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THE PMO BLUEPRINT: A MODULAR TEMPLATE TO ESTABLISH A PMO IN AN IT ORGANISATION

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ABSTRACT

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Project Management Office (PMO) is an emerging solution to mitigate complex projects in mid to large companies. To endure the fierce competition between project-based organizations, PMO has been a useful tool to resolve various project management related constraints. Large multinational organizations in Finland have implemented PMO in the last 5-10 years, with growing interests from mid-sized ventures. The objective of this thesis is to produce a PMO template that can be shaped as required from an objective point of view.

This thesis explains common project management terminologies while concentrating only on the elements that affect project management on a higher level. The literature then proceeds to theorise why a PMO is the answer to current organizational complexities. The theory is proven correct by the means of available literature, white papers and participant companies. This thesis compares previously available blueprints, maps them with literature and then validates the mapping from the responses by interviewed participants. The validated blueprint is then divided into arrangeable tasks or milestones which follows a project lifecycle template. Finally, the division is checked for time-validation based on a quantitative survey of 2020. Ultimately, this results in a step-by-step cookbook of project management recipe coined as Bhandari's PMO Blueprint.

This thesis concludes that Bhandari's PMO Blueprint is based on four pillars of project management: project governance, resource management, portfolio management and strategy. These pillars are supported by PMO sustainability through training and competency improvement, whereas overseen by a global PMO in the long run.

Keywords: Project Management Office, PMO, project portfolio management, conceptual framework

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1 Introduction

1.1 Topic overview

The gradual change from waterfall to agile in multinational technology companies has been a trend in the current context. To supplement the change, implementation of proven methodologies and development of new practices in rapidly growing corporations is visible, such as the innovative customer orientation, capital operation and asset management of Tesla (Liu and Meng, 2017). Agile, Lean, Scrum, ITIL, PMI are some of the gold standards of project management methods and frameworks. However, it is not certain that the same set of proven methodologies can be implemented to diverse corporations.

With the objective to produce a product, a service, or a solution, projects are unique undertaking including a pre-defined objective, requirements, scope of work, timeline, and budget (Lewis, 2006). Management of projects is a temporary affair which requires concentration of resources allocated to fulfil the set objectives. These resources can be people, location, funds, equipment or tool that aid in fulfilment of the planned objectives (Watts, 2014).

Among multiple project management strategies, a Project Management Office, commonly known as the PMO, is a concept that even though originated in the 1950s, is currently being implemented across organizations throughout the world (Hraki & Benny, 2015 and Karkukly, 2015). Even though the PMO funnels strategy, project and program into performance, there are little to no sets of definitive steps that can be followed as a template while establishing an effective PMO.

1.2 Research problem

This thesis aims to understand the current state of PMO implementation in large-scale businesses and identify possible gaps between theory and practicality. Thus,

a template for best project management practice for organizations with established PMO will be suggested in the form of a blueprint. This research aims to answer the following:

a. What is PMO and how does it facilitate the organization?
b. How can it be implemented and improved?
c. How does the proposed framework improve the current PMO processes and how is it helpful?

This thesis will principally suggest the implementation of a PMO framework which envelopes all the stages of PMO involvement during the lifecycle of a project. On the theoretical implication, this framework can be further improved in the future to provide a better structure of template in accordance with the current trends and necessities. On the practical side, the situation of PMOs in subject companies will be examined with the aim to find process gaps. This conceptual blueprint will be offered to the subject companies for application in their real-world project lifecycle.

1.3 PMO hypothesis

1.3.1 Why projects fail

Unrealistic scope, improper management, underdeveloped technology, organizational goals, and custom work are some of the bottlenecks for project failure (Murray, 2000). On the other hand, realistic scope, proper management, user involvement, organizational goals and smaller project milestones are seen as project success factors (Clancy, 1995). A survey of 588 respondents in 2020 concluded that lack of effort, lack of resources and unclear scope, objectives or requirements were the cause of project failure. It was identified that 10% of projects can fail without proper project management (The project group, 2021).

Covering a vast variety of causes, project failures are common. Insufficient communication, harmony, estimation, planning, progress, or quality control are factors resulting in inferior output (Stamatis, 2012). Rajegopal et al. (2007) have identified areas of pain regarding project management, some of which are:

a. No alignment between project delivery and business growth
b. No alignment between goals and objectives
c. No visibility of project status and activities
d. No support or sponsorship from management
e. No practical time, resource, or technology
f. No transparent communication, planning, allocation, or accountability.

Many projects fail due to their dynamic nature and difficulty in coordination in an unfamiliar environment. Therefore, effective control and planning are

required for their success. Processes that adhere to structured organization, demanding timeline, strict requirements, and objectives are required for a project's success (Harrison & Lock, 2017). Projects that were led by technically skilled project managers have been proven to be successful. They seem to be able to estimate and implement project plans skillfully. Companies currently focus on project management because the application of correct tools and managerial processes by a technically skilled manager aids in accomplishing project objectives with a higher efficiency. However, it is the project's success criteria that determines whether it succeeds or fails, rather than depending on the manager (Attarzadeh & Ow, 2008).

On the contrary of timeline, project failure is perceived in the development phase where identification, resourcing, planning, acceptance, support, and tools fail to align with the project objectives (Pinto & Mantel, 1990). Thus, a proper project management practice could mitigate the gap between the failure factors.

1.3.2 **Empirical hypothesis**

This thesis hypothesizes that ICT companies with complex projects implement PMO in order to efficiently handle projects. Therefore, based on design science research, a framework is proposed as the appropriate solution for companies with desire to establish a PMO and improve the existing PMOs for ICT organisations with an outdated PMO.

The design research method researches a real-life problem of complex projects in ICT companies, specifies that PMO is the solution, produces a framework based on available frameworks and literatures and implements an artifact which is relevant to the problem in hand (Richey & Klein, 2014). It gauges and improves the quality, usefulness and efficiency of the framework based on qualitative interview contribution as the research progresses.

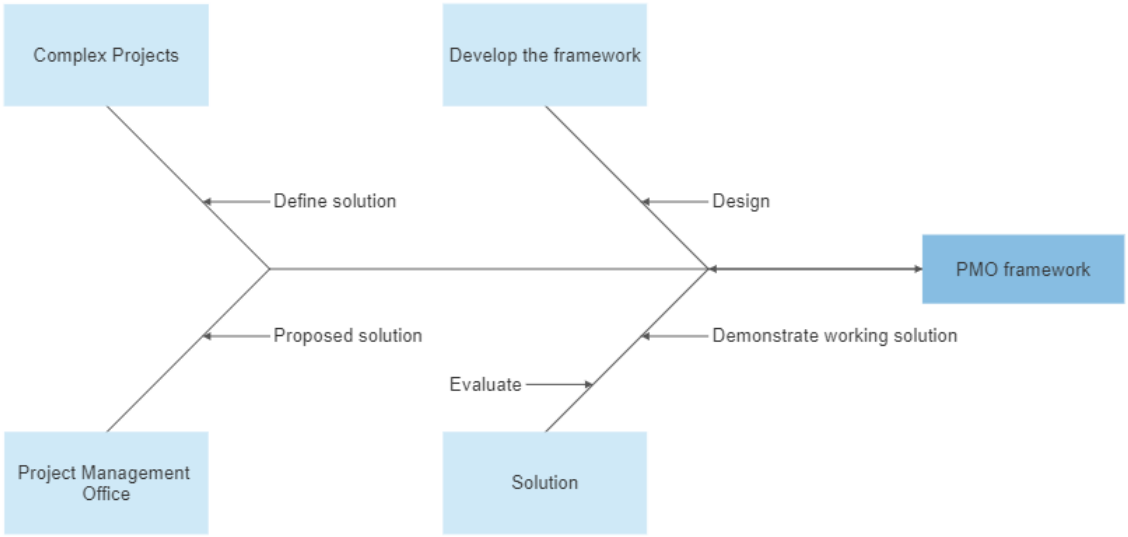

Figure 1: The placement of a PMO based on project governance framework by Too & Weaver (2014)

2 Theoretical Framework

This topic will explore the theoretical framework of the thesis where the common practices of IT project management will be focused. Starting with widely recognized methodologies of project management, followed by specific establishment and operational procedure of the project management office, concluding with emphasis on the shortcomings of a PMO and how it can be mitigated.

The Project Management Institute (PMI) argues that project management varies from general management, that a project management has a definitive timespan, whereas general management is a continuous process (PMI, 2017). Management of a project is done to achieve a desired future state of a new process, product, or structure in order to improve the efficiency by solving present obstacles or gain a competitive advantage with an opportunity (Turner, 2009). The success of a project has dependencies with the success of project management, which is the reason for the requirement of co-existence and equal importance of the two (Munns & Bjeirmi, 1996). Project management has transformed along with the changing requirements of decentralized and complex structure of commerce, industry, and management, especially with the emergence of IT projects. It has developed in either of two ways with the changing environment: (1) advancement with the characterization and study of practical as well as theoretical application of project management and (2) deployment with the characterization and study of the wide participation by human resources (Bredillet et al., 2010).

Turner (1998) proposes five functions for project-based management: organization, scope, time, quality, and cost. On the other hand, it consists of expecting the potential obstacles, formulating a disaster management plan if needed and keeping the timeline on track to achieve the pre-conceived goals regardless of the uncertainty (Lock, 2021). These rigorous tasks require the stakeholders' pivotal role of plan and control of involved resources, especially the communication relay to all involved parties (Harrison & Lock, 2017).

Project management lies directly underneath the organizational board, in sync with the head management. Depending on the organizational structure, a well-structured project management team comprises managers from various business units such as production or marketing who work as a coherent team faithful to a common objective. This practice is prevalent in a large and structured organization with complex projects with substantial organizational changes, large timeline, and considerable budget (Lock, 2021). On a general practice, project management culture encourages contribution to future changes, global thinking, resource consideration, expected and unexpected business change management (Whitty & Maylor, 2009). On the contrary, Burbridge (1989) and Turner (2005) advocate that project management is an art of procuring reality from vision.

The PMI published guide to project management body of knowledge, generally known as PMBOK, gets updated based on changes to conform to the latest role delineation study. The sixth edition of which identifies 10 Knowledge Areas covering project integration, scope, schedule, cost, quality, resource, communication, risk, procurement, and stakeholder (PMI, 2017). Project portfolio management oversees all these knowledge areas as an overall control point; thus, it has been identified as an important sub-chapter in this thesis. The activities included in a project portfolio management tracks progress of both agile and waterfall projects into a project portfolio, supports change management and mapping of projects based on KPIs, strategic contribution and customer satisfaction (Pöntinen, 2019).

2.1 Project management in an IT organisation

Project is a unique temporary advancement endeavor with predefined scope of work which consumes resources, has specific timeline, and provides profitable gain to the organization either competitively or financially (Turner, 2009 and Jetu & Tiedl, 2012). The objectives of a project are pre-specified with a constraint of funding, time, and resources (Kerzner, 2018). In general, all projects have decisive scope with clear objectives, co-dependent assignments with defined timeline and allocated resources within the resource constraints (Soldano and Krueger, 1944). Young (2007) characterizes projects with the following attributes:

a. has a predefined specific objective
b. is temporary and unique to daily operations
c. is customer-centric
d. comprises dependent tasks with contribution to the objective
e. has specific milestones
f. is complex
g. open to change
h. is budget-constraint
i. educate team members with new skills
j. changes normal work practice
k. aims to plan, mitigate and retrospect possible risks
l. can be divided into fragments of smaller projects

A project with cross-functional team members such as highly skilled personnel from different levels of organization with different roles provides coordinated results which would be hard to achieve with a team of members from a single business unit. The reason being the application of a diverse set of resources who specialize in a particular set of skills, which in general, is not expected from a single team member (Young, 2007). However, the inclusion of highly skilled individuals might result in clashes of ideas, specifications, theory, or vision. Thus, to mitigate the responses of all involved stakeholders, a skillful project manager

is required (Dinsmore, 1993). The task of a project manager can be supplemented with project management methodologies and frameworks such as Aubry et al. (2007)'s organizational framework.

Similar to project management, projects with new and innovative value-added benefits have been improving and advancing (Hainsch & Wald, 2011). For a large organization, a project may vary by size, duration, and type such as business transformation, companywide information systems upgrade or strategic implementation. Independent of the business model of an organization, a project provides a detour to achieve an advancement in a multifunctional restricted environment (Rajegopal et al., 2007). It can also be considered as an independent or supplementary activity to normal operations which is aligned with the demands of the future desired business operation (Young, 2007).

Thompson (2019) and Bell (2013) divide a project's lifecycle into five phases based on the delivered output:

a. Initiation where the project is defined, and resources appointed.
b. Planning where suitable documentation is done based on scope and phase.
c. Approval where the deliverables are created and presented to the stakeholders for acceptance.
d. Delivery where, after the acceptance of deliverables, the project is executed.
e. Closure where the delivered execution is accepted by the stakeholders and the project is formally closed.

However, Hill (2008) and Westland (2006) divide a project into initiation, planning, execution, and closure where approval and delivery are considered under execution, where the built deliverables are monitored and controlled. These divisions are either separated as sprints for agile projects or project milestones (PM) or gates for waterfall projects.

A project is considered a success when the implementer has achieved stakeholder satisfaction, organizational effectiveness, and economic prosperity (Shenhar et al., 2003). Therefore, for a project to close, it is necessary that it is run to achieve an objective, solve problems, or gain situational advantage by delivering specific deliverables. A successful project will be completed on time, within budget and resources and meet the performance objectives (Gray & Larson, 2008). The team members gain the benefits from the project objectives whereas the project manager gains an accomplishment (Biafore & Stover, 2012).

The difference in project management in traditional business companies and IT companies is the frequency of changes in project execution and management methods, tools and skills. Thus, various IT project management methodologies are proposed for software development projects, such as cloud-based IT project management proposed by Alemu et. al (2020) where a layer of security, privacy and requirements are met according to the service agreement. However, the classification of a project into IT project or traditional business project is the choice of upper management.

2.1.1 **Types of projects**

Based on various characteristics a project has, of which timeline being the primary, there are two common modes of IT projects: waterfall and agile. There is a mid-point which is also referred to as hybrid-agile or waterfall light which is implemented for smaller projects with minimum risk focused on fast implementation. Depending on the size of the organization, a dividing point between an agile and waterfall is the milestones or gates and a specific budget amount threshold.

a. Waterfall

A waterfall mode is applicable for big projects with higher risks and several complex dependencies. The project activities are sequenced into steps with specific deliverables and dependency on the completion of previous steps. Waterfall projects are not dynamic as the original project proposal cannot be changed due to the impact on the whole project (Lindblad, 2021). Therefore, the primary focus of the waterfall method is the detailed preparation of a linear plan. Säisä et al. rightfully point out in their study that this is the project lifecycle understood and practiced in general businesses.

A linear waterfall lifecycle has the following common milestones: plan, design, build, verify and deploy, also known as CDIO approach as mentioned by Säisä et al. (2018). When a project is initiated, it is launched, committed, design made ready, solution made ready, solution accepted by key users and handed over for completion.

The study by Säisä et al (2018) also points out that a waterfall project's deliverables and timeline are described at the earlier stage of the project, which is a difficult feat to achieve as it is possible that project members are not available for a certain duration due to sickness, resignation, or other factors. Due to the dependency of the prior task to the forthcoming task, it would be then not possible to move the project forward if any phase in the linear process is halted leading to the project either not meeting the deadline or not having a promised solution ready. The static planning also means testing or changing of project objectives is a cumbersome task (Lindblad, 2021).

The PMI and Projects IN Controlled Environments (PRINCE2) are popular organizations who advocate waterfall due to the tried and tested methodology. Although there are alternatives to waterfall modes, the reason according to Croitoru (2018) why waterfall is preferred by customers is the acceptance of an agreed project which simplifies design and development for the steering team and visibility of the project outcome to the customer. The pre-agreement with the customer means there is no disturbance to the project designing and building phase of the project from the customer's side.

Conflictingly, the advantage of a waterfall model is the disadvantage as well. In a situation of a change requirement proposed by the customer or a mistake while planning a phase, an overhaul is required. Substantial amount of work needs to be discarded to implement the change. To mitigate this in foresight,

tremendous amounts of background documentation is required, which in turn is difficult to visualize while presenting the larger picture to the involved stakeholders. Therefore, a small change request would create a vicious cycle of documentation impacting the project performance (Croitoru, 2018).

b. Agile

Agile or nimble refers to the swift movement and tackling of obstacles, which is the very ability expected from an agile project manager. Agile mode is a technique that adds value to the project in short development cycles of continuous improvement known as sprints (Lindblad, 2021). The solution acceptance stage in a project is repeated with a small yet important change as a sprint during the product development lifecycle (Pries & Quigley, 2010). A sprint can either be approved by the client and integrated to the project or can be terminated if the solution does not meet the requirements. This method is visibly prevalent in software development because of iterative development cycles with changing priorities and fast releases that are usually required in software development rather than business development (Thompson, 2019). Nonetheless, experienced project managers adapt rapidly to changes in projects and implement changes seamlessly.

The primary goal of an agile project is to reduce waste of resources and concentrate on the prioritized change requirement from the backlog. Scrum Alliance (2015) claims that Scrum is the most popular agile methodology of project management among Lean, Kanban, XP and others, used by 95% of businesses which implement agile methods. This could be because scrum is adaptable as a modular framework as stated by Schwaber & Sutherland (2017).

Agile projects have short term goals visibility, which is the reason planning in detail is not required. An agile self-organizing team's goal at the conclusion of each sprint is to provide tangible product or service (Schwaber, 2004). The manifesto for agile software development prioritizes:

a. People and interaction over process and tools
b. Working software over comprehensive documentation
c. Customer collaboration over contract negotiation
d. Responding to change over following a plan

Due to the active involvement of the customer, they can accept or reject rapid responses of quick fixes based on the changing adaptation of new technology and market demand. Therefore, the product or service is tested at the end of each iteration which in turn produces a result that meets the quality standards while maintaining transparent communication (Thompson, 2019).

