

EXPLORING THE PROJECT MANAGEMENT OFFICE (PMO) – ROLE, STRUCTURE AND PROCESSES

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Abstract

The Project Management Office (PMO) is an organizational entity that maintains the standard of projects and may also provide resourcing to support the project management process across an organization. The PMO can be involved in portfolio or program management as well as strategic project development and management. Traditionally associated with IT (Information Technology) projects, the PMO approach has now been adopted in other applications and industries. However, there remain a lack a frameworks to properly describe the specification and functioning of the PMO. Therefore, this paper will provide insights from an exploratory study of the PMO approach to organizing and managing projects, including the results of a literature study related to engineering projects that will be used to develop a framework to describe the potential role, structure and processes of the PMO. This framework will be of use to practitioners looking to design and establish a PMO in order to improve the efficiency and effectiveness of the project management process. The findings will be used to develop a research agenda to inform future studies needed to further understand the theoretical basis of the PMO as well as the practical implications of implementing an organizational PMO.

Keywords

Project Management Office, PMO, Engineering Projects, Multi-Project Management.

Introduction

The Project Management Office or PMO is an organizational entity that is created in order to standardize how projects are undertaken and to generate efficiencies through so called ‘economies of repetition’ (Davies and Brady, 2000). Such repetition of projects allows lessons to be learnt and best practice to be established, thereby leading to a more efficient and effective delivery of projects. Moreover, it is possible to develop common approaches, systems, management tools and methodologies to drive forward performance improvements in terms of project delivery (according to schedule, budget and quality parameters). The PMO leverages knowledge and resources, including people, finance and supporting infrastructure so that a focused service and organizational capability is available to support projects from the early conceptual stage through to commissioning, project delivery and finally project closure, i.e. across the full project lifecycle.

Many organizations have implemented PMOs to varying levels of success and there are a range of different types of PMOs. Originally established in the IT (Information Technology) sector, PMOs have now been set up in a range of industries that have requirements for technology and engineering projects, such as telecommunications, aerospace and construction. PMOs also support the development of strategic projects and have been viewed as an enabler to ensure strategic alignment of projects with corporate strategy. A recent survey of the project management profession by the PMI (Project Management Institute, 2014) found that somewhat alarmingly less than half (42%) of organizations report a high level of alignment between projects and organizational strategy. PMOs are ideally placed to improve this level of alignment and especially for technology and engineering projects where there can often be significant levels of technical and management uncertainty (Philbin, 2015) and such projects can also be subject to many challenges as reported by the Standish Group (1995 and 2009).

Implementing a new PMO structure requires a good understanding of the underlying features to be developed and it is therefore useful to be able to draw on supporting management frameworks. Consequently, some PMO approaches have been developed along with definitions. Indeed the Project Management Body of Knowledge (PMBOK) defines the PMO as “*An organization structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques*” (PMI, 2013). This definition is accompanied by the categorization of PMOs in terms of three types: supportive (1), controlling (2) and directive (3). Nevertheless there are still a lack a frameworks to properly describe the specification and functioning of the PMO. Therefore, this paper will provide insights from an exploratory study of the PMO approach to

organizing and managing projects, including the results of a structured literature review related to engineering projects that will be used to develop a framework to describe the potential role, structure and processes of the PMO. The findings will be used to develop a research agenda to inform future studies that are needed to further understand the theoretical basis of the PMO that underpins the practicalities in implementing an organizational PMO.

