of solid theoretical foundation for their performance (Darling & Whitty, 2016), complicate justifying the required investment, hindering PMO acceptance in practice.

This study focused on a case of a medium sized project-based IT firm going through a period of accelerated growth. The authors used the DSR methodology, adapted to include a case study in the preliminary evaluation stage (Peffers et al., 2007; Costa et al., 2016). The research aimed to determine, by means of an artifact consisting of a custom PMO Model proposition, to what level a PMO could be perceived as an important tool to advance project management in the firm, and what should be the functions performed.

We were able to respond to Research Question 1, "What should be the functions performed by an IT PMO in this project-based IT firm?" by proposing and validating an artifact featuring the 7 most valued PMO functions by the firm's leadership, identified through case study research conducted in the *ex-ante* stage. The unique blend of functions proposed included strategic, operational and tactical functions, as well as functions pertaining to almost every group identified by Hobbs and Aubry (2007), with a focus on monitoring and controlling performance and organizational learning, but also multi-project management and development of PM competencies and methodologies.

To the Research Question 2, "To what level can this IT PMO be an important tool to advance project management in this project-based IT firm?", we were able to respond through the analysis of the *ex-post* evaluation questionnaire. In it, participants have declared to believe that the outlined PMO would generate significant added value to the organization (3,25 score in 0-4 scale).

The Primary Objective of the investigation was "To develop a PMO model proposition with setup recommendations that addresses stakeholders' needs, based on gathered insights and direct observation". We consider that this objective was achieved.

The PMO Model proposition was developed based on case study findings and literature review. It encompassed target PMO functions (Hobbs & Aubry, 2007), Mission

Statement, Opportunities and Objectives (Letavec, 2007) and target functions maturity levels (Pinto et al., 2010). PMO location and scope phasing were also proposed.

The artifact proposed was a multi-project PMO, that would initially start as a Business Unit PMO and then evolve to a Corporate PMO, encompassing almost all organization's projects. As stated, the target functions are the Top 7 most valued PMO functions by leadership, identified through the case study conducted. The recommended approach for the first PMO iteration is a supportive one, that appears to be favoured by most participants and is correlated in literature with increased chances of success for PMO and projects (Singh et al., 2009; Aubry, 2015; Barbalho, 2020). Regarding maturity, two stages of implementation are proposed: a tactical one, at an intermediate maturity level, and a target one, at an advanced maturity level (Pinto et al., 2010).

In the validation stages, the artifact was demonstrated to participants for subsequent evaluation and communication. All dimensions were evaluated by participants in a questionnaire, and scores received are overall very positive. The artifact was deemed validated by key project management stakeholders in the company. In other words, professionals in this IT project-based firm generally believe that the implementation of the PMO outlined would be an important tool to advance project management capabilities, generating significant value-added to the company. Suggestions received from participants to establish more ambitious maturity targets and a more directive approach to resource allocation should however be considered when incrementally reviewing PMO performance, during the implementation stage.

As for the Objective 2, "To verify if a favorable view of PMO and its functions exist in the company.", we have been able to uncover an overall very positive outlook of PMO and its functions, which can be verified from the *ex-ante* questionnaire and focus groups results. Indeed, 56% of functions (15 out of 27) scored at least 3.00, in an importance scale going from 0 to 4. We consider it then achieved.

Regarding Objective 3, "To examine the importance attributed by professionals in the company to each of the various functions a PMO could perform.", this was achieved through the case study detailed in Chapter 4. We have been able to determine importance ranks for each of the PMO functions and compare it with previous academic literature (Hobbs & Aubry, 2007).

Concerning Objective 4, "To determine if the proposed PMO Model would, according to its employees, be able to generate enough value to help the company in its current

challenges.", participants have clearly declared in the *ex-post* questionnaire that the PMO would generate significant added value to the organization (3,25 score in 0-4).

Finally, we also consider Objective 5, "To assess organizational context inclination for the creation of such a PMO.", achieved. The participants declared almost unanimously that they would support this PMO implementation (3,58 score in 0-4). There is, therefore, a favorable inclination of relevant key stakeholders for the establishment of a PMO.

It is worth mentioning that, in the systematic literature review conducted, no study out of the 36 meeting the inclusion criteria addressed scenarios prior to PMO implementation, focusing on the outline of a PMO proposition targeted to the needs of a given company. This underscores the originality and contribution of the study to the field, especially in the national context, where PMO literature is particularly scarce.

This research offers valuable insights for the company in question and others facing similar challenges, aiding their journey toward high-performing, mature project management. It can also stimulate discussions in Portugal and internationally, promoting project management as a key driver of economic development.

6.1 Research Limitations

This research has some limitations. We were not able to gather all 22 participants in the study throughout its different phases, with validation questionnaire response rate attaining only 55%, versus the 77% in the first questionnaire. Additionally, non-leadership staff were not included, and some could have possibly added valuable insights.

Additionally, as this is a single-case study, its results cannot be used for statistical generalization, only for analytical generalization (Yin, 2018). Meaning, to test a theory, in this case, that PMO could be an important tool to advance project management. All scientific literature agrees that there is no one-size-fits-all for PMO. Each organization's context should be examined thoroughly to establish the most suitable PMO configuration.

6.2 Future Studies

The next logical step is to plan the PMO implementation and assess its impact on project and organizational performance within this IT firm. Additionally, repeating the study in non-project-based firms or other industries could reveal whether the results differ from those obtained in the current study.