Unlike waterfall, an agile project consists of a cross-functional team with close coordination and control over the project. A scrum core team consists of a scrum master who oversees that the team adheres to the Scrum Framework, a product owner who evaluates the end product delivered by the team and the

development team who develop the expected results and services (Santos et al., 2018). Lindblad (2021) claims that scrum surrounds the idea that any of the core team members can handle any task of a sprint. Daily scrum sessions ensure the continuous flow of results, while daily testing will monitor possible bugs that could be found in the future. A proactive management will be able to adhere to the requirements rapidly to sync the client's expectations with their own vision. This progress is reported timely and transparently to the stakeholders.

2.1.2 **Common project management practices**

Project management is a well-perceived practice that is applicable at every organizational level in a business as the right application adds value to the business, provides financial benefits and efficient management practices (Kerzner, 2015). It lies within business management and is considered as an integral business function. Hubbard & Bolles concluded in their 2015 research that an effective project management results in efficient cost, time, quality, and recognition to market (Hubbard & Boles, 2015). The history of applied Project management practices can be dated back to the construction of the Great Wall and Pyramids (Solomon, 2006 & Mpazanje, 2009). The most widely recognized project management practice being the management of people (Belout, 1998). The project management best practices book by Kerzner (2018) highlights the particular project management methodologies that have left an imprint on daily operations such as Lean methodology at Toyota, integrated multilevel scheduling at Airbus, earned value management at Sony and recognition of the need for supporting tools at Wärtsilä to name a few.

Recent studies have shown that businesses worldwide are iterating their method of operation into a project-based operation as either regular project management or as a strategic agile part-by-part application (Ward, 2010). Therefore, it can be observed that not all organizations apply the same project management practices. For some businesses it is centered around people and for others around systems or processes (Cooke-Davies, 2002). The changes in project management practices are required due to the dynamically changing features of the modern world, open competition between companies, increase in the sentiment of brand image and the efficiency of project execution directly dependent on the skilled human resources (Lock, 2021). It is proven from various project management research that efficient project management practices, processes and principles have dramatical effect on the product, service, cost, time, and quality to market along with brand recognition from the target consumers (Hubbard & Bolles, 2015).

Despite the large number of successfully implemented and launched projects, the documentation of project management methodologies is lacking. It is in retrospect that, for a successfully completed project, the principles, processes, and practices are documented (Seymour & Hussein, 2014). Olkiluoto 3 power plant in Finland can be an example where due to the lack of management of

design and other related compliances, the project had multiple overruns in budget and timeline causing compensation of over €800M (Vaskimo, 2021).

Change management, risk management, quality management, knowledge management, product management and portfolio management are some of the common practices of project management (Kerzner, 2000). Associated project management, also known as management by projects has been a widely recognized trend in rapidly changing organizations and the results have shown the potential to elevate company-wide performance, especially in a dynamic environment (Munns & Bjeinni, 1996).

During a project's lifecycle of initiation-plan- execution-closure, operational management is carried out during the static state of production or execution of the project. On the other hand, technical management concentrates on the theoretical and technological aspects such as policy checklists, design approvals and possible risks. Therefore, general, technical, and operational management can also be considered as practices of project management (Dinsmore, 1993). Specific project management practices identified in regard to this thesis are discussed below.

2.1.3 **Resource Management**

Resource management is the allocation of people (work), capital (cost) and material goods for efficient completion of a project. These resources reciprocate with the type and size of the project and the requirements set by the project steering team. For example, Gartner describes devices, software, networks, methodologies, physical structures, and interfaces as IT project resources.

The resource allocation for projects lies within the power of the project managers. A project manager can act as a resource manager in a smaller organization as they borrow resources based on their competences regarding particular project phases. It is an uncommon practice to allocate resources to the PMO (Hill, 2013). A PMO can influence the allocation and quality of resources and report its usage but has no jurisdiction over the overall allocation of resources (Hill, 2008). However, this definition does not consider the management of finances which is contradicted by Charvat (2003) who emphasizes that higher management and executives involved in the project identify cost as the KPI. Cost management involves estimation, budget allocation, budget transfer between projects, cashflow oversight and financial performance reporting (PMI, 2008).

Independent of the operation module, it is observed in common practice that the human resources (HR) department facilitates resource management and the PMO has the responsibility over availability of resources and reports the utilization of resources. The project or resource manager is facilitated by both departments. Overall, resource management aids PMO to align with the HR department with successful selection of resources.

With regards to PMO, it deals with the human resources of a project and fulfills the drivers for successful resource utilization which, according to Harris (2010), are training, travel, development of guidelines, evaluation of effectiveness

of resource performance, resources transfer, extensions, and termination. The dynamism of a PMO is required in resource management as both can have numerous configurations. This involvement of PMO arms the senior management for structured project management-based resource allocation in further project processes such as project portfolio management (Hill, 2013).

2.1.4 **Project Portfolio Management**

A project portfolio is a collection of simultaneously running projects within the same program. All projects under one program share the same resources and have a common strategic goal (Artto et al., 2011). It acts as an oversight to the upper management or executives on each of the projects under execution or planning stage. The engagement of these executives is coordinated by the project management office (Hill, 2013).

The PMI (2019) states that the goal of a project portfolio management (PPM) is to manage all projects in a single constitutional management system to concentrate organizational resources correctly based on a project's priority and impact on overall business strategies. This claim is further proven by Agyapong (2016) when they clarify that PPM is used for efficient allocation of resources corresponding to respective projects.

An ideal PPM comprises project roadmap, category, classification, priority, goals, timeline, resource list and impacted business units to name a few. Executives balance the load of these characteristics on a regular basis based on the project lifecycle and status of profitability (Solomon, 2002). Solomon's theory is endorsed by Cottino's (2015) theory that cherry-picked projects with a balance of cost and resources ensures efficient business prosperity. The constant changing of the balance of cost and resource mean project portfolios need to be assessed on a regular basis, which in turn changes priorities of projects. This leads to efficient resource management with increased efficiency. This theory is proven by LaBrosse (2010) in the explanation of PPM benefits as the alignment with business strategy and objectives, efficient resource management based on priorities and choice of projects based on their performance, all of which are dynamic properties that shift along with the changes within the organization.

On the other hand, Hill (2013) contradicts that PPM is a cross-organizational business alignment function of the PMO which is however not limited to the threshold of the PMO. The project portfolio management office is also referred to as a PMO in large organizations where multiple projects with common organizational initiatives and deliverables are classified under a large portfolio (Sopko, 2015). Pöntinen (2019) illustrates the PMO as a governing body which regulates the project deliverables, requirements, templates, and checklists but does not lead the execution of projects or their deliverables rather owns the project model and portfolio management. Furthermore, a study by EIRMA (2002) concluded that a PMO is established with the aim of information collection and distribution without portfolio planning. Based on Kaufman and Korrapati (2007) as a governing entity, a PMO is responsible for the following:

a. Establishment and upkeep of project portfolio
b. Planning and forecast with stakeholders
c. Demand management
d. Resource management
e. Information distribution
f. Project prioritisation
g. Portfolio reporting

The project portfolio is owned by a process owner called project portfolio manager. A successful project portfolio manager is intolerant of timeline setbacks, and to compensate for delays will inject more resources. It is observed from McDonough et. al (2003) that projects with uncertainty with timeline or stakeholders burn time and resources quicker. IPMA (2015) presented portfolio management as a dynamic process based on the fact that organizational strategic changes are dynamic in nature and projects being unique temporary endeavors that provide different change within the business than previously achieved. This, in turn, advises that a successful project portfolio manager needs to be synchronized with the current business state and upcoming requirements. They are responsible for business alignment of projects on an overall portfolio level to create efficient output from projects for long-term benefit of the institution (Rajegopal et al., 2007).

However, it is not feasible that the dynamic nature of projects under PPM causes projects to start and stop based on the priorities and outcomes. For instance, the PMO implements a template, and due to the changing nature of the environment, the project may not match with the template design. This causes disruption in the process and therefore the foundation laid out by the PMO becomes redundant. According to Spradlin and Kutoloski (1999), this leads to the PPM process not being followed-up or managed. Therefore, a framework which covers the dynamism of PPM in literature and practice alike is needed (Archer and Ghasemzadeh, 1996). Only a limited amount of material on a modular framework can be found, one of which this thesis aims to provide.

A modular PPM framework should consist of components that increase the portfolio value, untangle conflicting project objectives, balance the project portfolio, and provide an environment where the strategic connections overlap so that projects within the portfolio move towards the same objectives. The framework should also distribute transparent communication among the executives and managers in a common configuration.

2.2 Project Management Office (PMO)

A Project Management Office (PMO) is an organization within an organization with the objective to govern project management within the business supported by top management. A PMO aligns business with customer relationship,

portfolio, and performance. It is the PMO that reports the overall picture of the organization's project portfolio(s) to relevant stakeholders and provides the estimates of models and schedules as oversight, control, and support (Hill, 2004).

Project management office, program management office, portfolio management office or simply project office are different names for a PMO. Maylor (2006) states that appointing the correct type of PMO is the first phase to establish a PMO; therefore, based on the different activities a PMO is designed for, it is also called ERP office, office of planning and innovation or strategy management office (Ibrahim, 2013). Andersen et al. (2007) theorizes that a PMO resembled support offices in NASA. However, Harrison and Lock (2004) divide the PMO based on its function; a project/program office would concentrate on delivery; a project support office would concentrate on supporting project managers; a project management office would act as a business governing body and an enterprise project office would concentrate on the long-term objectives acting as a hierarchy to project management and project support offices.

A study by PM solutions (2012) reported that business organizations with PMO increased from 48% in 2000 to 87% in 2012. It was also reported that businesses lose millions due to improper project management or performance (Crawford, 2011). Another study reported by Andersen et al. (2007) reports that 46% of IT projects exceeded the budget and deadline whereas 28% failed, and as a disaster management decision, implemented a PMO. Gartner reports that the use of the word PMO has increased by 5000% between 2001 and 2006. Therefore, due to the fear of missing out, Dai & Wells (2004) report that organizations have prioritized the establishment of a PMO.

An efficient PMO facilitates higher profits and competitive advantage through the means of strategic alignment of resources and practices. Training, project data mapping, best practice implementation, project management promotion, resource allocation and training are few activities to aid the strategic alignment. The advantage of a PMO is the ability to research, implement and improve suited project management practices such as practice management, infrastructure management, resource management, technical support management and business alignment (Jainendrakumar, 2008).

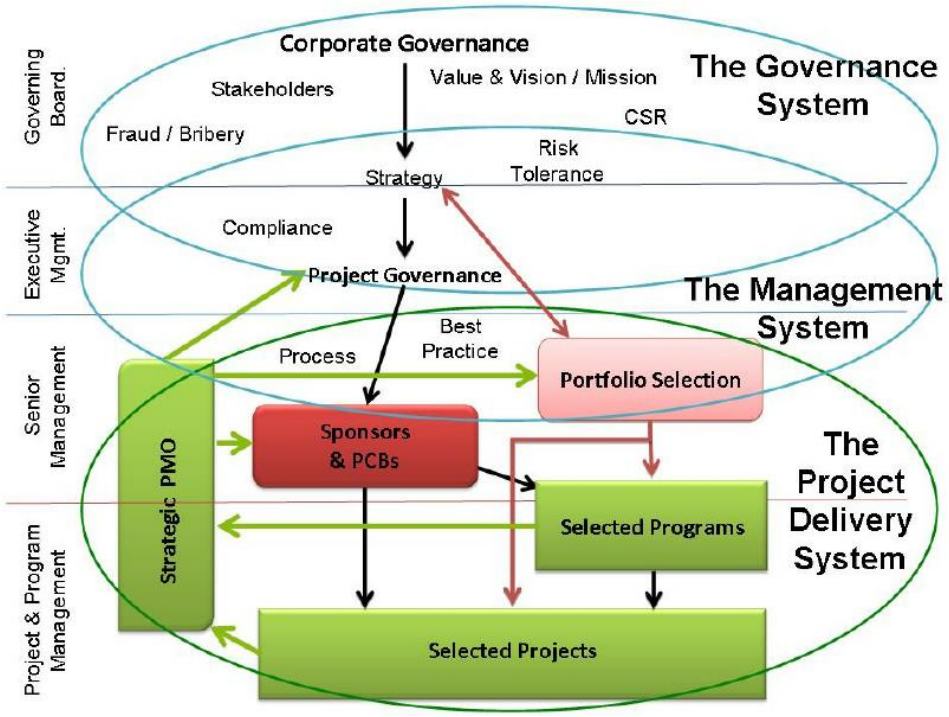

Figure 2: The placement of a PMO based on project governance framework by Too & Weaver (2014)

Too & Weaver (2014) presented figure 1 which gives a visual perception of a PMO placement within an organization. The placement can be changed depending upon the strategy of the PMO and its objectives. The idea this framework is spreading is of continuous feedback on the project environment where all management functions, stakeholders and relevant projects within the same strategic objectives are incorporated.

2.2.1 **Composition of a PMO**

PMO provides a feasible environment to project managers for successful implementation of processes and methods while adapting and integrating business strategies to project management (Srivastava, 2012). Therefore, a PMO is established with predefined expected benefits, strategic objectives, performance requirements and change initiatives.

A PMO lifecycle is indifferent to a project lifecycle as both consist of initiation, planning, execution, monitoring and transition. This involves a wide range of elements such as governance, strategy, metrics, risk, finances, human resources, responsibilities, communication materials and marketing (Blazevic et al., 2014).

As stated in the research problem of this thesis, there is a lack of empirical data on PMO. However, Rad & Levin (2002) divide the involvement of PMO into levels based on the experience a PMO has acquired, and Crawford (2010) divides the level of reporting accordingly. The project level PMO focuses on timeline, budget, and administration. The division level PMO focuses on prioritized

projects and compilation of similar projects in a program or portfolio. The corporate level PMO focuses on the prioritization of projects based on their business benefit.

Table 1: Rad & Levin (2002) and Crawford (2019) division of PMO level

Duration	PMO Level	Reporting body
3 months - 1 year	Project level PMO	Project Manager
1 year - 3 years	Division level PMO	Head of IT
3 years - 7 years	Corporate level PMO	CEO/General Manager

Based on Perry & Leatham (2001), establishing a PMO is a three-stage process of training the PMs, Launching the PMO and Deployment. However, Maylor (2006) describes 10 phases to establish a PMO:

a. Appointing the correct type of PMO.
b. Selecting the correct organizational model
c. Standardization of PM processes
d. Timely valuation of current situation against past situation
e. Oversight of PMO's success and failures
f. Implement best practices based on organizational model
g. Support PMO with best available resources
h. Establishment of a support office
i. Communication of competent stakeholders, leadership, and ownership
j. Make PMO the hub of change

Acting as a program management office, the PMO oversees the project practices such as management tools, standards, and methodology. PMO governs, records, complies, and develops the standardized processes and methodologies as continuous improvement and facilitates its implication by the project managers. In order to monitor the maturity of involved resources, data compiled from project execution, such as cost, time, scope and risks are stored and processed to aid the continuous best practice process improvement. As discussed in the previous chapter, these activities are performed as part of resource management making PMO responsible for project resource management. Therefore, as a resource management hub, a PMO is responsible for the monitoring of resources including facilities, infrastructure, budget, stakeholder involvement and accountability. These resources should be managed, trained, and developed with proper processes by qualified project managers. A PMO contains a deposit of project management professionals whom it assigns based on competency and the project demands. For example, if a project has come to a standstill due to the lack of direction, the PMO can assign an experienced project manager from one project to another project to move the project forward (Jainendrukumar, 2008).

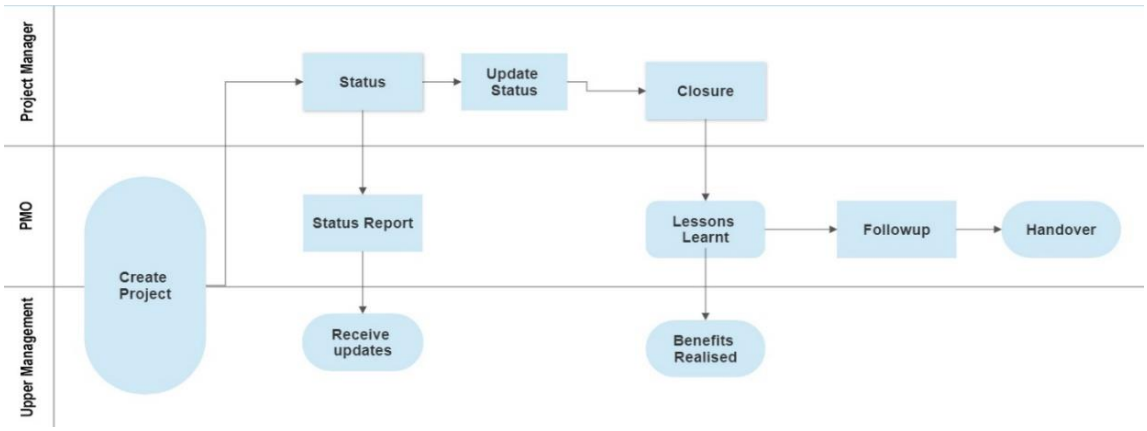

Figure 3: A reference on the placement of a PMO.

A PMO is established to support the organization on a higher level, as a facilitator and a watchdog. It is involved in all phases of a project's lifecycle along with resource acquisition until project closure. PMBOK guide by PMI (2013) explains the composition of a PMO based on the primary activity it executes. With low influence on execution of projects, a Supportive PMO acts as a repository of best practices during a project lifecycle. Higher competent PMO, called a Controlling PMO not only controls the best practices, but also expects feedback. Finally, a Directive PMO takes full control of the projects on a general management level.

A PMO integrates leadership and projects, therefore it is a permanent organization which involves upper management and executives (Artto et al., 2011). An existing business unit takes responsibility of a PMO, and as a program office for projects with a strategic approach. A 2009 survey of 13 European countries and the UAE pointed that less than 10% businesses had a central PMO and 27% businesses had various PMOs based on the strategic alignment (Pole to Pole, 2009). Therefore, it can be said that a PMO is a double-edged sword with the functionality of coordination and implementation of support. Set of methodology and foundations are laid out depending on the business unit undertaking the PMO role (Mariusz, 2014).

In a well-established organization, a structured PMO is managed by a PMO director, who in turn reports to either the general manager or the executives. The director reports on information management support, management support, resource management and project assessment (Yaning & Yuan, 2010). However, if a PMO is not established under higher management, it does not operate on strategic or corporate impacting grounds, which Philbin (2016) suggests as not suitable for a PMO. Despite its higher placement, a PMO acts as a hub for project practices as it provides coordination for multiple projects simultaneously.