Literature Review

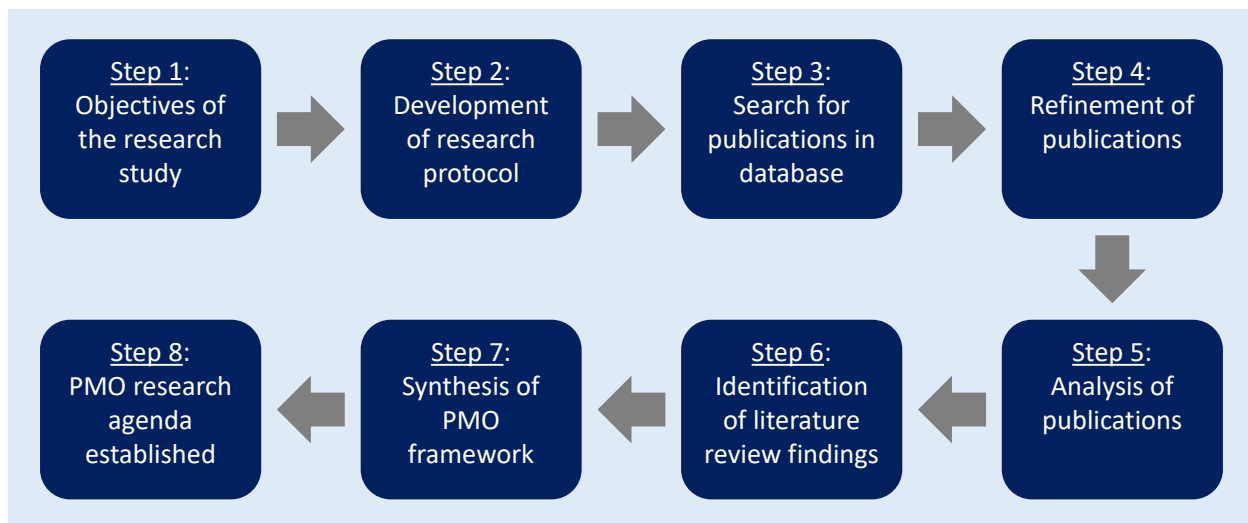
The literature review section includes details on the methodology used and initial analysis of the results.

Methodology

The literature review was undertaken through searches carried out using the IEEE Xplore Digital Library (IEEE, 2016), which was selected as the database of enquiry so that the publications would be related to engineering projects. Two searches were carried out on 18th February 2016. An initial search for “Project Management Office” resulted in 22 publications being identified and a further search for “PMO” resulted in 66 publications being identified, giving a total of 88 publications. However, the two searches included a number of repeated publications. There were also a number of publications from the PMO search that related to entirely different definitions of PMO, such as Probabilistic Multi-Objective, Periodic Mesoporous Oxide and Project Management Overnight model. Furthermore, there were a number of publications that did not cover the PMO in any significant detail but were instead more generally related to IT projects. Consequently, once these exclusion criteria had been applied the total list was reduced to a set of 15 publications that focused in detail on the PMO in relation to technology and engineering projects.

Exhibit 1 provides an overview of the main steps of the research methodology. There were eight steps in total, with steps 1 and 2 being the initial steps associated with defining the objectives of the research study and development of the overall research protocol. Steps 3, 4 and 5 involved the database search, refinement of the results and initial analysis of the publications. Step 6 involved identification of the literature review findings in terms of four main areas, which are as follows: functions of the PMO (1), designing the PMO (2), implementing the PMO (3), and benefits of the PMO (4). Step 7 was the synthesis and conceptual development of the PMO framework in regard to role, structure and processes. Finally step 8 involved defining the PMO research agenda.

Exhibit 1. Steps of the research methodology.



Results

Exhibit 2 provides a graphical view of the publications according to the year of publication (from 2001 to 2015), which highlights the peak years of 2010 and 2013 with 3 publications from each of these years. Although 2014 and 2015 only have a single publication in each of these years, there does nevertheless appear to be an overall trend of an increase in the number of publications over the past 15 years. This can be discerned through considering the number of publications according to 5-year time periods (see Exhibit 3), although whether or not we are currently seeing a reduced level of publication activity (with a peak from 2010 to 2013) is difficult to know due to the

relatively small sample size. Exhibit 4 provides details on the source of the publications identified by the searches, which highlights that from the 15 publications there were 12 papers from conference proceedings and 3 journal articles (although 2 of these are opinion pieces, leaving only 1 full journal paper). This indicates that in the field of technology and engineering projects, the PMO is still a relatively new phenomena that is being reported at conferences but there is presently a lack of coverage in journals related to technology and engineering management.