Most importantly, future research should survey companies using PMO in Portugal, including typologies and position in organizational structure, given the scarcity of literature on this topic in the national context.

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Annex A - *Ex-Ante* evaluation Questionnaire

PMO functions Questionnaire

A Project Management Office (PMO) is a dedicated entity within an organization tasked with providing comprehensive project management support. Its primary objective is to ensure adherence to best practices and standards, thereby facilitating the delivery of maximum value from projects. Drawing upon academic and technical literature in project management, here below is a list of 27 functions commonly executed by PMO worldwide. We invite you to assess which of these functions align most closely with the specific needs and context of your current company. Please consider your company's objectives, challenges, and operational environment when determining which functions would be more valuable in a PMO.

1. From your perspective, how important are the following roles or functions in a PMO mandate customized to fit your current company's needs?

	0	**1**	**2**	**3**	**4**
	Not Important at all	**Of Little Importance**	**Of Some Importance**	**Of Considerable Importance**	**Very Important**
Develop and implement a PM standard methodology					
Supply a set of PM tools without an effort to standardize					
Develop the competency of project personnel, including organizing training					
Provide Mentoring for Project Managers					
Recruit, Select and Evaluate Project Managers					
Promote project Management within the organization					
Organize environmental scanning and networking for Projects					
Execute specialized tasks for PMs, e.g. preparation of schedules, risk analysis, project recovery					

Identify, select and prioritise new projects					
Manage one or more programmes					
Manage one or more portfolios					
Coordinate between projects					
Manage Project Benefits					
Allocate Resources between projects					
Monitor and control project performance					
Implement and operate a project information system					
Develop and maintain a project scorecard					
Report the status of projects to upper management					
Provide advice to upper management					
Participate in Strategic Planning					
Conduct project audits					
Conduct post-project reviews or post mortems					
Implement and manage a database of lessons learned					
Implement and manage a risk database					
Manage archives of project documentation					
Manage customer interfaces					
Monitor and control the performance of the PMO					

2. Are there any other functions/roles that you would consider important for a PMO to execute?

Thank you for your participation!

Annex B - *Ex-Post* evaluation Questionnaire

PMO Model Proposition Feedback

This is a Questionnaire targeted at collecting feedback on the PMO model proposition presented. When responding, please consider the supporting material provided and your company's current needs and challenges.

1. **What is your category/job role in your organization?**
   - Project Manager
   - Head
   - Director
   - C-Level
   - Other
2. **How long have you been working in your current organization?**
   - 1 year or less
   - From 1 to 3 years
   - From 3 to 5 years
   - From 5 to 10 years
   - More than 10 years

3. **Slide 3 and 4 - Business Needs expressed during Focus Groups**

Do you believe that the below represent pressing business needs in your organization?

	0	**1**	**2**	**3**	**4**
	Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**
Need for predictability through PM Standardization					
Need for uniform project control					
Need for organized and mediated coordination between projects (dependencies and resource needs)					
Need to enable organization learning					

4. **Slide 5 - Business needs vs PMO Functions**

Do you believe that TOP 7 PMO functions identified correspond to the business needs identified?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

5. **Slide 5 - Business needs vs PMO Functions**

Do you believe there are other PMO functions that should be considered?

6. **Slide 6 - PMO Value Proposition**

Do you agree with the proposed PMO Mission Statement?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

7. **Slide 6 - PMO Value Proposition**

   Do you have any comment regarding the proposed PMO Mission statement?

8. **Slide 8 - Proposed PMO Value Proposition - PMO Opportunities, Objectives and expected Benefits**

   Do you concur with the identified PMO Opportunities?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

9. **Slide 8 - Proposed PMO Value Proposition - PMO Opportunities, Objectives and expected Benefits**

   Do you concur with the identified PMO Objectives?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

10. **Would you like to add any PMO Opportunity or Objective that you think could be useful?**

11. **Slide 9 - PMO Functions - Tactical and target maturity level**

    Monitor and Control Project Performance

    Develop and implement PM Standard Methodology

    Do you agree with the tactical and target maturity levels for these functions? If not, why?

12. **Slide 10 - PMO Functions - Tactical and target maturity level**

    Conduct Post Project reviews or Post-Mortems

    Coordinate between projects

    Do you agree with the tactical and target maturity levels for these functions? If not, why?

13. **Slide 11 - PMO Functions - Tactical and target maturity level**

    Implement and manage a lessons learned database

    Report the status of Projects to Upper Management

    Do you agree with the tactical and target maturity levels for these functions? If not, why?

14. **Slide 12 - PMO Functions - Tactical and target maturity level**

    Monitor and Control the PMO Performance

    Do you agree with the tactical and target maturity levels for these functions? If not, why?

15. **Slide 13 - PMO Location**

    Do you agree with the proposed PMO location?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

16. **Slide 13 - PMO Scope & Phasing**

    Do you agree with the proposed PMO Scope and associated Phasing?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

17. **Slide 13 – PMO Location, Scope & Phasing**

    Do you have any comment on the proposed PMO Location, Scope and associated Phasing?

18. Do you believe that the PMO proposed would be of significant added-value to the organization, given its current and future needs/challenges?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

19. Would you support the implementation of such a PMO in your current organization?

0	1	2	3	4
Strongly Disagree	**Disagree**	**Somewhat Agree**	**Agree**	**Strongly Agree**

20. **Do you have any final comments?**

Thank you for your participation!