Therefore, a PMO comprises the project standards, methodologies, policies and processes for operation. Project statistics, data, and guidelines for training. Results, expectations, organizational support for monitoring (Kendall & Rollins, 2003).

2.2.2 **Responsibilities of a PMO**

PMOs are established to align with the organizational strategy to handle resources throughout the network within the business. Apart from projects, it oversees portfolios, programs, and strategy. Therefore, it is possible that the PMO heads multiple functional unit's projects related to software, research, development, continuous improvement, software, engineering, or business processes (Pietinen, 2019).

As a governing body, a PMO establishes standards and best practices for project managers. It improves the current processes by collecting metrics from current projects and processes them based on organizational strategies (IPMA, 2006). The new improved practices are then taught in training and consultation sessions to the project team. Successful implementations and trainings are stored and maintained as a project document repository.

Based on Hill (2008) and Lendry (2006), the areas handled by the PMO are as follows:

a. Practice management: PMM, standards, tools, and benchmarks
b. Infrastructure management: governance, structure, organization, resources, estimation
c. Resource management: methodology support, training, and development
d. Technical support: planning, auditing, bookkeeping, recovery, and status reporting
e. Business alignment: PPM, customer, vendor and contractor relationship management, business performance management

2.2.3 **PMO practices and difference from normal PM practices**

A PMO comprises a group of qualified professionals who act as a governing body to facilitate project managers during a project's lifecycle. On the other hand, PM practices are based on the company culture and the skillset of the delegated project manager. The practices in these organizations change only if the project manager is changed as the higher authority rarely intervenes on who decides on the implemented methodologies. This differentiates from a PMO in a manner that the PMO regularly updates its project management regulations and templates based on the project at hand.

In a PMO, during a change of project manager, knowledge management sharing is done at the strategic, tactical, and operational level. The transition phase involves project integration of services and products with persistent quality, evaluation of current state against the desired future state and overlapping of competency (Desouza & Evaristo, 2006). Organizations with a PMO have

template practices that are constitutional to project management, which simplifies the practices within the business units.

Unlike project managers, a PMO officer acts as a disjoint business unit, unaffected by the day-to-day activities. Due to this nature, a PMO can work on multiple projects concurrently while switching business units (Aubry & Hobbs, 2011).

2.2.4 **The difficulties with a PMO**

PMO faces high expectations, is the source of experience and income for the consultants and plays a pivotal role as the resource manager in the organization. These are termed as triple threats by Kaufman and Korrapati (2007). Association for Project Management reports that 50% of PMOs fail within three years (Al Hraki & Benny, 2015).

Due to the changing nature of projects for which PMO was established in the first place, a project can become less complex in the future. It is possible that due to allocation of competent project managers, the management is efficient. However, Crawford (2010) rightly implicates the possibility that the threshold set by the PMO during the implementation phase might hinder an otherwise simple project, forcing it to take the complex route of milestone completion.

Change management is one of the challenges with PMO. Letavec (2006) and Bernstein (2000) point to the misunderstanding of the role and the value of the PMO among the stakeholders due to clouded communication of the importance of PMO might lead to the consensus that PMO is a bureaucratic entity. Kwak and Dai (2000) add a point that the stakeholders might view PMO as an unnecessary expense. This is backed by the study by Hobbs & Aubry (2007) which reported that the legitimacy of a PMO is questioned in 50% of the surveyed organizations.

Similarly, inexperienced professionals in the PMO would lead to unbalanced implementation resulting in a burden rather than a solution, further causing resistance to change (Singh et al., 2009, Selig & Waterhouse, 2006 and Desouza & Evaristo, 2006). This is proven on a 2007 survey of 500 PMs where 50% of PMO did not fulfil the anticipated solution (Aubry et al., 2007).

In a well-structured PMO, the risks are anticipated and resolved as per predefined PMO standards (Selig & Waterhouse 2006). The predictable challenges are factored in terms of economy, performance, project flow and existing state of affairs (Parviz, 2000). To communicate the value and importance of PMO to the stakeholders, Ward (2010) and Desouza & Evaristo (2006) suggest the following:

a. State-of-the-art operation plan and business case
b. Active stakeholder involvement
c. Executive support
d. Attainable and visible KPIs
e. Timely status reporting
f. Availability of professional resources
g. Acclaimed PMO lead
h. Organizational change management plan

2.2.5 **Benefits of a PMO for a company**

It is claimed by Jainendrakumar (2008) that a PMO increases efficiency of project areas such as scope, budget, time, quality, and stakeholder approval; while the PMO Study 2020 suggests companies with efficient PMO outperform companies without a PMO in areas of qualitative benefits, project management, project support, information communication, reporting quality, project deadlines, project budget and overall project member satisfaction (The Project Group, 2021). This is possible due to the continuous improvement principle of a PMO, utilization of qualified personnel, tools, plans and procedure which aids in increased success rate. Procedural upkeep as per the demand of the current environment leads to optimization of resources and integration on new practices such as Lean, Scrum or other agile methodologies, especially for software development businesses. A survey of 450 businesses by CIO.com and the PMI concluded that 67% of the survey pool reported improved project success rates (Santosus, 2007).

A PMO also sets specific quality standards, processes, and best practices which if not met, the project is not approved (Rad, 2001). It allocates in-demand resources to multiple projects and re-allocate underutilised resources based on the priority of projects (Biafore & Stover, 2012). As an organization grows, there is an increment of complex projects, which requires trained project managers with contemporary standards. Wysocki (2009) reports that this demand is catered by the PMO.

The need for a PMO is due to the high complexity of projects and the exponential demand of quality results in record time. A Gartner survey in 2000 implied that 40% organizations with project-oriented business model have a PMO, and the organizations with efficient PMOs have 50% reduction in budget, schedule and resources. This is endorsed by Tjahjana et al. (2009) and Do Valle et al. (2008) as they suggest that a PMO reduces the cost and time due to improved project management, efficient project performance monitoring, transparent communication, regular reporting and visibility and resolution of risks. Do Valle et al. (2008) also provide a theoretical point of view on the benefit of PMO that it supports managers in execution of governance processes, acts as a pivotal point of control, and provides best practices, methods, standards, and templates.

In terms of project management, it can be concluded that a PMO is the center of innovation and governance in an organization. Based on the theoretical framework flexible to encompass the dynamism of a PMO, a PMO template is proposed in the *result and analysis* chapter.

2.3 **Published PMO blueprints and frameworks**

This section funnels how relevant researchers have produced a PMO framework or defined them in their respective manner. It will also highlight the perspective

of the PMO framework from a business, strategic and requirement point of view. The questions answered will be if the researchers implement a PMO; and if changes or suggestions to the implementation of these frameworks have been proposed in the future articles.

This section will evaluate the selected PMO frameworks, conduct a short literature review, identify the usability in the new proposed framework and point out the shortcomings. The selection of below frameworks and models are done based on the number of details or the recurrence of the authors in PMO related academic literature.

2.3.1 **Strategy implementation model by de Brito & Junior (2021)**

This model is based on 19 selected and identified articles whose target cases were project-based businesses (PBB). This framework primarily focuses on the strategic aspect of the PMO, which is considered as one of the four key pillars in the following section of this thesis. It is expected as an outcome of this framework that the PMO shall contribute to the organizational strategic implementation through three key logics: support, environment, and link.

Though the first logic preliminary defines the monitoring and maintenance of projects, it is named as the support logic. It is a possibility that this can be understood as the governance role of a PMO as it concentrates on tracking projects with respect to their scope, KPIs and integrity. The second key logic, environment, is an imperative aspect of a PMO which is visible in numerous interviewed participants. A playground for transparent communication, change management, resource allocation and similar bridging activities. The final logic, link, is the mediator between the organizational strategy and the project selection. It was identified in the previous sections, based on Aubry and Hobbs's survey that identification, selection, and prioritization of projects is a common practice in most PMOs. Therefore, the latter two logics can be identified as vital aspects that can be implemented into the new proposed PMO framework.

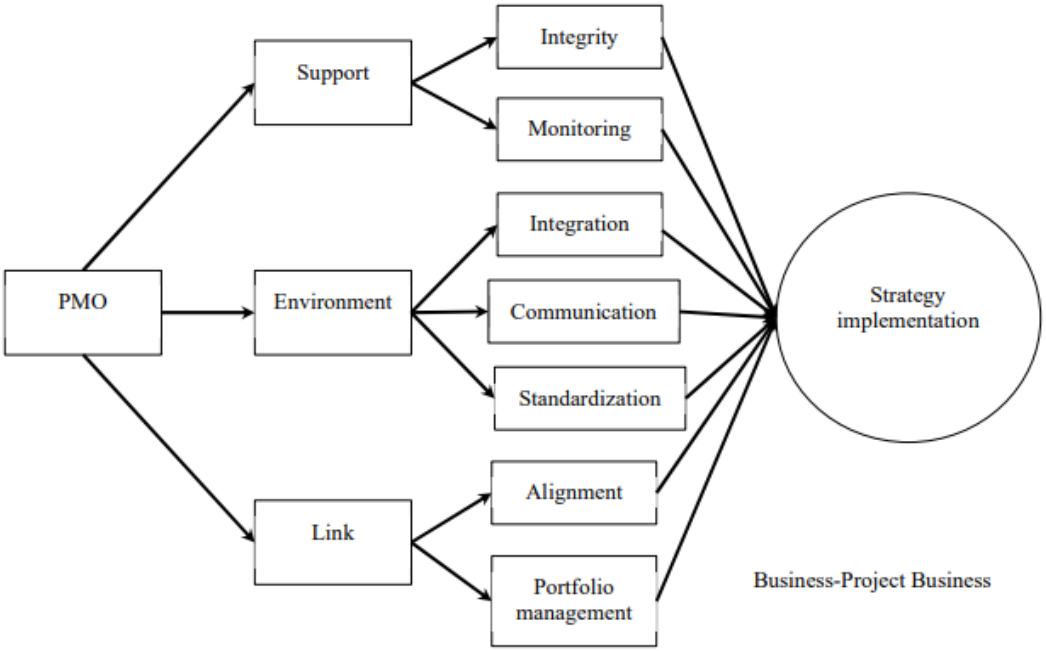

Figure 4: De Brito & Junior's strategic PMO model

De Brito & Junior's model points out the deficiency of PMO case studies that target PBB, which ultimately renders this model as a guesstimate. However, an argument is raised that the responsibilities bestowed upon the PMO in this framework resonate with that of a PBB. The basis of this argument is the alignment of various PBB functionalities by Thiry & Deguire (2007).

2.3.2 **Framework to understand organizational project management through PMO by Aubry et al (2007)**

It would be misleading to claim that the framework by Aubry et al. is for a PMO setup or improvement as it is what this thesis is aiming for. This framework can be considered a project management supplement for a structured PMO because the PMO is considered a dynamic body. In this framework, project management as a whole is affected by the three theoretical fields suggested: social innovation system, contribution to organizational performance and network theory.

The social innovation field includes various aspects which contribute to the behavior of the PMO. It claims that past activities of the organization lead the path to the future structure, which ultimately shapes the PMO. However, this field is nullified for a new company seeking to establish a PMO from the forefront. There is no evolution or improvement on previous methodologies. Similarly, the PMO's placement is understood by the status of the organization, competencies and accomplishments based on Hagström & Hedlund (1999). Finally, the organizational contribution field provides an overview of the processes and project performance within the organization.

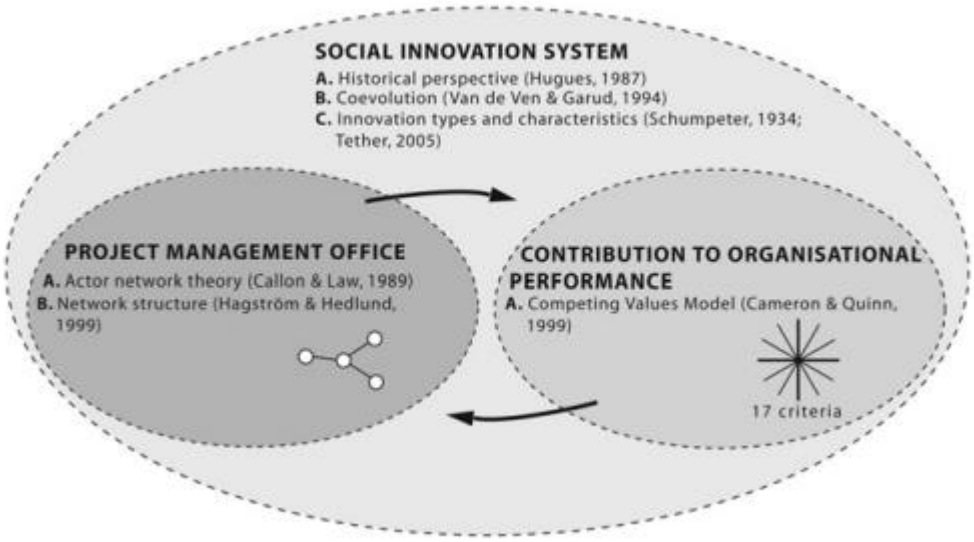

Figure 5: Organizational PM framework by Aubry et al. (2007)

The drawback of this conceptual framework is that it is based primarily on theoretical variables. There are a large number of variables within each field which would be complex for a PMO officer to keep track of, which eventually will fail to provide datasheets for future improvements. This framework is applicable for complex organizations with a high demand for structure. Nonetheless, the social innovation system provides a good lesson learnt for PMOs that seek improvement in current standards, methodologies, and processes.

2.3.3 **PMO for IT projects by Kaufman & Korrapati (2007)**

Discussed previously, a PMO can either be a project, program, portfolio, or any element management office. Kaufman & Korrapati's PMO framework highlights the importance of choosing the right incorporation while implementing their proposed framework. Therefore, an organizational mandate based on the objectives, scope, and development the PMO is established upon requires to be identified. The inner layer of Philosophy voices the opinion that the management should consider the results while concurring with incurring costs and mitigate the lack of result-focused communication at all project management levels. The further layer of Mechanics suggests a role matrix where PMO officers are labelled based on their functionality and objectives so that it can be tracked during reporting. Finally, the innermost vital layer Domain consists of project delivery and portfolio management. This layer includes activities such as resource management, audits, monitoring, prioritization, and knowledge transfer.

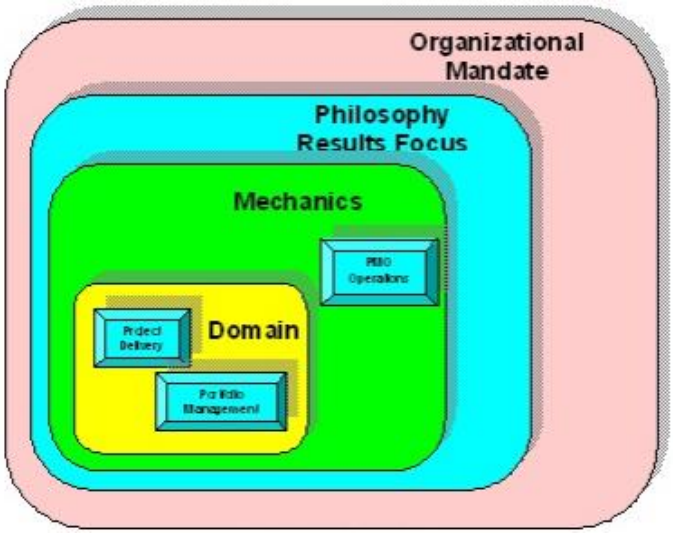

Figure 6: Kaufman & Korrapati (2007)'s PMO alignment

It is comparable that some elements in this framework resonate with frameworks discussed previously. It claims that the PMO increases efficiency economically as well as timely. However, the relationship between the layers is not clear. This framework is based on four elements identified by the authors: organizational, philosophical, mechanical and domain. Yet, the proposal does not point towards the reason behind these choices, be it previous literature or whitepapers. The successful or unsuccessful implementation of this framework is also not documented.

2.3.4 **Salameh's framework to establish a PMO (2014)**

Salameh's PMO framework is comprehensive which gives a step-by-step guide on how a PMO with all required functionalities, processes and plans can be introduced. This framework proposes that the establishment process should be taken as a project by following a project lifecycle of plan, execute, monitor, report and enhance.

It is evident from the figure that this framework provides a methodological end-to-end scenario to kick-start a PMO. It demands that the mission, strategy, and dependencies be prioritized over processes and methods. Upon identification of short-term organizational objectives, the structure can be defined, which in turn depends on the type of PMO as defined by Hubbard & Bolles (2015). The KPI for a PMO also depends on the type, which also should be defined and monitored. Then comes resource allocation for the PMO which includes PMO officers, managers and other members who should be acknowledged with PMO ways of working. This is documented along with the timeline, objective, and other metrics of the PMO in a PMO charter. Finally, PM methods can be standardized, trained, and monitored along with distribution of responsibilities. In order to

visualize the importance of the PMO, continuous PMO process improvement along with weekly report should be reported to upper management.

Figure 7: Salameh's linear PMO framework

This framework clearly shows that it is possible that the process of establishing a PMO be followed in a step-by-step manner. However, upon smooth integration with the organizational structure, can be iterated in an agile manner as per organizational operational structure. This possibility is not proposed in this framework but would be beneficial for the framework this thesis is churning.

2.3.5 **Project business Management PMO framework by Hubbard & Bolles (2015)**

This framework is sourced from case studies, PMO models and project business management (PBM) practices. The authors claim to coin the term Project Business Management which refers to management of business practices in a project-

based business. The anchor point of this framework is the development of business objectives and strategies based on their previous literature.