In regard to the research methodology or type of approach employed in the publications, Exhibit 5 provides a breakdown of the publications according to the four main categories, which are as follows: hypothesis and survey instrument, case study investigation, practitioner insights reported, and descriptive commentary. This analysis identifies that there are roughly the same number of publications according to these types of approaches (research methodologies employed), thereby indicating no preference in the literature to a particular research methodology.

Exhibit 2. Publications per year.

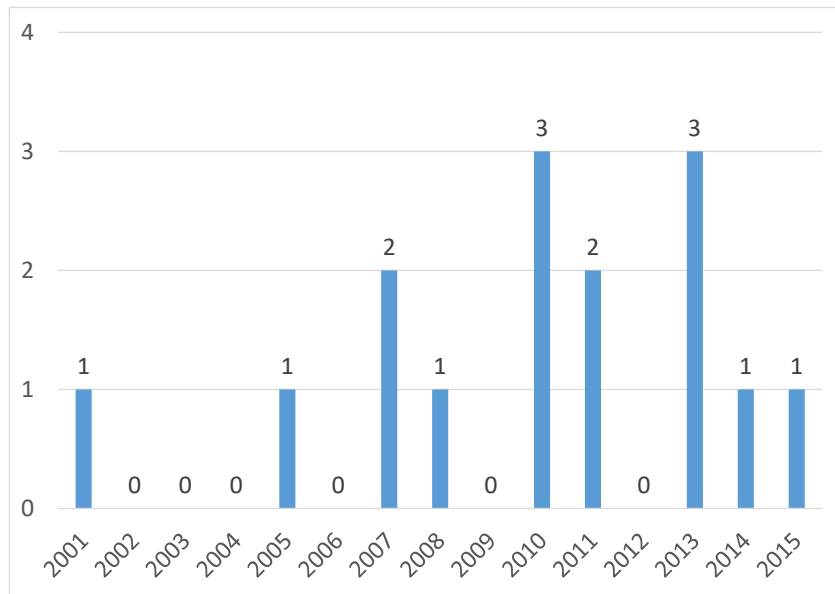


Exhibit 3. Number of publications per 5-year time period.

Time Period	No. of Publications
2001-2005	2
2006-2010	6
2011-2015	7

Exhibit 4. Source of the publications.

Publication Source	Number
IEEE Engineering Management Review	2
Proceedings of Portland International Conference on Management of Engineering and Technology (PICMET)	2
Proceedings of Agile Conference	2
Proceedings of Hawaii International Conference on System Sciences (HICSS)	2
IEEE Transactions on Engineering Management	1
Proceedings of International Conference on Management and Service Science (ICMSS)	1
Proceedings of International Conference on Engineering, Technology and Innovation (ICE)	1
Proceedings of International Conference on the Quality of Information and Communications Technology (QUATIC)	1
Proceedings of Andean Council International Conference (ANDESCON)	1
Proceedings of International Conference on Wireless Communications, Networking and Mobile Computing (WiCOM)	1
Proceedings of International Conference on E-Product E-Service and E-Entertainment (ICEEE)	1

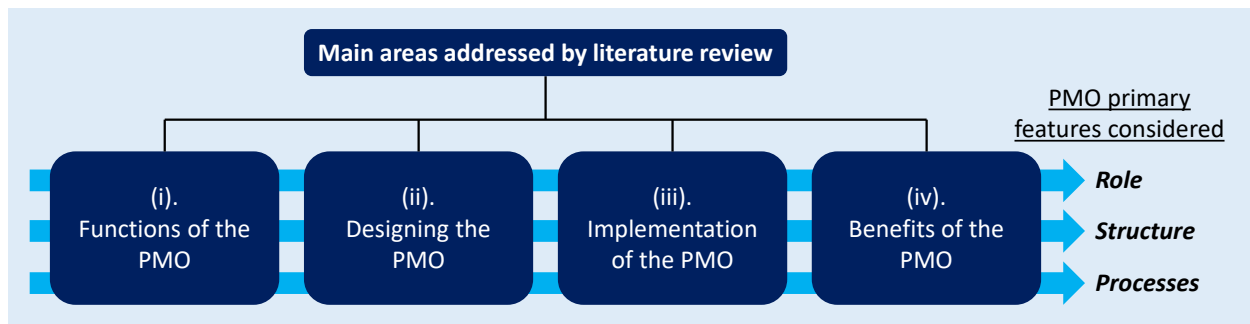
Exhibit 5. Research methodology of the publications.

Research Methodology (Type of Approach)	Publications	Number
Hypothesis and survey instrument	Martin, Pearson and Furumo (2005); Liu and Yetton (2007); Qing-Lan and Chang-Wei (2008); Anantatmula and Rad (2013)	4
Case study investigation	Bettin, Tobar, Prado and Da Silva (2010); Abdi and Kaddoura (2011); Polat and Meydanli (2013); Karayaz and Gungor (2013)	4
Practitioner insights reported	Tengshe and Noble (2007); Carrillo, Abad, Cabrera and Jaramillo (2010); Power (2011)	3
Descriptive commentary	Rad (2001); Yaning and Yuan (2010); Desmond (2014); Desmond (2015)	4

Findings from the Literature Review

The findings from the literature review are summarized according to four main areas, which are relevant to both the theoretical basis of the PMO as well as capturing practitioner related insights. The literature has been reviewed according to these areas but with additional consideration of the PMO primary features, namely role, structure and processes, undertaken for each area (as depicted in Exhibit 6).

Exhibit 6. Scheme for literature review findings.



(i). Functions of the PMO

Desmond (2014 and 2015) cites the recognized PMBOK (2013) view of the PMO through the three definitions, which are as follows:

- Supportive PMO – This type of PMO provides a consultative role for projects through the provision of templates, project management best practice, training, access to information as well as lessons learnt from other projects. The PMO is basically a knowledge repository, where the degree of control is low.
- Controlling PMO – This type of PMO provides support and requires compliance of projects via various means, such as through the adoption of project management standards, using specific templates, forms or through conformance to certain governance arrangements. The degree of control provided is moderate.
- Directive PMO – This type of PMO has direct control of projects through provision of project management services to enable delivery of the projects. The degree of control provided is high.

Although the level of control increases (from supportive to controlling to directive), all of these models provide a standardized approach, or system, to facilitate the efficient and effective delivery of projects from the outset to completion. This standardized approach will likely include certain materials and documents (i.e. management products), which support the delivery of the project outputs (i.e. technical products). The PMO is able to provide portfolio level oversight of projects and support the measurement of project performance according to defined KPIs (Key Performance Indicators). Furthermore, the PMO can be viewed in terms of people-oriented functions (such as provision of project management staff, training and consultancy services) as well administrative-related functions, such as maintaining project archives and lists of approved contractors and vendors (Rad, 2001).

Yaning and Yuan (2010) identified certain functions of a PMO in the context of multi-project management in the construction sector. These functions are as follows: development and maintenance of management standards

and procedures to support multi-project management (1); support for resource planning and analysis across a defined set of projects (2); allocation and coordination of resources across a defined set of projects (3); provision of management oversight for all projects, with monitoring and corrections undertaken where necessary (4); provision of management information systems to support the project management process, including consulting and project closure services. The functions point to a holistic perspective of the PMO that includes process, resource and system aspects. The authors also identify how organizational complexity can increase in multi-project environments and the PMO is ideally suited to help address the resulting issues and challenges that may arise.