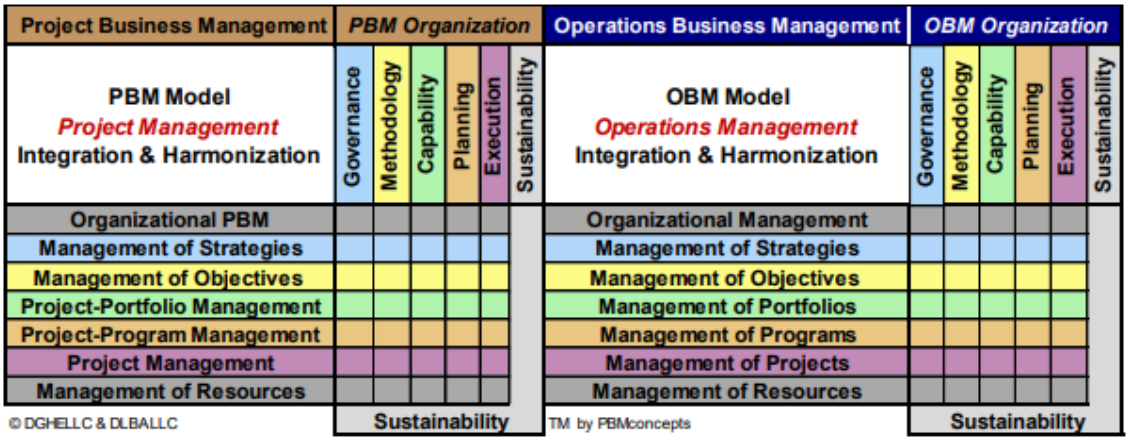

Figure 8: Hubbard & Bolles (2015)'s PBM PMO framework

This framework identifies key areas based on PMI reports where upper management has significant impact on the planning and authorization process, which seems to be the primary objective of this framework. The key areas are divided according to the classification of PBM and organizational PBM.

Figure 9: Supportive PMO model

Interestingly, the framework is similar to Aubry and Hobbs's organizational PMO framework as it does not directly affect the construction process of a new PMO. Rather, a PMO model is proposed based on Hubbard & Bolles (2012) literature where four pillars of governance, methodology, capability, planning, and execution are erected. The components of this model are enveloped by a structural enterprise unit which oversees the implementation of company-wide PM processes. When the methodologies, processes and practices are harmonized

company-wide, a certain maturity level is reached. However, if synchronization between the proposed five elements breaks, the sustainability of the model is compromised.

2.3.6 **PMO Starter Kit by Oracle Instantis (2011)**

This starter kit is similar to Salameh's framework in the respect that it provides a step-by-step guide on establishing a PMO. The guide is divided into 3 phases: plan, implement and manage. The plan phase starts after an agreement has been reached that a PMO business case has been created and ends when a PMO charter has been created. This phase establishes the objectives, scope, processes, governance, structure, milestones and finally the PMO charter. In the implementation phase, resource management, training, methodologies, project portfolio management plan and standards are formulated. Conclusively, in the management phase, project monitoring, review, governance, implementation of PM model, validation and PMO improvements are done.

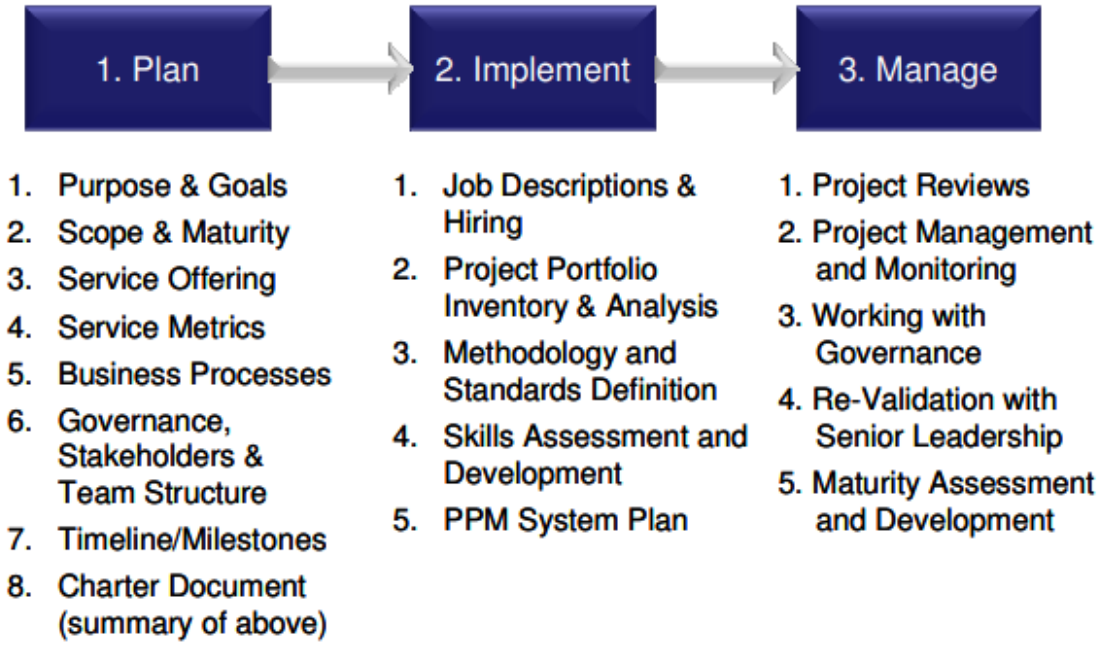

Figure 10: Instantis (2011)'s project based PMO starter kit

It is evident from the figure 11 that this framework resonates with previously discussed frameworks. It covers the governance, resource management and portfolio management aspects, but does not individually point towards strategy which was previously identified as a crucial pillar.

2.3.7 **PMO framework by PMI (2013)**

This framework was an outcome of a one-day workshop which included multiple PMO professionals ranging from professors to subject matter experts (SMEs). The objective of the workshop was to distinguish a widely applicable PMO framework, identify the PMO resources and develop frameworks depending on the type of PMO. After this process, a survey was conducted between PMO SMEs where the framework that resonated with their way of working was chosen. Then, frameworks with larger than 50% agreeableness were chosen which were:

a. Departmental PMO
b. Project Office
c. Project support office
d. Enterprise PMO
e. Centre of excellence

Based on the survey results, the correct PMO resources, methods, processes, plans, and management methodologies were allocated to the respective framework where effective fit was observed. This framework facilitates upper management to choose the correct framework depending on their way of working, expected outcomes and resources available from an earlier phase. Thus, iteration to the PMO design can be made with the help of this foresight which saves resources.

2.3.8 **PMO Survey 2020**

The Project Group conducted a timely and encompasses a large number of respondents. The survey was conducted irrespective of the business model of the 588 respondent companies of which 80% are in Germany. It is observed from the survey that a significant number of companies have larger than 5000 employees and the number of PMO a company has can be the indication of successful implementation of a PMO process. 133 respondents indicated that they have multiple departmentalized PMOs.

The survey points out that PMO acceptance is higher in companies that have a PMO for over three years, with a 68% satisfaction rate. Another metric for trust in the PMO was the number of PMO officers and their ability to manage projects. On the other hand, the experience of the PMO officers or number of projects per year does not affect the satisfaction rate. The PMO acceptance rate declines starting from upper management to project managers to department leads since the survey points only 20% of high acceptance rate, the reasons being change resistance, ill-defined procedures, lack of PMO authority and poor quality of resource management.

On a project level, shorter projects and financially endowed projects seem to be easier to manage and meet standards which could suggest agile projects have efficient project completion than waterfall projects. The priorities seem to be quality, then budget and then deadline. Thus, it is a possibility that short iterations in an agile manner is carried out as quality delivery. The findings of this survey are used as the source of the quantitative results in formulation of the framework for this thesis. A coordination between representatives of The Project Group was done to get hold of this survey which is available to purchase at their website.

2.3.9 **Common consensus**

It can be observed in the proposed frameworks that identification of the role and objective of the PMO is the penultimate deciding factor on the type of the PMO that suits the organization. A common project lifecycle of initiation, planning, execution, and closure as defined by Hill (2008) and Westland (2006) can easily be implemented on the formulating process of a PMO. Jainendrakumar (2008) suggests the establishment process of a PMO carried out like a project lifecycle process. This includes definition of the PMO objectives, strategy and success criteria in the initial phase followed by resource sourcing and process building in the planning phase. When formulation is completed, training, capability management, execution and reporting are done in the execution phase. Finally, instead of closure, an agile development strategy of continuous improvement can be practiced.

Best practices from the selected and studied frameworks are identified for integration into the modular PMO framework. An opinion on the current frameworks is also requested from the interviewed participants, to get a sense of validation of selection.

3 Research Framework

The study is conducted based on available articles and reports which are specific to the establishment of a PMO as a whole and the practices that are followed in the process of a PMO lifecycle. Nokia solutions and Networks Oy is the primary organization based on which the PMO framework in this thesis is proposed. This section discusses the research method chosen, data collection criteria, justification of the research questions and processing of the collected data.

Table 2: Table of primary research sources

Author	Name	Type
Aubry et. Al	Framework for understanding organizational PM through PMO (2007)	Qualitative
Kaufman & Korrapati	PMO framework for successful implementation of IT projects (2007)	Qualitative
Instantis	PMO Starter Kit (2011)	Qualitative
PMI	PMO frameworks (2013)	Qualitative
Salameh	A framework to establish a PMO (2014)	Qualitative
Too & Weaver	The management of PM: A conceptual framework for project governance (2014)	Qualitative
Hubbard & Bolles	PMO framework and PMO models for project business management (2015)	Qualitative
Aubry & Hobbs	Identifying the structure that underlies the extreme variety found among PMOs (2006)	Quantitative
The Project Group	PMO Study 2020 (2021)	Quantitative

The identification of resources was done by searching relevant keywords such as PMO, project management office, project management methodologies, and project resource management. It was identified that Monique Aubry and Brian J. Hobbs are cited in majority of PMO and related literatures. Therefore, their literary journey in relation to PMO was followed, which resulted in finding of various improvement in their first proposed framework of 2007. It includes PMO state of practice (2007), results of 2006 survey (2007), proposed framework (2007), PMO topology (2008), PMO as an organizational unit (2008), PMO metrics (2010) and importance of PMO (2011). The interview questionnaire was based on their survey questions, results and findings.

3.1 Qualitative research

Qualitative research is inductive in nature and covers a large area of different techniques and philosophies which focuses on psychology, sociology and anthropology aspects. Furthermore, qualitative research uses words and expressions that give in depth explanation of the situation and provides flexibility and openness to writers (Bryman & Bell, 2003). However, qualitative research is less structured, more descriptive and communicative which provides opportunity for further questioning and understanding human emotion. When a researcher is not sure about what is happening and does not have a numerical explanation then qualitative research can be used to investigate why something happened or not happened (Kelly, 2017).

There are different types of qualitative research such as case study, phenomenology, narratives, ethnographies, grounded theory, and mixed methods (Kelly, 2016). From research and study, it was clear that this thesis demanded both qualitative and quantitative research. It is also because this study needs detailed explanation from different IT companies with link to a PMO, and proper understanding of stakeholders' behavior and the work culture.

There are different approaches to collect data, among which qualitative interview was conducted to carry this research based on the questionnaire prepared forehand. Among multiple methods to conduct interviews such as structured, semi structured and unstructured interview, the interview for this thesis was arranged in as a structured interview with two parts. 30 to 45 minutes was requested from head of PMO of each technology company where a structured 12-questions interview was conducted to learn the present status of the companies. These questions anticipated a yes/no response, which was used to gauge the fulfilment criteria of an ideal PMO based on Aubry & Hobbs (2006) study.

Similarly, unstructured interviews are where interviewers start asking questions spontaneously on the spot and are allowed to discuss freely with interviewees. Semi structured is a combination of both structured and unstructured. It is flexible and has a set of questions but provides flexibility and freedom to speak and discuss about the topic in detail (Bryan and Bell, 2007). The 12-question structured round was followed by open-ended unstructured questions depending on the available time to understand the past and future of the PMO and benchmark the present health.

The structured interview gave a proper idea and understanding of the situation and allowed interviewers to tell us in detail about what they think and how they have been doing. This way of data collection gave exploration of different issues which involve the stakeholder's views and rationality. Even though there were sets of prearranged questions, in some interviews it was needed to go beyond that so that they would tell in depth what they think about a particular topic of interest and why. In some cases, the interviewer themselves didn't have answers to some questions, which was expected. This has shed light to topic that might be implemented in their PMO.

Due to the request of some participating interviewees, the result analysis was shortly discussed in a short follow-up session, either via email or Microsoft Teams. This was done to validate the understanding and checkpoint to make sure none of the disclosed information is sensitive. The result of this approval provided the foundation to validate the sustainability of some of the units of the proposed framework.

3.2 **Quantitative research**

Quantitative research provides quantifiable data from a large scale of responses to understand trends and behavior. Qualitative is subjective, whereas quantitative is objective. The inclusion of variables and numbers results in the possibility of statistical analysis and report generation based on selected constraints (Goertzen, 2017). Leedy & Ormrod (2001) and Cresswell (2003) suggest that this method, however, also opens the door to biased information presentation. Therefore, Goertzen (2017) proposes to set objectives before the research process.

Based on Handbook of methodological research by Jason & Glenwick (2016), the application of quantitative research was justified for this thesis because data analysis of pervious literature was identified as a requirement. Coincidentally, a similar new survey was published during the production of the thesis, which provided an indicator for a new benchmark. Therefore, the survey by Aubry & Hobbs (2006) was compared with the PMO survey by The Project Group (2021) using an online survey tool with a trial license, resulting in an exploratory analysis. This tool took responses from respective 500 and 300 respondents and compared their structure and questions. The resulting summary provided the most common questions with overwhelming responses, and the top questions were selected for the structured qualitative research questionnaire. The result from the analysis tool also showed which PMO practices are relevant, such as reporting to upper management, provision of trainings, and upkeep of project information management system.

As suggested by Dudwik et al. (2006), the reason this approach was implemented instead of new collection of survey was the demand of large sample with lack of resources. Upon primary research, it was discovered that limited companies in Finland implement PMO, especially as PMO is present in large scale companies with complex projects. Nonetheless, for the unprecedented access of the 2021 PMO survey, The Project Group was approached, who provided the research free of cost. It was discovered that this survey analyzed their responses and filtered potentially irrelevant results. Therefore, limited analysis was deemed sufficient for the purpose of this thesis.

3.3 Multiple case methodology

This thesis is compiled with the research contribution of primarily qualitative research, for which, the structure is formed with quantitative research in coordination with The Project Group. Multiple-case qualitative methodology is exercised as multi-method research strategy in this thesis, which utilizes a common anchor point of two research methods to produce the desired objective (Spratt et. al, 2004). However, since a small scale of empirical data is used to suggest a framework, content analysis method is also implemented as it analyses qualitative data quantitatively. Due to the variance of content from humans from the same position, content analysis can provide applicability of interviewee's answers (Downe-Wamboldt, 2009). Description based on keywords (coding) is exercised by identifying a theme for one or more questions to map with a particular keyword, such as "upper management" or "training". The frequency of the usage of words in the interview gives the weight of the answer.

It was identified during the drafting of the research framework that two sets of interview questionnaire would be required, one for a structured interview, other for an open-ended unstructured interview. Therefore, the questions were compiled from Aubry & Hobbs's (2007) research results. However, the contemporary validation was considered a variable as practices in an IT organization tend to change in a rapid pace. Therefore, a similar survey conducted and published during the drafting of the thesis was discovered. The paradigm between these two surveys was discovered as the validity of a PMO in the current context. Thus, the owners of the 2021 survey were contacted to extract further details about the survey. With the agreement of The Project Group, a set of questionnaire was crafted which complimented Aubry & Hobbs.

The result of this questionnaire is the foundation for the proposed conceptual framework as it provides state-of-the-art practices in large IT business organizations. The foundation was overlayed by the components from previously published PMO blueprints and frameworks. It can be observed that Salameh's (2014) process flow is validated by previous research, and therefore contributes to the planning and implementation phase of the research framework. Similarly, the PMO starter kit by Instantis (2011) suggests the swimlanes and milestones.

3.4 Data collection

Some companies approached for interview had no knowledge about a PMO and would refer it as an upper management challenge/responsibility. Therefore, selection of correct participant was based on whether their organization had PMO involvement during any duration of its operation.

In contemplation of the current status and practices of PMO, different online reports regarding PMO establishment, framework or involvement were studied from various reputed journals, whitepapers and past thesis. The case

companies from these literatures were used for mapping a pre-set benchmark. However, to produce a modern framework, recognition of contemporary practices was necessary. Therefore, identification of correct recognized and large international companies was done via social network and online information available. Colleagues from various companies were approached to understand if their company implemented a PMO, and subsequently requested for a connection request with the PMO lead. This direct approach proved to be fruitful as majority of PMO responsible agreed for an interview.

Meyers & Newman (2007) identify level of entry as one of the problems with qualitative interviews. If an ordinary officer is interviewed, there is a possibility the senior officers or managers with more knowledge might not be available. Likewise, an ordinary officer might not hold information at a lower level than a senior manager and vice-versa. Thus, selected and structured interviews were carried out with PMO representatives of companies with adequate PMO knowledge. The latest PMO reports of different companies which describe the reasons for establishing PMO, importance of PMO and benefits realized after establishing PMO were analyzed. The companies were selected based on following criteria:

a. IT companies which have a PMO or had it in the past
b. IT companies which have published yearly reports
c. IT companies which operate internationally

The reason for choosing companies from the same country is to understand the similarities, differences, and problems which they are dealing with operating in the same market. Likewise, PMO in developed countries like Finland and developing countries like Nepal could have differences in operation. Therefore, the aim is to compare and explore areas of improvement for both the countries. In the end, the thesis provides a suitable new framework which suits best for all the companies.

3.5 **Research Questions**

The aim of this thesis is to answer the main three research questions in order to understand the current status of PMO in the large organizations and suggest the entities that can be considered for future improvement. The first research question focuses on defining PMO and the importance of establishing PMO in organization. The main objective of this research question is to find out why businesses established a PMO, how organizations sustain their PMO and how knowledgeable the PMO officers are. Similarly, the second question focuses on PMO implementation and improvement. Finally, with the understanding of the present situation and techniques in PMOs, the third question serves the purpose of an improved model which would be useful for organizations with interested in a PMO, and further improvement. The main research questions are:

1. What is PMO and how does it facilitate the organization?
2. How can it be implemented and improved?
3. How the proposed framework improves the current PMO processes and how is it helpful?

3.6 **Data analysis**

This literature was broken into various phases to answer the research questions while conveying project management theory, establishing the importance of a PMO, PMO status in multiple companies and finally proposing a PMO framework based on previous phases. Figure 3 illustrates the flow of data collection and analysis was based on Philbin (2016) and Costa & Zoltowski (2014).