Anantamula and Rad (2013) have posited that the PMO should be viewed as being a complementary and supportive unit, and not as a rigid and overly administrative unit that may stifle creativity and the necessary flexibility. The PMO should be aligned to organizational strategy and the level of PMO functionality (or reach across the organization) should be a function of the strategy with the resourcing and staffing of the PMO being at a level commensurate with the required functionality. Where a mismatch between required functionality and resourcing occurs, then dissatisfaction in the performance of the PMO may result. Moreover, the PMO is not restricted to supporting traditional project management methodologies (*cf.* the waterfall methodology for IT projects) and has been reported as supporting agile project management through either an Agile PMO (Tengshe and Noble, 2007) or Agile Office (Power, 2011).

(ii). Designing the PMO

In regard to designing a new PMO, Bettin et al. (2010) identified through a case study investigation of implementing a PMO at a research institute, five 'fronts' that need to be addressed. These are as follows: procedures for project management based on the recognized PMBOK; management tools that are standardized and made available to project managers on a central server; instigation of training for project management staff; contract management and financial planning, which was again made available on a central server; project management support through the expertise of the project management staff and according to the adopted standard (e.g. PMBOK). This work also highlights a broad consideration of factors that can be considered when designing a PMO, as was observed previously for the functions of the PMO. In other work, Polat and Meydanli (2013) identified three types of PMO, which are the project control office (level 1), business unit project office (level 2) and the strategic project office (level 3). Here the level 1 office is focused on a single project, whereas a level 2 office provides support to projects across a department or division, and a level 3 office supports project activities and governance arrangements at the corporate level. In designing a new PMO, it is therefore useful to consider at what level in the organization the PMO will be expected to operate and make an impact.

Yaning and Yuan (2010) have proposed an organizational structure for the PMO, which is managed by a PMO director that reports to the organization's general manager. The director oversees four areas, which are as follows: resource management team, project assessment team, management support team and the supporting information management systems. In this model, the PMO becomes responsible for the multi-project selection and assessment process, along with resource integration and allocation as well as coordination and resolving any arising conflicts between the projects under management. Therefore, the design of a PMO should take account of these factors so that the necessary resources, processes and systems are in place to support project initiation and delivery. An inability to properly resource a PMO is likely to result in a diminished level of support that can be provided, thereby lessening the positive impact that the PMO should have on project performance. Consequently, a poorly resourced PMO may be 'set up to fail' from the outset, whereas a PMO that has the necessary resources, along with an appropriate amount of time to build up operational and strategic level activities and interactions within the organization, is much more likely to have a positive impact on project performance and thereby support the sustainability of the PMO as an organizational unit.

Carrillo et al. (2010) has derived a set of roles and responsibilities for the PMO team, which is useful to consider when designing a PMO. The PMO team includes the following proposed roles and responsibilities:

- PMO coordination – Administration of the PMO, presentation of reports, team coordination and project committee membership.
- Tool management – Enterprise Project Management (EPM) tool and document management, tool updates and improvements.
- Resource management – Allocation of resources and follow-up activities to obtain project results in the required timeframe.

- Follow-up management – Metrics management to measure project health and progress, follow-up of various areas, including project risks, global problems and budget, preparation of progress reports for projects.
- Mentoring management – Socialization of the project management process, creation of policies and procedures, training on project processes and tools, improvement of project plans and organizational templates, implementation of new plans to increase project management maturity.

This provides a useful set of areas to consider when designing a PMO in regard to the main roles and responsibilities that need to be included. Ideally such roles and responsibilities can also be related to both the operational and strategic dimensions of the PMO (Karayaz and Gungor, 2013).

(iii). Implementation of the PMO

Implementation of a new PMO structure may potentially require a cultural change in the organization that is a consequence of the new approach to managing projects and consequently it may take substantial time and effort for the new structure to be properly embedded in the organization (Polat and Meydanli, 2013). As part of the implementation process for a new PMO, it is useful to consider whether the PMO will be required to operate at the operational or strategic level (Karayaz and Gungor, 2013). In the case where a PMO is set up at say the level of n-2 (where n is the CEO level), it is highly likely that the PMO will not have direct access to contribute to strategic level decisions and in such a case, the outlook and activities of the PMO will be more likely to be at the operational level. In cases where no strategic input is required, establishment at n-2 or even n-3 is appropriate, although if strategic or corporate level impact and support to the corresponding decision-making is required, forming the PMO at n-1 would be more suitable. Therefore, PMO implementation needs to take into account such factors in regard to the required operational/strategic focus. Moreover, implementation is also likely to be contingent on the specific organizational context and blindly pursuing a ‘one size fits all’ approach to establishing a new PMO is therefore discouraged.