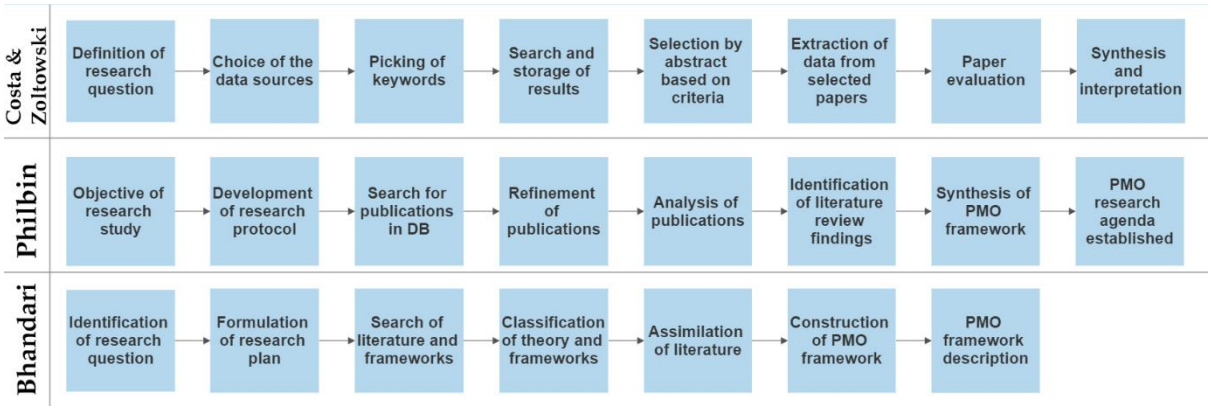

Figure 11: Swimlane comparison between Costa & Zoltowski (2014), Philbin (2016) and this thesis.

To understand the composition of an ideal PMO, research plan was formulated attributing available conceptual frameworks and related literatures. An analysis of a possible overlapping framework was done with the quantitative research results as an anchor point. The result of the analysis provided questionnaire material for the qualitative research with a mix of structured and open-ended questions. The second research question was fulfilled by this engagement with the interviewees. The outcome was a table of comparison, recommendation and lessons learnt, which was mapped out based on Aubry & Hobbs (2007) suggested framework.

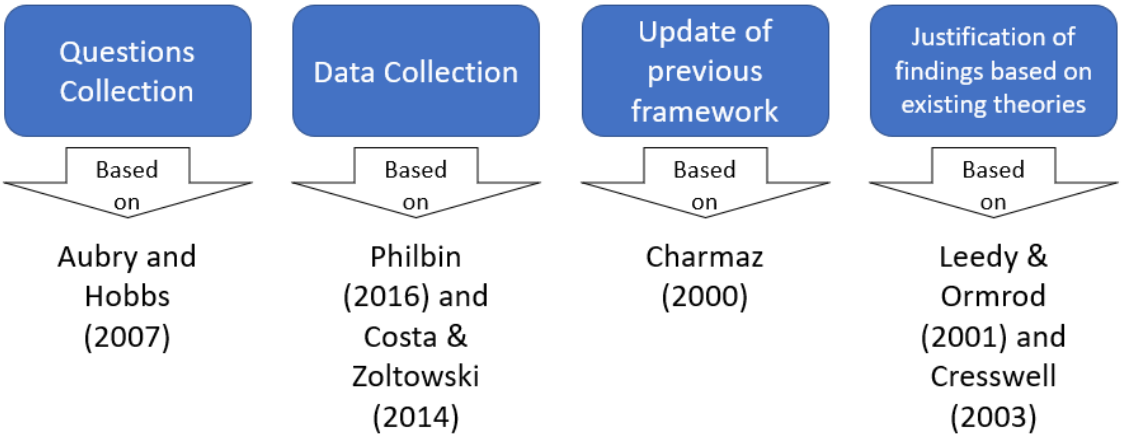

Figure 12: Research framework overall figure.

The final research question was shaped by the mix of empirical data to validate the research objective. Constant comparison analysis as suggested by Charmaz (2000) to update information of the same topic over a period of time was implemented to overlap and sample the theoretical framework. Leedy & Ormrod (2001) and Cresswell (2003)'s suggestion to justify the findings based on selected existing theories is also prevalent in this research.

4 PMO in multinational companies

PMO officers at leading project-based businesses implement tried and tested methodologies primarily based on PMBOK by PMI. It is the choice of the program steering committee or higher management to decide whether to implement a new PMO with external expertise or to transform, for example, an IT governance or project portfolio management team into PMO officers. Establishment of a PMO can be available as a service when consultants with skills identify the requirements of the client business and propose what type of PMO is required. Based on metrics such as project scope, resources, priority, execution, and deliverables. The goal is to manage and select resources with the needed skill sets and establish a fully independent organization which can transform the way of working to achieve maximum efficiency.

A 2020 survey of 450 respondents by The Project Group concluded that information, communication, and manufacturing industries implement a PMO. Moreover, it was discovered that larger companies with over 1000 employees have implemented a PMO. This survey supports the hypothesis that companies with an increased number of projects raises the complexity of project management, therefore requiring a PMO (PMI, 2013).

The literature in this chapter aims to find companies from various sectors who have implemented a PMO and have described their PMO strategies in a published white paper or academic report. This chapter also reports PMO service providers for companies that do not have the expertise required to establish a PMO with competency from their current resources.

4.1 Companies with PMO implemented currently or in the past

4.1.1 **AstraZeneca**

AstraZeneca (AZN) is a biopharmaceutical company that has come to world recognition after their breakthrough vaccination against Covid-19 coronavirus. The company was founded as a merger of two companies Astra AB and Zeneca Group in 1999. The business model of the company is research, distribution, and commercialisation of medicines with focus on oncology, cardiovascular disease, renal disease, metabolism, respiration and immunisation.

According to their 2020 annual report, AZN employs 76000 people with a revenue of $25.9 billion. Large portion of the revenue materialized from the sale of 1.5 billion covid vaccines in 2020 (Azeez, 2021). It operates in over 100 countries worldwide with engagement of over 120 million patients annually. The project pipeline contained 171 projects with 69 projects approved for various regions.

To facilitate a newly formed agile roadmap, AZN introduced a project management organization in 2013. The role of the PMO was to implement and

monitor agile governance practices, project management practices, decision making conventions and transparent information management practices (Martine, 2018).

4.1.2 **Toyota financial services**

Toyota Financial Services (TFS) is an affiliate of Toyota Motor Corporation which acts as the financial brand of various Toyota subsidiaries such as Toyota Motor Credit Corporation, Toyota Lease Trust and Toyota Motor Insurance Services. According to TFS quarterly report, Toyota currently employs 366,283 employees in over 30 countries resulting in a revenue of 27.2 trillion Yen for 2021. TFS contributes 7.9% of the total revenue although Toyota reports exponential growth of the financial services division, which is expected to overcome vehicle sales.

Frank (2002) reports that TFS was formed as a division from Toyota Motor Sales in 2000 which had been analyzing methods to achieve business requirements while completing projects within time, budget, and resources. The analysis concluded with the requirement for a PMO and resulted in recruitment of professionals who established a PMO in 2001 to achieve the business requirements pointed out before the division. The business needs were personnel development, quality assurance, project support, portfolio management and methodology (Frank, 2002).

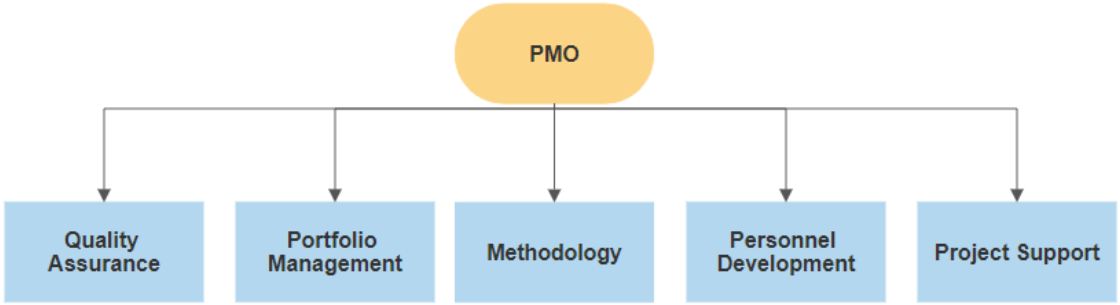

Figure 13: PMO structure at TFS.

It is suggested that the established PMO struggled with management of more than 30 projects at a time, with executives unaware of the underlying resource allocations due to the incompetent reporting by the project managers. However, a rigid implementation of governance, organizational change and development resulted in an evolved PMO. In 2014, prioritization of project investments as a multiyear plan was introduced (CA Technologies, 2016).

Recently, the PMO has been instrumental in the change management activities, providing strategies for business changes (Rodgers, 2018). A 2016 client profile report reports that TFS uses project and portfolio management solutions to gain overview on all project activities. Toyota newsroom (2021) reports that the IT operating model has received digitization with agile practices.

4.1.3 **Intel Corporation**

Intel is an American multinational microprocessor producer founded on July 18, 1968. It has since grown to a 110,000-employee brand with an asset of USD 153 Billion (Intel Corporation, 2020). With the exponential growth, intel has expanded its services to retail, industrial and consumer networking goods and services which includes cloud services, chipsets, system-on-chip, and artificial intelligence. Alsop (2021) reports an increase of 11.37% in research and development spending to USD 14.8 billion.

Intel has identified scaled agile with Agile Persistent Teams (APTs) as a solution over time consuming cyclic releases. Similar to a scrum or lean methodology, teams of highly competent individuals synchronize in daily sprints to produce frequent releases. The APTs function under an Agile PMO which is established with data-driven decision making, accountability and transparency as the objectives. The PMO reports the visibility using an IT portfolio to the Chief Information Officer (CIO) office (Intel, 2020).

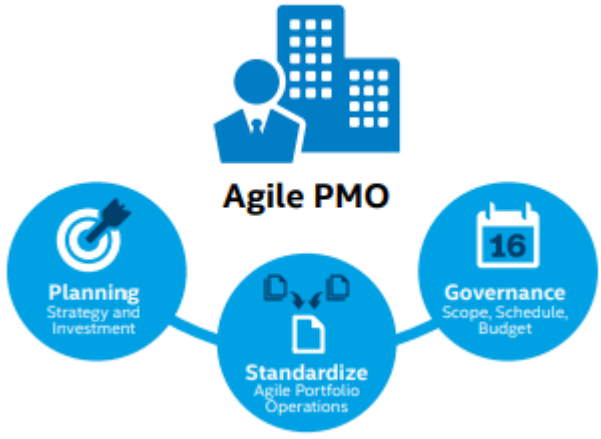

Figure 14: Agile PMO at Intel Corporation.

The alignment of objectives is mitigated by an approach shown in figure 5. Standardization of agile portfolio operations provides a clear roadmap based on the priorities, expectations, and resolution. Planning of strategy and investment supports the standardization process which is done with the IT portfolio management system called Value Management Office (VMO) dashboard. Governance, on the other hand, is considered as a difficult approach as the APTs are expected to self-govern and decide the products/services that bring value to the business. Nonetheless, it is expected by the PMO that the APTs use standardized metrics to update project progress status.

The standardization of processes in the PMO was done throughout the PMOs lifecycle, which was then compared to the maturity state. This study was carried out with the aid of Gartner in the form of a survey which showed that the VMO dashboard clearly reported desired metrics in terms of project visibility.

Intel projects the Agile PMO will provide a transparent metric of complex projects via IT portfolio for future endeavors (Intel, 2020).

4.1.4 **Vodafone**

Vodafone is one of the largest telecommunications providers with 270 million customers in 70 countries. USD 52.6 Billion worth market capitalization is made possible by USD 50 Billion in sales and 94,000 employees (Forbes, 2021). Apart from telecommunication services, Vodafone provides financial transfer, payment services and similar services to end customers as well as business customers (Gurufocus, 2021).

In terms of operation, Vodafone claims that its primary operation is handled by marketing, licensing and research and development (R&D) (Vodafone, 2019). Identifying Global Local Area Network (GLAN) as a replacement for the existing network, Vodafone addressed the high complexity of networks by deploying a project management team who implemented PMO practices to set priority based on the complexity of projects. This resulted in a 90% success rate during change of services from existing network to VLAN. After the application of project governance based on PMI standardization, projects were completed within time, within budget and best practice for GLAN projects were collected, studied, and improved (PMI, 2021).

4.1.5 **FES GmbH**

Frankfurter Entsorgungs- und Service GmbH (FES) is a public-private waste management company which is a joint venture between the city of Frankfurt (51%) and Remondis SE & Co. AG (49%). It was established in 1996 with the purpose of city cleaning and waste management. Generating a revenue of USD 229 million in 2021, FES has since grown as an assemblage of six subsidiaries with 1700 employees which services the Rhine-Main area (D&B Business Directory, 2021). Along with the production of energy from wind and solar sources, FES extracts raw materials, cleans, recycles, and incinerates waste which in turn is converted into electricity and heating (Hessen, 2021).

The success of services are the results of various strategies implemented with specific goals in a portfolio. Remondis Akutell (2021) reports predicting the behavior of customers and tuning the portfolio accordingly as one of these strategies. During the development of innovative solutions, FES established a PMO to implement a standardized process and methodology, create a project portfolio to prioritize projects and establish a cross-department project manager exchange community (Schmitz and Gossen, 2016).

The resulting PMO members conduct weekly meetings and report monthly to the steering committee. A project portfolio management process and project guidelines were taught to the PMO members. The standardization process

involved a project priority criterion based on the agreed specifications (Schmitz and Gossen, 2016).

4.1.6 **TD Bank N.A.**

TD Bank, N.A. (TDBNA) is a subsidiary of Toronto-Dominion Bank as a result of the acquisition in 2008 of Commerce Bank in the United States. TDBNA employs 25,000 employees at 1220 locations with a total asset of USD 452 Billion from nine million customers. TDBNA provides regular banking services, private banking, wealth management, asset management, mortgages, loans, insurance, and investment planning (TD Bank, 2021). Chartered as a national bank, TDBNA is limited by the U.S. deferral consumer financial laws (Ontario Securities Commission, 2018).

The PMI white paper on TD Bank (2013) reports that the exponential growth from a regional bank in 2008 to one of the largest financial service providers in the U.S. resulted in the growth in the number of projects and their complexities. Therefore, TDBNA established an implementation PMO (IPMO), which resulted in efficient project execution within time and budget. Thus, the IPMO was evolved into a PMO on an enterprise level. PMI (2013) reports that the resulting PMO produced a template for project management practice for strategic achievement suitable for various businesses.

4.1.7 **Nokia software and networks**

Founded in 1865, Nokia Corporation is a telecommunication company with business organization in mobile networks, cloud network services and network equipment. Nokia operates in 130 countries with 92,000 employees resulting in net sales of EUR 21.9 billion (Nokia annual report, 2020). Though the beginning of Nokia started from pulp mill, it is reported by Nokia that significant sales are generated from Nokia Networks, whereas Linden (2021) projects that Nokia will continue 5G services until 6G can be deployed in the 2030s. Production of Nokia branded tyres (Nokian Tyres), paper products, cables, rubber boots, televisions and mobile phones are either done by subsidiaries, or bought-off ventures.

Nokia has industrial research and innovation centers known as Nokia Bell Labs in multiple countries including Finland, China, the UK, and the US where wired and wireless communication technologies are developed. Nokia reports EUR 4.09 billion expenditure on research and development in 2020 (Nokia annual report, 2020 and Statista, 2021).

Capgemini (2015) gives insight on the establishment of PMO at Nokia. The increment in complex projects, ventures and services led to the demand of a structured project management system. Therefore, PMO-as-a-service was offered with current status in reference to supplement standardization of project planning, updates and enhancements.

4.1.8 **KONE**

Kone Oyj (KONE) is an elevator, escalator, automatic door and similar equipment manufacturer which advertises its activities as a "lifting business" meaning inspection, maintenance, replacement apart from new installation which is the rebranding of the maintenance business. Marketscreener reports Otis Worldwide (USD 36M) and Schindler Holding (USD 29M) as direct competitors of KONE which has USD 36 Million market capitalization (Marketscreener, 2021). Established in 1910, the Finnish company serves 60 countries with 60,000 employees generating EUR 9.9 billion in 2020 (KONE ANNUAL REVIEW, 2020).

KONE's annual report highlights the creation of the best *people flow experience*, pointing to the 1 billion people KONE claims to move each day. In order to enable this, the Finnish company aims to work with customers and end users to understand the expected services and improvement of current facilities. Thus, KONE reports EUR 180 million expenditure in research and development. The testing, improvement and application of services are carried out under various subsidiaries such as KONE EcoSystem, KONE Care and KONE Ecodisc (World Market Intelligence, 2015).

The KONE Way is the harmonization methodology which has been improved since 2005 and is the standardized methodology used in KONE. Suurnakki (2019) reports that implementation of the KONE Way has improved growth, profitability and share price through the effective implementation of new business processes, practices, and strategies. Due to self-investment into R&D and innovative sustainability practices, KONE maintained its sustainability goals during the Covid-19 pandemic (Mazareanu, 2021).

4.1.9 **TietoEVRY**

Tieto Oyj was an IT services company serving industry, enterprise, managed and product engineering solutions. It was established as Tietotehdas Oy in 1968 serving development and maintenance service for the Union Bank of Finland. Tieto Oyj merged with EVRY, a Norwegian IT services company to form TietoEVRY in 2019. Churning EUR 3 billion in 2020, TietoEVRY employs 24000 professionals in 90 countries.

Currently, TietoEVRY's ventures revolve around data and digitalization. The company is employed by its customers to increase effectiveness with implementation of agile practices, digital services, and products on the basis of digital footprints. Digital experience consultation, software product growth and maintenance of competitive edge are the specialties of TietoEVRY (Pitchbook, 2021). TietoEVERY serves customers such as the City of Stockholm, Goodyear, Getswish and Norwegian government organizations (Virtanen, 2020). A weekly financial magazine Talouselämä named TietoEVRY as the company with the highest valuation against returns, naming it the most sustainable company in the Helsinki Stock Exchange (Huhta, 2021).