Implementation of so called business-driven PMOs may benefit from adopting a more process-based management approach and not simply having a focus on tools and documentation (Carrillo et al., 2010). Other factors to consider for PMO implementation include the need to have an initial and clear focus on defining the overall role of the PMO and the team responsibilities required to support such a role. This should be accompanied by establishment of the PMO structure and communications model to ensure effective interaction with PMO stakeholders and any executive level sponsors of the PMO initiative. The PMO operating model in terms of the type and scope of projects should be defined and implemented along with the necessary project and PMO governance arrangements, such as the project committee structures. Appointment of the PMO team members followed by implementation of the overall project management process is required, i.e. including use of work breakdown structures, Gantt charts, resource plans and risk registers, etc. Definition of business oriented measurements and indicators as well as the continuous improvement process is recommended. Finally, assessment of the status of implementation and performance across these areas, which can be considered as the ‘PMO building blocks’, is undertaken in order to inform project maturity assessments and capability improvement plans.

Realizing a level of maturity in the use of project management processes and systems can be a determinant to the success of PMO implementation (Abdi and Kaddoura, 2011). Furthermore, using benchmarking and quality assurance techniques to assess the status and use of process methodologies is encouraged, where achievement of a recognized level of process implementation, for instance according to CMMI (Capability Maturity Model Integration) level 2 would be a desired goal for the PMO implementation process.

In regard to the implementation of an Agile PMO, Tengshe and Noble (2007) recommend that organizations should build on and leverage the capabilities of an existing PMO. This assumes of course that there is already a PMO in place. An existing PMO is viewed as being an effective platform to implement appropriate metrics to support Agile project management, such as Scrum, Extreme Programming and DSDM (Dynamic Systems Development Method). The ‘right kind of people’, with an open mindset and an inherently flexible approach, are also needed to staff an Agile PMO. Finally, securing the necessary executive level sponsorship through having a strong champion from senior management is recommended. Other factors that support the implementation of an Agile Office (Power, 2011) include the need for strategies to support stakeholder engagement (including again the executive level interaction) as well as having an overall roadmap to support Agile adoption.

(iv). Benefits of the PMO

A number of benefits have been identified for the PMO, for example, in terms of corporate efficiency, client satisfaction and staff effectiveness, which has been viewed as outweighing the costs of staffing the office (Desmond, 2015). Moreover, the PMO is able to act as a knowledge repository for project management arising from the collective experience that is built up from managing successive projects. The PMO is also able to facilitate working across organizational silos and help break down barriers that may exist between different departments within an organization. Benefits of the PMO can be considered from the strategic perspective, where the PMO (along with the related constructs of program management and gate reviews) can play a positive role in helping organizations to implement strategy and lead to improved organizational performance (Qing-Lan and Chang-Wei, 2008). Although the findings from this empirical research are tempered by the view that an overly homogenized (or standardized adoption) of project management standards (especially to support differentiation and not low-cost business strategies) can result in certain negative consequences, such as stifling innovation.

Bettin et al. (2010) found that the installation of a PMO at a research institute resulted in more accurate control of project information and also enabled less effort to be expended in order to monitor and record project status. Moreover, this study highlighted that the PMO contributed to a significant reduction in the number of non-compliance issues encountered, i.e. through audits of the hardware department in the institute. Martin et al. (2005) identified through empirical research that the PMO can influence an organization's ability to complete a project within budget, although they also found that the PMO has little influence on the quality or schedule adherence of information system (IS) projects. However, it is not clear whether these findings would be the same or similar for projects other than IS projects, i.e. projects from other sectors, such as manufacturing or construction.

In other work, Liu and Yetton (2007) found that the PMO can have a positive impact on project performance where there is a high level of task uncertainty and this situation was viewed as being a high information processing capability due to the level of uncertainty that was being managed. They also found that for projects with a low level of task uncertainty, project reviews were adequate in achieving a positive impact on the performance of the projects with this situation representing a low information processing capability corresponding to the lower level of uncertainty. This research was conducted for IS and construction sector projects and the level of task uncertainty was identified to be higher for IS projects, which are often subject to significant uncertainty at the requirements definition stage, whereas in the building trade it has been possible to drive down levels of uncertainty in construction project management. Nevertheless, this highlights the effect of the industry sector can have on the level of task uncertainty and therefore the scope for a PMO to support positive improvements in project outcomes, with this research pointing to sectors with higher levels of uncertainty being those that would benefit the most from deploying a PMO to oversee and support project management activities.

In terms of project success, delivery within budget and schedule as well as meeting quality expectations is clearly important (i.e. achieving the so called 'iron triangle' of project requirements), although generating customer satisfaction and ensuring customer needs are fully addressed can also be important outcomes (Anantatmula and Rad, 2013). Consequently, ensuring this wider (holistic) set of project criteria are realized is a desirable objective for project-based organizations. This can be achieved through organizations instituting various structures and processes associated with gaining a satisfactory level of project management maturity across the organization, which include formalized and established project management procedures, project portfolio management, project manager certification as well as adoption of the PMO.

PMO Framework

The literature review has identified a significant number of features of the PMO in terms of the role, structure and processes. This information can be synthesized into a supporting framework that captures the key information in a logical manner, which can inform future studies and also be of use to practitioners seeking to develop a new PMO as well as improve the structuring and processes of an existing PMO. Consequently, Exhibit 7 provides a schematic view of the role of the PMO and Exhibit 8 provides details on the structure and processes of the PMO.

The role of the PMO can be viewed in terms of the strategic and operational dimensions and the framework provides the scope and activities along with corresponding benefits for both of these dimensions. It is envisaged that the specific balance of strategic and operational activities of a given PMO will depend on the organizational needs and requirements for establishing the PMO. This should be taken into account when the organizational positioning of the PMO is considered, e.g. whether it sits at the departmental, divisional or corporate level. The specific structure of the PMO within different organizations is likely to differ but nevertheless the framework provides the overall set of structural components together with the accompanying processes as well as the resources required to support such processes.

Exhibit 7. Role of the PMO.



Exhibit 8. Structure and processes of the PMO.

Structural Components	Processes	Resources
(1). Governance arrangements	<ul style="list-style-type: none"> Corporate and division level project approval Annual corporate planning round Ethics and audit compliance 	<ul style="list-style-type: none"> Corporate or senior level management Executive level sponsor of PMO Organizational compliance and audit office
(2). Direction and team management	<ul style="list-style-type: none"> Management of the PMO and team members PMO strategy development and roadmap Portfolio/program level management 	<ul style="list-style-type: none"> PMO director Director's office/administration Director's network and peers
(3). Project management	<ul style="list-style-type: none"> Project management (PMBOK or PRINCE2) Data and information management Risk management & quality management 	<ul style="list-style-type: none"> Project managers Budget for project management training Decision-making tools & financial models
(4). Project support and administration	<ul style="list-style-type: none"> Project and contracts administration Financial management and cost control Support to training provision 	<ul style="list-style-type: none"> Project administrative staff Contracts, finance, process & systems staff Budget for project management
(5). Systems	<ul style="list-style-type: none"> Project management ICT system ERP (Enterprise Resource Planning) CRM (Customer Relationship Management) 	<ul style="list-style-type: none"> Project management and related software systems (likely to be cloud-based) Access to corporate level systems
(6). Tools	<ul style="list-style-type: none"> Project management tools, e.g. EVM Data and information management Performance measurement 	<ul style="list-style-type: none"> Standardized documentation, e.g. project plans, Gantt charts, risk registers, etc. Management scorecards and databases