In the 2020 financial review, TietoEVRY identified strategic, operational, financial and compliance risks where change and transformation management were seen as an obstacle from a strategic point of view. The merger in late 2019 followed the change in organizational practises. In turn, a requirement of an Integration Management Office (IMO) with governance of change, communication, training, and milestone standards was established. This form of a PMO reports to the project excellence unit which is the governing body of project management (TietoEVRY, 2020).

4.1.10 **An IT device sustainability company**

After the request of the Director of IT, the name of this company has been redacted, and will be referred as "TSIT". TSIT is an IT device lifecycle management company which debates access vs ownership of end user IT devices in companies and businesses. Acquisition (and loan), management and refresh of IT devices is the service business model of TSIT. It aims to reduce e-waste by loaning IT devices to partner companies and reselling them after the loan period to provide a second life to the devices (Annual report, 2021). The annual report 2020 states that TSIT has 24 subsidiaries throughout Europe and Asia with 400 employees.

Due to the investment in process automation of inventory management (Kivelä, 2009) and application of state-of-the-art tools and technology, TSIT declared a historical turnover of EUR 662.6 million in 2020 (Annual report, 2020). In 2020, TSIT launched a joint venture (JV) with another leasing solution, a subsidiary of BNP Paribas bank, resulting in an increase of workforce and customers. TSIT reports that out of 500,000 devices it managed, 98% of devices were resold with the remaining 2% recycled (Annual report, 2020). Therefore, with the JV in pre-planning and year on year increment of turnover, TSIT decided to establish a PMO in 2018.

4.1.11 **Etteplan**

Etteplan is an engineering consultancy company that operates primarily in Finland and Sweden, with few customers in EU and China. The company provides delivery design and product development services to mid and large companies through 3500 employees with a cash flow of EUR 38 million and turnover of EUR 260 million. Etteplan aims to achieve EUR 500 million by 2024 (Financial review, 2020). Persistent acquisition of various engineering companies throughout Europe, Etteplan has specialized in technical documentation, design and embedded smart solutions (Hämäläinen, 2019).

KONE, Metso, ABB are some of the clients served by Etteplan. The preference of digitalization by large customers influenced Etteplan's own investment into digitization of services. This was possible due to acquisition of multiple subsidiaries including Espotel in Finland, Skyrise in Poland, Tegema in the Netherlands and EMP engineering in Germany (Etteplan, 2021).

4.1.12 Metso Outotec

Metso Outotec (MO) is the result of a merger between mineral processing company Metso and digital, innovation and growth leader Outotec. The merger was done in 2020, resulting in a company potentially valued at EUR 4.2 billion (Leonida, 2019). MO provides services related to mining, aggregates, metals refining and recycling. Metso is driven by 15,466 employees with net sales of EUR 475 million in 2019, which included EUR 534 Million in orders (Financial review, 2020).

MO states in its yearly financial review of 2020 to increase visibility of its project development via reassessment of current status of project. It aims to differentiate various project and group management based on levels within the organization (Financial review, 2020).

4.1.13 Digital Network Solution

Digital Network Solution (DNS) was founded in 2010 as an IT service provider with network, cloud solutions and cybersecurity as primary services. DNS serves a variety of industries ranging from hospitals to the government. The expansion of the company from a few clients to full-fledged IT solution provider in terms of data management, disaster recovery, cloud transformation and changes, DevOps and data center networking has resulted in technical alliance with large network solution partners such as Cisco, Juniper, Paloalto, Vmware and Microsoft.

The company decided to introduce a PMO in 2021 due to project process, structure, timeline, and best practices demanding a harmonized methodology. Therefore, an experimental PMO was established with a new hire to support, standardize, manage, develop, and train the current practices and stakeholders.

4.2 Companies that provide PMO as a service

4.2.1 Spice Technology Group Inc

Spice Technology Group Inc (Spice) is a supply chain consulting firm which works with the science, technology, and management industry. It is known for cloud-based services and third-party vendor services. Spice currently provides its 7500 clients with supply chain networks and 37 related applications under the Software-as-a-services (SaaS) business model. Founded in 2010, Spice currently employs 76 personnel and generates USD 17.8 Million (D&B Business Directory, 2021).

Industry Era Review (2020) claims that the reason behind Spice's success are the highly experienced team members, modular technology, and continuous development. Although it has a small number of employees, Spice is a PMO service provider that establishes PMOs based on governance, delivery management

and enablement and tools. The resources provided by Spice are PMs, SMEs, BA, CMs and IT Developers (Rogers, 2021).

4.2.2 **SDLC Partners L.P.**

SDLC Partners, L.P. (SDLC) is a consulting firm which works with the science, technology, and management industry, specializing in customer specific business and IT needs. Established in 2004, SDLC operates 13 subsidiaries in the United States with 405 employees generating a revenue of USD 36.8 million in 2020 (Glassdoor, 2021). Along with joint ventures, partnerships, and new subsidiaries, SDLC is expanding into automation, intellectual property, and cybersecurity.

SDLC reports that it provides PMO implementation services based on the requirements of the clients, for example tenacious IT competency and strong PM capability. SDLC implements PMBOK practices into the established PMOs and develops standardized PM practices and training based on client's objectives. SDLC claims its implementation saved 20% project resources for the case client (SDLC partners, 2021).

5 Results and analysis

5.1 Findings

During the collection of literary materials for this thesis it was observed that there is a lack of research on the standardization of PMO. It was found that the most common articles would either be based on already established PMO or would explain what a PMO is and its roles. Therefore, to produce a template for PMO was taken as a challenging opportunity.

The foundation of the framework was based on Aubry and Hobbs's survey of 502 public and private companies. The 2005 survey was re-done with 123 valid surveyors again in 2006 which resulted in the description of a PMO from the point of view of these participants. Among the 27 questions/functions in the survey, for the purpose of less discrepancy, the upper 12 questions were chosen for the qualitative interview process. The idea behind this was to check the validity of these functions 16 years after the identification.

It is evident from the survey that there are a high number of functions that hold its values at PMOs for the interviewed companies. However, the PMO practices are based on either a working solution from a consultant or external methodologies which are in practice in other companies. It was reported by the majority of interviewed companies that their project management methodology was based on the Project Management Body of Knowledge (PMBOK).

Table 3 shows the 10 selected functions practiced by companies who have a PMO white paper published in the public domain. The data suggest a lack of knowledge exchange, project governance and intra-organizational promotion of project management. However, this contrasts with the interviewed companies who priorities overseeing of project governance and spread of project management methodologies. This will be discussed per company in the section below.

Table 3: PMO functions at companies with a published PMO case study.

Questions	AZ	Toyota	Intel	Vodafone	FES GmbH	TD Bank NA
Describe PMO in a case study?	✓	✓	✓	✓	✓	✓
Report project status to upper management?	✓	✓			✓	✓
Develop and implement a standard methodology?		✓	✓	✓	✓	✓

Monitor and control project performance?		✓	✓	✓	✓	✓
Develop competency of personnel, including training?	✓	✓	✓			✓
Implement & operate a project management information system (or a portfolio)?	✓		✓	✓	✓	
Promote project management within the organization?		✓	✓		✓	
Participate in strategic planning?	✓	✓	✓	✓	✓	✓
Provide mentoring for project managers?	✓	✓				✓
Identify, select and prioritise new projects?	✓	✓	✓	✓	✓	✓
Facilitate knowledge exchange?	✓					
Implement and oversee project governance?	✓	✓				

The below section first reports the reason a PMO was established in the company and the changes that were carried out to mitigate the establishment process, which is followed by the ways of working. The mid-section also answers the governance, management, and strategic aspects of a PMO in each interviewed organization. Finally, it concludes with the current status of their PMOs and future changes.

5.1.1 **Nokia Network and Solutions**

Nokia established its PMO in 2018 to mitigate higher demands, larger projects, and complicated procedures. It was agreed that a new organization which supports project management governance, capability and methods was required as a strategic driver for organizational excellence. However, the resource allocations were not done by the PMO, rather by line managers based on the budget allocated for the establishment. The qualification criteria for PMO officers were experience as a PM, an ITPM or cost management expertise. The focus was on change management, cost management and planning process. A project standard based on the PMBOK was implemented for simplification, digitization, and regular monitoring.

Nokia describes the PMO in a case study but is not available to the public. It is used as a training material to understand the role of the PMO within the

organization. There are bi-weekly reports and monthly summary provided to the strategy and technology unit. There are a certain set of KIPs that are followed monthly. Based on the PMBOK, a methodology called PMM is implemented as a standard methodology which is trained to incoming PMs. Project management information systems such as Office365, PowerBI and an in-house portfolio management system called ITPOL are used by the PMO and its officers. The PMO also facilitates knowledge exchange and has a project governance task force. This task force identifies, selects, and prioritizes new projects through a dedicated channel. However, the Nokia PMO does not promote project management within the organization.

In the present state, Nokia operates four different PMOs in different business units with a harmonized RACI allocation, which is blanketed by an enterprise level PMO. There are 8-9 project management officers allocated full-time in these PMOs. The short-term objective is to close the gap between business and IT.

5.1.2 **KONE**

One of the oldest PMO in Finland, KONE's PMO was established more than a decade ago. Known as the Strategy Transformation Office, the PMO at KONE was established to introduce new strategy and follow up. Different business units provided support on how to implement the PMO and agreed on similar way of changes. There is no published case study on the PMO at KONE, however, according to KONE's head of PMO, the PMO way of working is a company recipe which was established under the KONE Way.

The KONE PMO reports project status to upper management for prioritized and biggest transformational projects. Since each executive has their own PMO, status reports are presented by respective officers. A native methodology called the Kone Way project methodology is standardized and deployed for both business and IT. It is a gated model, nonetheless, is an agile model that has a standard process framework. The Kone Way is provided as training and change management to PMs while PMO provides coaching and mentoring programs, not necessarily related to the PMO. The PMO promotes project management within the organization by training ITPMs, solution designers, architects, and testers. Community specific knowledge sharing is run to facilitate knowledge exchange. This is how KONE develops the competency of its personnel. Project governance is defined in a governance model which is handled by individual solution teams. The individual PMO are responsible to identify, select and priorities projects based on their own objectives. The project outcomes based on benefit, KPIs, schedule, cost and quality criteria are monitored as project performance metrics. Being a strategic business entity, the STO implements standard templates based on needs where certain templates are mandatory for small to medium projects. Larger projects, however, are executed based on the needs, internal capabilities, strategy, and the market.

Currently, KONE has a STO which oversees different PMOs based on respective objectives. It supports KONE executives, leaders, portfolio, and program managers. The prioritization of methodologies, deployment, development, and rollouts indicates the roadmap of the organization are responsibilities of each PMOs. It is evident that a different pathway focusing on strategy has worked for KONE since it has shown continuous process improvement and effectiveness in implementation of Kone Way standards. Direction towards lean and agile portfolio management, agile development methodologies and own change management capabilities are some of the continuous improvements ongoing for the longevity of the PMO.

5.1.3 **TSIT**

PMO at TSIT was established in 2018 when the company started experiencing project complexity. With the decision of the CIO, the PMO was placed under the information office, from an iteration of IT and technology. A consultant company was involved in the development model with external and internal resources involved to establish the framework. The PMO officers were internal PMs, personnel with budgeting, resource management and business case knowledge.

As a sustainability focused company, TSIT publishes numerous studies and papers. However, there are no case studies or whitepaper available in relation to PMO. The reason could be the implementation of PMBOK standard PM methodology. The PMO reported to upper management on a weekly frequency, based on the reports generated from its project management information system offered by Planview. The PMO was a governing body that controlled and monitored project performance, identified, and prioritized new projects and participated in strategic planning. Project management was promoted within the unit which included training, certifications, and knowledge exchange.

It is observed that the PMO at TSIT carried out most of the important activities identified by Audrey and Hobbs. However, the PMO at TSIT has been dissolved and moved to the previous *IT and tech* unit. It can be observed from Stanleigh (2006) and Al Hraki & Benny (2015) that 50% PMOs, if unstable, disband within the first three years. TSIT could be the victim of misalignment between the consultants who established the PMO and the PMO officers who run the daily assignments. Nonetheless, the company is looking to re-establish the PMO after realising the importance of a project governance body, especially in regard to their IT projects' operation.

5.1.4 **Etteplan**

Etteplan's PMO has a diverse set of roles, with the primary objective to support project engineering globally within the organization. In 2019, Etteplan restructured the company strategically to increase growth and the PMO was placed under Operational Excellence unit (Cision, 2018).

Large scale projects involve the PMO for strategic planning which is reported to the top of the organization. However, for small to medium size projects, business owners are reported. The PMO agrees almost all client projects, which infers no identification, selection, or decline. Therefore, the participation of PMO is expected in all engineering projects, especially agreement of scope and terms. Due to the heavy concentration on projects, the PMs and project engineers are given training and support. Etteplan has implemented its own project management processes which includes KPI measurement for each project. The project management practices are improved by lessons learned process after each project conclusion. The training provided in the future is also manipulated by the data gathered by these projects and, in turn, the lessons learned.

5.1.5 **Metso Outotec**

The merger of Metso and Outotec in 2020 brought the topic of harmonization between two different businesses with different roles. The main objective of the PMO was identified as coordinator of the merger and acquisition. Therefore, the Strategy and Business Development Office (SBDO) was established as the PMO at Metso Outotec. Since the initiation, M&A has separated and the SBDO concentrates on formalized strategy processes. The officers were selected based on strong PM skills, business understanding of all units, company network, change management, communication skills, end-to-end process, time, budget, and scope.

The SBDO does not follow PMI or PMBOK, thus implements an in-house standard methodology started at Outotec. Consequently, project governance methods and processes are also dependent on the SBDO. The PMs are provided informal competency development training and encouraged project management role changes. Mentoring and knowledge exchange for involved officers are also coordinated. The SBDO is involved in identification, selection, and prioritization of projects, for which project performance is monitored and controlled. Depending on the project, it is reported to upper management.

Currently, MO reports good health of the PMO with a "built" status. Smooth change management resulted in acceptance of authority of PMO by the employees. MO PMO uses Office365, SharePoint and Excel as project management tools. Changes and new implementations are expected, however with strategy as a priority. Therefore, improvement of the strategy process which is deemed complicated across business and functions is expecting professional project management.

5.1.6 **Digital Network Solution**

Expansion of the business, necessity of project process, structure, timeline, and best practices led to the inauguration of PMO at DNS in 2021. A new hire was instituted with the PMO lead role, which did not incur any structural changes with non-significant overall effect. DNS being an IT company lacks project

management personnel, therefore, the basis of qualification for PMs into PMO officers are seen as experience and training.

PMO case study is available for DNS, however, is not published in a public domain. The reason being implementation of in-house project management methodologies. However, the tools used for project management are common tools such as MS project and Azure DevOps. The PMO is involved in project selection, prioritization, however not in the strategic planning phase. The project performance is governed, monitored, and reported to upper management. On the other hand, due to possible lack of personnel and lack of full-scale project management methodology implementation, project management within the organization is not widespread, nor are training or mentoring provided.

About a year later, the tasks handled by the PMO are efficient and resource extension is reported to be smooth. The PMO is looking to expand since three officers are currently leading the overall PMO landscape. Implementation of common project practices, methodologies, governance, portfolio and resource management are the short-term objectives of DNS PMO.

5.1.7 **KPMG**

The growing emphasis on project management, connection to other teams, reduction of people working in silos, need of a particular kind of structure and to facilitate exchange of knowledge, the PMO at KMPG was established more than a decade ago. Known as the Program Management Office, KPMG not only provides PMO-as-a-service based on customer's process development but also has its own internal PMO working with various business units with various objectives. Different functions supporting a particular client demand more hands. Therefore, multiple PMOs based on various requirements are installed at KPMG. The PMO officers come from various competences, however primarily from a business background with structured emotional intelligence.

Various published articles describe PMO at KMPG at various levels, however there are various PMO with various capabilities and objectives. These PMOs fulfill all Aubry & Hobbs's essentials of a structured PMO. The PMO is involved in strategic planning, implementation and overseeing of project governance. It identifies, selects, and prioritizes projects. The project management portfolio system used for project performance monitoring and control is G2 gateway, OpenGL public as well as other internal tools. The project management methodology is applicable from the bottom to country level, after which deviation based on the country's regulations are applicable. The methodology is improved with the implementation of lessons learnt at the end of each project's lifecycle. The project status is reported to upper management regularly. Project management is promoted within the organization with offer of training, mentoring and knowledge exchange.

KPMG's PMO provides training that aligns with the strategic vision of the company. It also provides training for personal development and certified

training for professional development. Currently, the PMO is striving to do better and become competent, not merely a PMO. An international PMO is under construction which would resonate with the vision of the company.

5.1.8 **TietoEVRY**

The objective of the PMO at TietoEVRY is to improve results, sell projects and make customers happy. Established in 2014, it was built ground up with implementation of global project management methods. Personnel were hired from within the company to start the PMO dice rolling. Due to the requirement of diverse expertise, wide representation of business units, cultural locations and countries was considered while selecting PMO resources. The PMO officers are a mix of higher level and lower-level personnel with PPM, PMI, ScrumMaster, Agile master's certifications. On an individual level, a development plan is sought after in a PMO officer.

TietoEVRY's PMO sits at a lower level than other interviewed candidates in a manner that it is not involved in selection of projects or strategic activities. However, it monitors, controls and reports project performance to upper management. A native project management information system along with portfolio management software such as Jira, Confluence, PMM add-on, financial tools and project accounting tools are used. Knowledge exchange, mentorship, and training to develop personnel competency is facilitated by the PMO. A project development process, based partially on PMBOK, is integrated with other processes to enforce project management methodologies.

Improvement within the past eight years has seen 3rd version of processes, management, and deliverables in working progress at TietoEVRY's PMO. Continuous addition of new methodologies, especially hybrid methods depending on the client and project has increased the PMO projects from on-premises to 99% hybrid. In the future, the PMO seeks change in strategy based on six independent businesses, each with end-to-end entities. It is proposed that they choose their own PM tools, and in the long run rethink their own project portfolio management and processes.