Research Agenda for the PMO

The research agenda has been developed through considering the findings from the literature review in the context of the proposed PMO framework. Therefore, it is suggested that the following research areas are pursued:

1. Understanding the strategic and operational dimensions as well as focus of the PMO.
2. Exploring the role of the PMO in non-IT sectors, such as pharmaceutical, aerospace, manufacturing, construction and higher education.
3. Balancing the need for standardization with the ability to remain flexible and support creative solutions.

4. Project management tools and systems designed to support PMO level applications.
5. Pathways to project management maturity and the role of the PMO.
6. Application of project management techniques, such as EVM (Earned Value Management), to support the operations of the PMO.
7. Integrating portfolio, program and project level management as part of the PMO.
8. Development of PMO level key performance indicators (KPIs).

Conclusions

Ultimately the main purpose of the PMO is to facilitate project success through standardizing projects and implementing best practice, mitigating project risks and supporting effective project delivery according to schedule, budget and scope requirements. Although the PMO has been adopted by many organizations there are unfortunately still a lack of studies in the literature as well as supporting frameworks that describe the functioning of the PMO. Consequently, this paper has provided the results from an exploratory study in order to investigate the role, structure and processes of the PMO.

A structured literature review identified 15 publications that provided significant details on different aspects of the PMO related to engineering project management. Consideration of the literature review findings has allowed the PMO framework to be synthesized that identifies the role of the PMO in terms of both the strategic and operational scope along with corresponding benefits. The PMO structure is also proposed with supporting details on the processes and resources required to implement the structure. This framework can be used by practitioners looking to develop a roadmap for a new PMO and in cases where enhancements or improvements are sought for an existing PMO. It should be noted however that any PMO implementation should be contingent on the organizational circumstances and specific needs for the PMO. Adopting a 'one size fits all' approach is not recommended although there are benefits from identifying and communicating PMO best practice, which this study has sought to achieve.

A specific theme arising from analysis of the PMO is the need for standardization and even in the case of an Agile PMO or Agile Office, there is likely to be a standardized mechanism adopted for the management of projects, e.g. through Scrum techniques and so called 'project sprints'. It is recognized that the PMO should support a level of standardization for projects (i.e. in terms of certification, systems, documentation, reporting, performance measurement, KPIs, etc.), although the benefits of a standardized approach should be balanced with the need for flexibility and the ability to pursue creative solutions especially to handle problems and major issues encountered for projects. The overriding factor in this instance should be that the projects remain aligned with organizational and corporate objectives and do not result in an expanded risk profile for the organization. The potential for standardization to compromise flexibility and creativity can therefore be seen as a possible drawback of the PMO.

In terms of other observations on the suitability of the PMO, there is a need to consider the level of project complexity (and corresponding information processing requirements). In cases where project complexity is low, there is likely to be less of an opportunity for a PMO to make a positive impact, whereas the PMO approach to managing projects may be more suited to managing in complex multi-project environments. A further factor to consider is the cost of operating and resourcing the PMO and this cost will need to outweigh the benefits arising from implementing the PMO (according to defined KPIs) especially if the PMO team is to be financially sustainable in the organization. In this regard, particular attention needs to be paid to how the PMO is funded; is it funded through a central cost centre provision, or via staff recharge on externally funded contracts? Nevertheless, the PMO approach offers many benefits for technology and engineering projects, which have been illustrated in this paper.

The framework has been developed to advance the current level of knowledge on the PMO and this has also allowed a research agenda for the PMO to be proposed. Further research is also suggested in order to provide an empirical basis to the merits of implementing a PMO approach to managing in a multi-project environment. This could be via a case study investigation of a single PMO application and/or through a broader study involving use of a survey instrument in order to determine the validity of selected hypotheses relating to the PMO. In such a case, the use of structural equation models for hypothesis testing is suggested.

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