5.1.9 **Lessons learnt from interviewed companies**

It is observed from the interview data that there is dissension between the participants even though the majority are related to the technology sector. This suggests to prove the points made by Ibrahim (2013), Rad and Levin (2002) and Harrison and Lock (2004) that PMOs are established based on function; if one formula suits one does not mean it will suit the other. This indicates that there is no universally applicable formula to implement a PMO. Therefore, if a template framework can be proposed, it needs to be dynamic in nature so that companies can iterate the template based on their ways of working.

The data presented in Table 4 differs from the data in Table 3 such that the data in Table 4 was collected between December 2021 and February 2022, and

therefore is in practice at the participant companies at the time of writing of the thesis. Thus, the consensus can be considered common for large companies in Finland. It is notable that none of the participant companies reveal their PMO ways of working even though they describe the noun in their yearly reports and portfolio.

It is observed from Table 4 that majority of the project management organization at the interviewed companies carry out the following periodical tasks:

a. Report project status to upper management
b. Develop and implement a standard methodology
c. Monitor and control project performance
d. Develop competency of personnel, including training
e. Implement & operate a project management information system (or a portfolio)
f. Provide mentoring for project managers
g. Identify, select and prioritise new projects
h. Facilitate knowledge exchange
i. Implement and oversee project governance

It was evident from Aubry and Hobbs's 2005 survey that these were the top 10% of the activities carried out by interviewed companies' PMOs. We can also infer that these activities are prevalent for PMO in the present, which validates our questionnaire.

Table 4: Status of PMO functions at interviewed companies.

Questions	Nokia	KONE	TSIT	Etteplan	Metso Outotec	DNS	TietoEVRY	KPMG
Describe PMO in a case study?								✓
Report project status to upper management?	✓	✓	✓	✓	✓	✓	✓	✓
Develop and implement a standard methodology?	✓	✓	✓	✓		✓	✓	✓
Monitor and control project performance?	✓	✓	✓	✓	✓	✓	✓	✓

Develop competency of personnel, including training?		✓	✓	✓	✓		✓	✓
Implement & operate a project management information system (or a portfolio)?	✓	✓	✓	✓		✓	✓	✓
Promote project management within the organization?		✓	✓		✓		✓	✓
Participate in strategic planning?		✓	✓		✓			✓
Provide mentoring for project managers?		✓	✓	✓	✓		✓	✓
Identify, select and prioritise new projects?	✓		✓	✓	✓	✓		✓
Facilitate knowledge exchange?		✓	✓		✓	✓	✓	✓
Implement and oversee project governance?		✓	✓	✓	✓	✓	✓	✓

5.2 Empirical review

1.1.1 Selection of companies

The participation of selected IT companies was oriented to fulfill a checklist of validity of common PMO practices. The common PMO practices were appropriated by comparing the surveys by Aubry & Hobbs (2007) and The Project Group (2021). As shown in table 3, well known international companies with IT-related projects whose PMO study was available in a public domain were taken as a case example.

The literatures were studied to validate the fulfillment of selected PMO practices, among which, 10 out of top 12 tasks are fulfilled for almost all cases, however in a random order. This analysis format was then followed up in table 4 with participant companies, which shows fulfilment of 11 out of top 12 tasks,

with majority not describing their PMO in a publicly available case study. It was an analogous answer that organizations would not like to publicize their organizational structure.

Nonetheless, during the open-ended interview round, it was discovered that all companies have had a PMO for at least 2 years, where companies with older PMOs have multiple PMOs. It was also observed that older PMO have an in-house enterprise resource planning tool or an IT portfolio management tool. Continuous process involvement is a common denominator since various project management tools for software development are being implemented across various business units of various participants. Therefore, this point provides a dynamic unit into the proposed PMO framework.

Table 5: Available PMO frameworks

Author	Name	Year
Aubry et. Al	Framework for understanding organizational PM through PMO	2007
Kaufman & Korrapati	PMO framework for successful implementation of IT projects	2007
Instantis	PMO Starter Kit	2011
PMI	PMO frameworks	2013
Salameh	A framework to establish a PMO	2014
Too & Weaver	The management of PM: A conceptual framework for project governance	2014
Hubbard & Bolles	PMO framework and PMO models for project business management	2015

1.1.2 Breakdown and implementation of collected information

Based on content analysis method, a deductive theme was identified based on inputs from participating organizations. Visualized in a word-cloud format in figure 15, word code was extracted from the interviews. It endorsed the proposals made by Aubry & Hobbs (2010) that PMO is complicit in the contribution to organizational performance by highlighting strategy, governance, resources and portfolio as the overlapping factors in present-day thriving PMOs.

Figure 15: Coding based on content analysis

To build the visual framework, the choice for the type of framework comes from Kaufman & Korrapati (2007), whereas the sustainability and training foundation is laid out on the basis of Aubry & Hobbs (2006). Similarly, the four pillars for the PMO model are identified from Hubbard & Bolles (2015) and Too & Weaver (2014). The idea to take the PMO establishment process as a project itself comes from Salameh (2014).

Previous frameworks do not reference each other during the proposal of their respective framework. Therefore, a pattern cannot be formed. However, some degree of agreeableness in few processes are visible, which is the connector for this conceptual framework. Process evolvement is also not considered in previous frameworks which include multiple-task process in separate entities, whereas due to agile work practices, redundant processes have been eliminated. It is also observed from previous proposals that the PMO models are unidimensional, which this thesis is aiming to eliminate by proposing phase-by-phase PMO integration process.

6 Bhandari's modular PMO Framework

This thesis proposes a conceptual PMO framework developed from the interviewed participants, survey results, involved companies, available academic literatures and published proposed frameworks. This framework is termed as Bhandari's modular PMO framework after the name of this thesis's author. The foundation of Bhandari's PMO framework are the fundamental elements of project management: Governance, management, and strategy. Groden (2007) identifies risk management, enterprise structure, IT portfolio management and governance as the four pillars while Hobbs (2007) identifies monitoring, development, strategy, and organizational learning as the key functional groups. However, Bhandari's PMO framework suggests governance, resource management, portfolio management and strategy as the foundations.

The structure of the framework is closely based on the framework proposed by Salameh (2014) and PMO whitepaper by Instantis (2011). However, dependencies, environment, relationship, and other elements are introduced to provide a dynamic non-linear process. The principles, methodologies, and choice of variables to filter the PMO components are sourced from Hubbard & Bolles (2015).

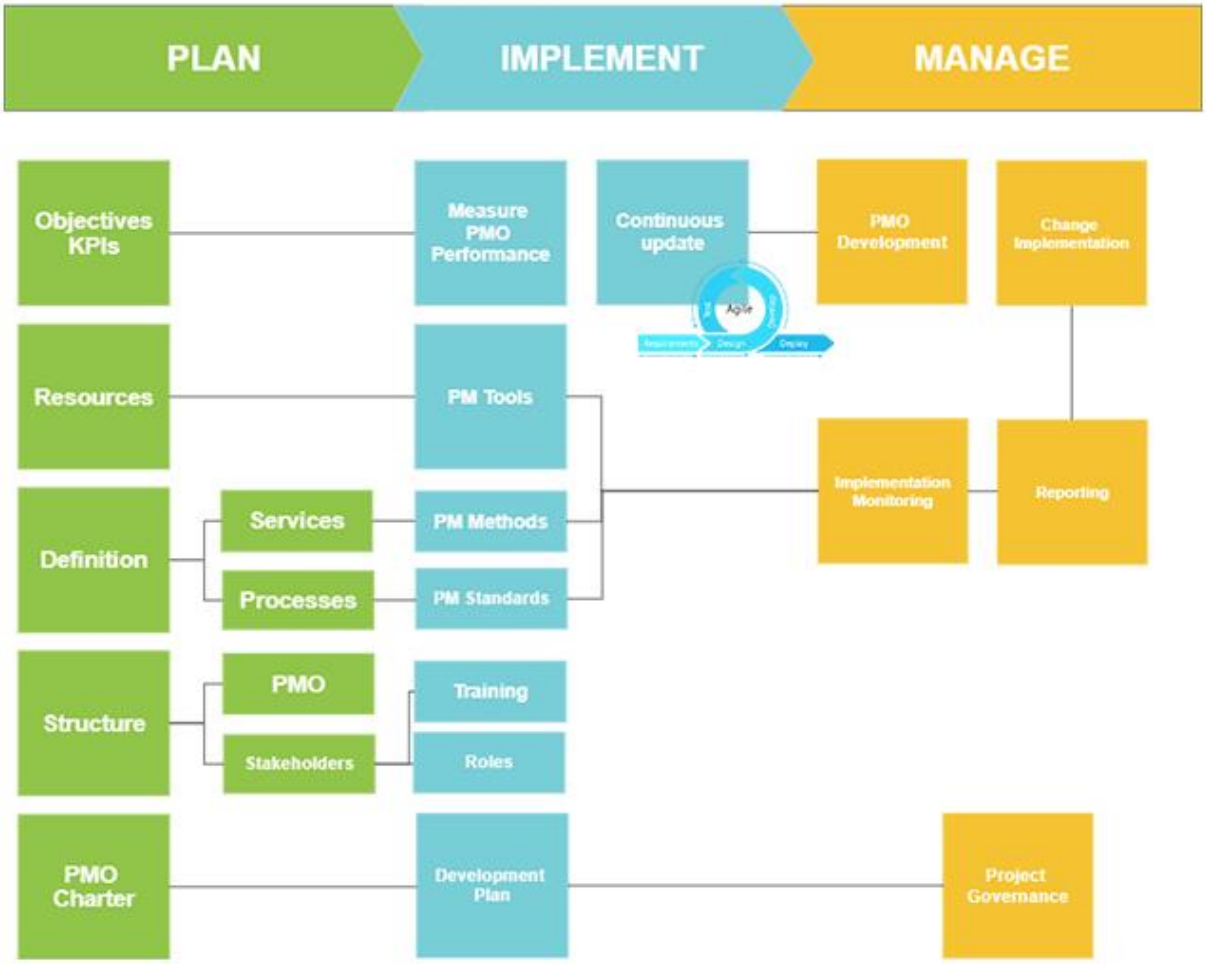

Figure 16: Bhandari's PMO framework

6.1 Planning a PMO

A PMO should be seen as a dynamic unit which implements organizational project management to achieve harmonization of complex projects and the stakeholders. Therefore, all actions taken during the establishment process should resonate with the future PMO objectives.

Based on the framework proposed by Instantis (2011), the best method suggested for a PMO establishment process is to take this process as a project on its own. Follow common project management practices at the client's disposal as it is easier to take this process as another project rather than an organizational change. A PMO as a common project lifecycle process is as follows:

1.1.3 Plan

The objective of this phase is to agree on the PMO framework that resonates with the business. This phase identifies the purpose of the PMO and explains the scope of services expected from the PMO. Overview of key performance metrics, service offering and success criteria and reporting them to upper management falls under this phase. The draft of this plan is proposed in a document called the PMO charter which includes the PMO objectives, organizational model, contact details and reporting guidelines.

a. Identification of objectives
b. Mapping and tracking of KPIs
c. Resource allotment
d. Definition of service and processes
e. Drawing of PMO structure and allocation of stakeholders
f. Creation of PMO charter

1.1.4 Implement

The objective of this phase is to establish the agreed framework and define the processes. The processes and activities can be an improvement of existing processes or application of best practices from the same industry. This phase identifies the key resources involved in the operation of PMO. A structure of desired PMO is obtained and the roles are defined. The project management standards and processes are also identified and implemented in this phase. Therefore, a project portfolio management system that indicates measurable variables should be identified.

a. Definition of stakeholder roles
b. Charter of PM methodologies
c. Charter of PM standards
d. Identification of PPM tools
e. Training of PMs

f. Formulate PMO development plan
g. Information distribution
h. Stakeholder engagement

1.1.5 Manage

This is a cyclic phase with the objective of continuous PMO development. Management of implemented standards, development of required processes and reporting to upper management is done in this phase. Decisive actions pertaining to projects, such as identification, selection and prioritization is done with the coordination with upper management. Finally, sessions on lessons learnt, PMO improvement, efficiency gains, value creation and other KPIs should be discussed in a weekly/bi-weekly status report.

a. Implement monitoring and reporting standards
b. Project monitoring and reporting
c. Project governance
d. PMO development and changes implementation
e. Training, improvements, and continuous enhancement

6.2 Model of the PMO

Figure 17: Bhandari's PMO model

A concise model, based on Hubbard & Bolles's PMO model is proposed with the integration of Salameh's suggestion. This PMO model includes the four identified pillars whose integrity is based on the sustainability of the PMO. It identifies

a global or parent PMO as the governing body described as upper management in this thesis.

Table 6: Sub-classification of four pillars of Bhandari's PMO model

Strategy	Governance	Project and portfolio management	Resource management	Training
Support top management	Measure KPIs	Manage interdepartmental dependencies	Resource planning	Mentoring PMs
Identify and prioritize projects	Projects allocation and prioritization	Prepare reports	Resource allocation	Training project workers
Communicate strategic changes	Define methods, guidelines and frameworks	Moderate monthly/weekly project status call	People skill and excellence	Facilitate knowledge sharing
Profitability and growth of services	Apply and monitor the processes	Monitor data quality	Capability management	Upkeep training environment
Harmonization	Develop PM charter/manual	Communicate project data	Remotisation	
Project steering	Manage PM tools	Coordinate multi-project environment	Centralization	

These four pillars can be explained in more detail based on multiple frameworks available in academic literature, the four pillars identified can be sub-classified with various proposed tasks. These tasks can be sourced based on the linear format of Salameh's (2014) framework as shown in Table 6. An innovative and common practice in most workplace has been remotisation of work, which refers to working from home. Thus, this is identified as a resource management task for the PMO.

6.2.1 **Governance**

Too & Weaver's project governance framework aligns a strategic PMO overlay between project management and upper management, resulting in a project delivery system. Influenced by this system, the governance pillar in Bhandari's framework recommends the cohesion of PMO strategy and PMO governance. The reason being the independence of the PMO from upper or executive management. In PMOs where organizational strategy is not part of the PMO, a PMO strategy should be injected to identify, prioritize, and monitor projects.

The primary task of governance in PMO is to monitor the KPIs in the form of project objectives and performance. Based on the performance, project allocation and prioritizations can be done. The secondary task is to Identify, implement and improve PM methods and tools. It includes guidelines, frameworks, methods, automation, demand, and information distribution. The changes are documented and communicated to the stakeholders via the project charter. This should be either a recurring or a periodic activity.

6.2.2 **Strategy**

Strategy is one of the driving units of the PMO. It is the link between governance and upper management. The role is to support top management by delegating the identification and prioritization of projects. The profitability from the projects and growth of services are communicated to attain a project steering position. Therefore, required changes on a strategic level can be overseen by the PMO itself. As discussed earlier, it is a possibility that strategy is not part of the PMO, rather the responsibility of top management whom PMO reports to. In this case, an internal PMO strategy can be implemented which is independent from the organizational strategy. This is reported and communicated through the project charter and in weekly reports.

Bhandari's framework has pointed out that not all PMOs are the same. Therefore, international companies should have PMOs specified by country or business unit. This requires a larger PMO governing body such as a Strategic Project Management Office (STO). It is evident from companies with over a decade old PMO that a larger global or strategy management office is established. All individual PMO report to the STO/global PMO.

6.2.3 **Project portfolio management (PPM)**

This pillar refers to both project and program portfolios. The intention of this pillar is to monitor projects and the management tools. Portfolio execution, predictability, measurement of metrics such as industry benchmarks and project automation are other secondary duties. An ideal PPM should have project automation, which is the target in the long term of a PMO.

To reach an independent automated PPM, a PMO should monitor the project resources, facilitate communication, assign correct roles and responsibilities, and ensure to take a required change management decision when required. Portfolio reporting, risk assessment, performance reporting, issue escalation and information transmission are few tasks that should be communicated with the upper management. This is suggested to align with the governance and strategy of the organization. This is an uninterrupted process with consecutive development.

6.2.4 **Resource management**

Resource management which includes capability management for a PMO is an integral portion of project delivery management. Available literature and frameworks vaguely describe resource management. However, the PMO survey by The Project Group (2021) identifies the PMO involvement in resource management at a generic level. This insight is tallied with participant companies to understand key resource management activities.

This portion of the PMO plans work and effort estimation and coordinates with project managers on the amount of FTE allocated. Overlapping or conflicting resources are resolved with strategic capacity planning. Skill management has been identified as one of the overlooked metrics, while remotisation is the growing trend. Due to the Covid-19 pandemic, remote work is encouraged in businesses where possible. In turn, monitoring of project personnel has become difficult. To mitigate this, new methods should be implemented which is one of the shortcomings of Bhandari's framework. Nonetheless, service metrics to measure project performance based on the efficiency of resource allocation and stakeholder satisfaction can be introduced.

6.2.5 **Training**

Strategic capacity planning via long term skills training so that PMO officers can handle their duties is advocated. The sustainability of the PMO is identified to be directly affected by the competence of the PMO officers. Therefore, for a sustainable PMO, it is recommended that the PMO resources are trained on a regular basis about the PMO vision, charter, strategies, objectives, and current status. Knowledge transfer sessions among PMs is observed in PMOs with over three years of operation. This can be facilitated by the PMO by maintaining a knowledge-sharing database. This aids in sharing of lessons learnt from one project to the other, advocating a process change or efficiency gain.

Training environment and the inclusion of state-of-the-art courses should be at the disposal of the business. This will promote project management within the organization and facilitate competence improvement. Mentoring of PMs is evident in many participating organizations, which resonates with Aubry & Hobbs's 2006 theory for an efficient PMO.

6.3 **Naming and objectives of the PMO**

It is evident from multiple proposed PMO frameworks such as Salameh (2014), Hubbard & Bolles (2015) and Kaufman & Korrapati (2007) that depending upon the business focus, the PMOs are aligned either strategically, tactically, operationally, or administratively. Therefore, it is crucial that, for a framework, a dynamic objective is identified. Furthermore, based on the business focus, the

managerial activities and title of the PMO (program management, portfolio management, enterprise project management, project support) can be chosen. The naming is the choice of the PMO officers, involved stakeholders and the upper management. However, the common practice as seen in table 6 is to name the PMO based on the PMO level, validity, managerial objectives, duties and the upper management.

Table 7: PMO naming table based on Hubbard & Bolles

PMO Level	Validity	Managerial Objectives	Duties	Reports to	PMO Title
Strategic PMO	Permanent	Project management in enterprise level	Oversee lower level PMOs Strategic planning Project identification	Directly to executives	Enterprise PMO Porfolio management office Strategy management office
Tactical PMO	Permanent	Project management in division (country/branch) Oversees lower level PMOs	Project portfolio management Division planning	Division, country, branch manager, executive or Enterprise PMO	Program management office Porfolio management office Project management office
Operational PMO	Permanent	Project management in business unit Oversees lower level PMOs	Project portfolio management Business unit planning	Division PMO	Program management office Porfolio management office Project management office
PM center of excellence	Permanent/Temporary	Implement project standards, methodologies Train PM methodologies	Communicate tools, methods, standards and PM practices Update templates, tools and project methodologies	Is an implementation body, does not report	PM center of excellence Center of excellence
Project Office	Temporary	Support prioritised projects Project management	Overall project management (initiate, plan, execute) After project monitor, oversight and handover	PMO head, project manager or operational, tactical PMO	Project management office

Based on the nomenclature proposed by Hubbard & Bolles (2015), table 7 below provides a summarized position of various levels of PMO, their objectives, responsibilities and choice of titles. It is possible that the business is not able to identify the title based on the table above, for which an alternative could be the classification of PMO based on three project elements. This classification is

inspired from Kaufman & Korrapati's interpretation of the level of PMO with various operational objectives.

Table 8: Concise PMO naming table based on Kaufaman & Korrapati

PMO Title	Objectives	Project Portfolio management
Project Management Office	Delivery of projects Project execution within scope Cohesion to PM standards	No
Program Management Office	Delivery of projects and programs Cohesion to PM standards Resource allocation Management planning	Yes
Portfolio Management Office	Selection of projects and programs Management of project portfolio and strategic business alignment	Yes

6.4 **Role of the PMO**

A document stating the objective and purpose of the PMO acts as the banner for communication with stakeholders regarding the role of the PMO. This can be in the form of a project charter or a statement of intent. We have established from previous observations that a PMO template needs to be dynamic as no two PMOs are the same. Therefore, based on the four pillars, the model or the objectives, the role of a PMO might differ.

Bhandari's PMO framework identifies key tasks based on the researched companies and two of Aubry & Hobbs's 2007 research which lays the foundation for PMO functions in common practice:

a. Monitor and control project performance
b. Report project status to upper management
c. Harmonise with upper management on project strategies
d. Involve in project identification, selection, and prioritisation
e. Develop and implement a tailored PM methodology
f. Oversee project resources
g. Provide skillset training to stakeholders
h. Implement and develop a project portfolio system

6.5 Success Criteria of a PMO

Available data points that change resistance, ill-defined procedures, lack of PMO authority and poor quality of resource management as the barriers of PMO acceptance. The stakeholders in the lower level of project participation need to realize the value of a PMO. It can be considered that transparency reveals the strengths of the PMO, however it is also true that it reveals the weaknesses. Thus, support from upper management needs to be provided to generate added value.

PMO performance metrics can be identified based on a self-formulated success criteria tailored according to the business. Involvement of the leadership team, or decision makers such as upper management or executive is expected during the choice of the metrics. A PMI survey of 2013 identifies multiple PMO evaluation criteria, among which below are identified as prominently recurring:

a. Project delivery vs schedule
b. Project cost vs budget
c. Performance against financial goals
d. Stakeholder or project owner feedback
e. Overall project quality

It is suggested that the criteria should not be limited to the above list and encouraged to formulate internal KPIs. For large organizations, monitoring of the PMO implementation, acceptance and development plan could give a watchdog perspective on the advantages or disadvantages.

6.6 The PMO Officers

The PMO study (2020) concluded that the acceptance of a PMO is directly dependent on the number of PMO officers and the age of the PMO. However, the competency or certification of the officers have no impact. It is important that the PMO officers be internal PMs who resonate with the company goals and mission. The reason being the work ethic differences between an employee and a consultant. It was observed from the case companies that employees would view a new change in the company as a new opportunity to improve daily work life. However, a consultant would generally be focused on delivering the PMO as quickly as possible, disregarding company sentiment. Although, this does not mean a consultant cannot be driving the process to establish a PMO. In cases where the PMs are not competent on the basis of PMO and how to run it, it is strongly advised that consultants with PMO experience be given the lead. A lesson that can be learnt from KPMG is to enable good knowledge transfer between consultants and senior level mentors.

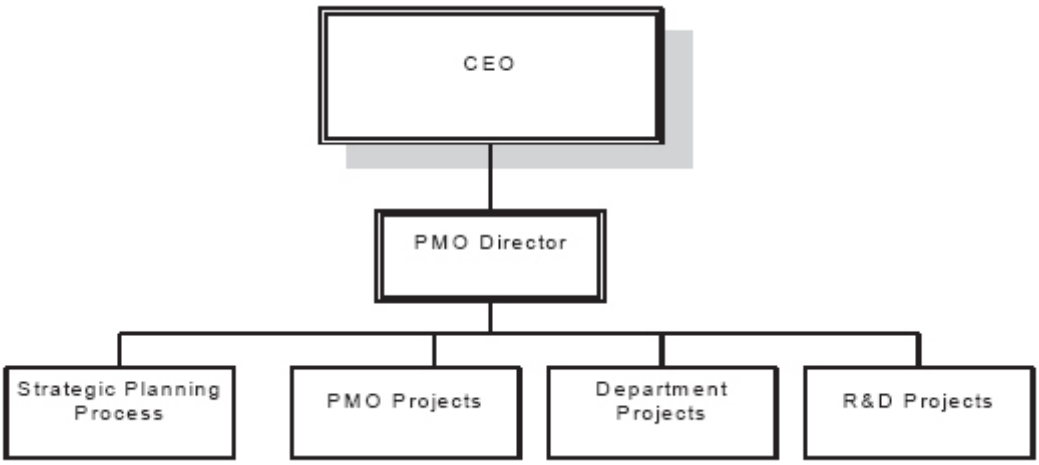

Figure 18: Structure of a PMO by Instantis (2011)

Instantis (2011) proposes a structured PMO with a PMO head or director, who is reported by PMO trainer, PMO analyst and project/program managers. However, Aubry & Hobbs's 2006 survey showed the majority of PMOs have 2 to 3 full-time equivalent (FTE) PMO officers, followed closely by PMOs with 4 to 7 FTE resources. The number of PMO officers is not a static number as the size and objective of the PMO is the key determination factor. It is possible that some PMOs require PMO analysts, PMO engineers, PMO trainees and such, whereas it is possible there could be a governance based PMO with a few PMs acting as a PMO officer. Nonetheless, it is suggestive that the ratio of PMO officer to project stakeholder be 1:10.

6.7 **Software and tools used**

Resourcing, project information management, implementation and support tools are the vessel for successful PM methodology implementation. Software and tools are required for the development and implementation of project standards, competences, and training. It is suggested to use a project information management system that fits the business depending on what the PMO reports to the upper management. For example, it is possible to use Excel online for small scale agile projects which have a short duration. However, if a project includes a large number of stakeholders with varying responsibilities over a stretched period of time during the project cycle, a 3rd vendor tool such as PPM Pro or MS Project is suggested.

It can be observed from the studied companies that most of them use Microsoft Project, Excel, SharePoint, Teams, PowerBI, Azure DevOps, Atlassian Jira and Confluence for project execution, monitoring and reporting. However, companies with advanced PMO, which has a global or parent PMO body, have their own tool implemented for project portfolio management. Thus, the choice of a PPM tool can change over time and is expected for a rapidly growing PMO.

6.8 PMO implementation

The PMO planning phase can be static, however the implementation phase depends on the objective of the PMO and the organizational strategic requirement. During this phase the objectives, services, processes, structure, and charter are implemented. Evident from the PMO framework; PM methods, standards, training, and role allocations are done. The PMO performance measurement already starts in this phase in order to compare the efficiency gains of the PMO. Parallelly, the PMO charter is transformed into a development plan and into a PMO retrospective document.

On a practical level, the implementation of the PMO starts with advocacy by executive management and company-wide information relay on the importance of the PMO because change resistance and legitimacy of the PMO is a persistent blockade. This is followed up by the training of project managers, followed by the implementation of tools, processes, practices and methodologies. The added benefits of the PMO should be communicated via the project charter to all stakeholders to provide the plan and evidence of efficiency. This can be a regular information distribution in the form of a PMO newsletter or message board.

Table 9: Maturity timeline of a PMO

Duration	Level
3 months - 1 year	**Project PMO**
1 year - 3 years	**Division PMO**
3 years+	**Corporate PMO**

In the long run, the division of a PMO implementation can be classified in three levels based on Rad & Levin (2002) in table 8. It was discussed earlier that a PMO reaches the make-or-break point in the third year.

6.9 Sustaining the PMO

Sustainability of the PMO is an important block in the framework because Stanleigh reported in 2006 that the threshold period of a PMO is three years. Therefore, Bhandari's PMO framework recommends a retrospective checkpoint at the three-year mark to the day the PMO was established. This is to determine if a PMO is a liability or an asset.

The inclusion of sustainability as a foundation is based on Hubbard's PMO model. The PMO sustainability model varies in such a way that, to sustain the PMO, this framework proposes personnel, competences, and methodology improvement in the form of training. Once the PMO reaches a certain organizational maturity level, it becomes a diluted business unit. However, with better project management practices being implemented, and the rapid changes in the way of working, it is expected that the PMO implements continuous improvement. This can be in the form of changes in the PM methods, way of working, competency improvement training to the PMO officers, coaching of the PMs or strategy alignment based on the current and projected status of the company.

At the retrospective checkpoint, it is advocated that the PMO charter is revised, PMO objectives updated, and competency of personnel assessed. In terms of continuous process improvement, innovative changes such as implementation of lessons learnt after each project lifecycle to improve current methodologies should be assessed at each retrospective.

6.10 **Lifecycle overview of the PMO**

PMOs are established with a particular set of objectives. Therefore, it is possible that a project specific PMO is dissolved after the completion of the project. However, in most cases, the PMO evolves from project management to program and portfolio management. It transforms from a project support unit to an organizational self-governing unit. From a service level point of view, it is a prerequisite that the upper management sponsors and advocates all activities carried out during the whole PMO lifecycle.

A PMO lifecycle may consist of design, identification, objectives, implementation, and development. Karkukly (2015) provides their overview of a PMO lifecycle as illustrated in figure 13. It suggests the three phases of assess, implement, and manage in each of the lifecycle phase. Similarly, Bhandari's PMO framework has treated a PMO establishment process as a project itself. Thus, even a company without a set of resources to establish an agile business unit can establish a PMO. However, the desire is the longevity, which is assured by training and sustainable practices. In order to identify the sustainability and affirmation of the PMO, the end of lifecycle needs to be identified. It is expected that the PMO reaches its maturity level when it meets the quality standards expected during the objective identification phase.

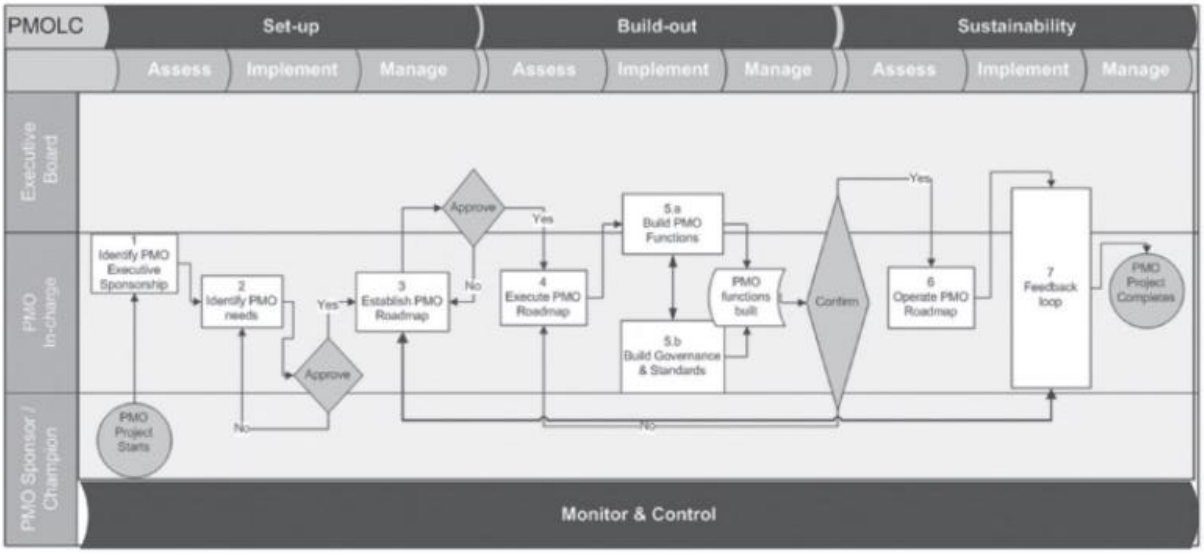

Figure 19: PMO lifecycle of setup, build and sustain by Karkukly (2015)

An ideal PMO offers governance, strategy, PPM, resource management, project support from start to finish and stakeholder training to sustain itself as an independent organization. PPM tools and methodologies implementation, governance process, KPI tracking, and quality assurances are definitive indicators of proper PMO implementation. Andersen et. al (2007) states responsibilities, resources, and authority as key identifiers of PMO development, which evolve according to the business practices and status of the PMO.

It is observed from Aubry & Hobbs (2007) that the legitimacy of the PMO is questioned by 42% of the participants. This is a possibility where either the authority of PMO is not established or the PMO is involved in specific projects as a supporting unit rather than a governance organization. Therefore, it is important to read the mind of the stakeholders to assure acceptance and recognition of a rigid PMO lifecycle.

7 Discussion

Current IT project management practices usually design project lifecycle based either on their project or on the structure of their respective PMOs. However, Gartner predicts that AI-enabled program and portfolio management will take over the market by 2030 Costello (2019). Project and test automation is a consideration from most of the interviewed participants, therefore autonomous can be perceived as one of the competitors for traditional project management practices. This framework, unfortunately, does not address this.

Bhandari's PMO framework dismantles a conceptual framework and explains the role of each integral unit for the functionality of the PMO. For the ease of the reader, the framework is divided into three phases similar to a generic project, where planning is done first, the plan is implemented, and improvement in the plan is done at the end. Common project management processes and terms are used for the ease of project managers and PMO implementers to extract correct information and allocate correct resources for respective units. Current prevalent practices such as the concept of continuous agile development is also suggested, giving it an updated facelift, and a replaceable unit which can be substituted when a newer methodology is introduced.

This thesis originates from Aubry & Hobbs's 2007 literature of the multi project PMO, which is considered as the holy grail. Influence is visible in various portions of the thesis from subsequent literature from them. It can be observed that there are multiple frameworks emerging periodically, as seen in table 5. As a result, a room for improvement is available for future authors, as this thesis executed the same strategy.

Since the basis of this literature is previously published conceptual frameworks, the proposed conceptual framework agrees with portions which are validated by the qualitative research. It can be observed that large degree of agreeableness comes from project resource management and change management.

7.1 Limitation of the study

Bhandari's PMO framework is the first version of a dynamic framework compiled from chosen best practices. The thesis has explained what has been identified as the integratable unit for a PMO. However, it does not point to widely practiced software project management methods such as DevOps or Agile. Deep dive into types of Agile ways of working from a project management perspective is clearly lacking. This suggests a limited dimensional point of view of the PMO and the framework as a whole. Even though it is expected to be a dynamic framework, the interviewed participants and selected companies primarily operate waterfall projects, which has shaped the literature. As mentioned in the research methods, companies that have not implemented a PMO, or stakeholders with

limited PMO knowledge are not included in the study. This leaves a large gap on understanding what a company without PMO understanding can expect from this thesis as it is pointed out that the objective of the thesis is to understand current PMO best practices, and to formulate a PMO framework for new emerging business that decide to establish a PMO. Deductive reasoning on the existing frameworks from a theory testing perspective is lacking. However, it is compensated by inductive reasoning for the creation of a framework capable of dimensional changes.

The implementation of multiple case study methodology limits the validity of the results presented from the qualitative interviews. The thesis compares and contrasts between selected few successful companies, but the data pool is not large enough to validate the concluded data. Similarly, due to unavailable statistics, the thesis could not compare the efficiency gains for organizations before and after a PMO. Another large topic seen unattended is the classification of businesses based on their way of working; either a project-based organization or business-based organization. The studied companies are both project and business-based IT companies, however that division is not addressed in the framework.

7.2 Future application

To mitigate the shortcomings, the framework has adjustability and adaptability for changes since it follows a basic project's layout of plan-implement-manage. Due to the wide desire for a PMO and the search for a template framework for which small emerging companies do not want to pay large consultant fees, this framework acts as a patent-free blueprint.

It can be suggested that future authors dissect the framework and suggest changes based on type of projects or even type of organization. Sub-classification of the framework can be done based on project-based or business-based organization. Bhandari's framework also fails to address where automation can be implemented, thus, future authors with automation in their background can suggest how AI or automation can be implemented, or even suggest an automated PMO framework.

A large-scale study with implementation of quantitative research methodology can strengthen the validation of the proposed framework. In this literature, selected Finnish multinational companies overwhelm a biased viewpoint, which could be negated by inputs from organizations from other countries or domains.

The framework has not been implemented for a real-life IT project management environment, which questions the credibility. Therefore, it is a possibility for new businesses to test this framework, and new authors to propose an improved framework based on their experiences.

8 Conclusions

"Necessity is the mother of invention", and this is proven by the invention of the Project Management Office. When organizations deal with complex projects, they seek a master of harmonization and coordination, which is seen as a set of methods, rules, planning, management, and strategy. This is what a PMO provides, and rightfully is highly sought after in various emerging project-oriented businesses. The interviewed selected participants further proved this proverb, as their reason for a PMO was the complexity of large projects.

Therefore, this thesis aimed to aid emerging businesses to understand PMOs at large scale well-established businesses. Thus, providing a practical use of the resulting conceptual framework in real life business. The interviews laid the foundation for the concept of the thesis by providing organizational point of action, and current state of business with the facilitation of the PMO. It showed the early identification of organizations that PMO is a useful tool with high efficiency gains with little to no changes in daily activities. It was observed that a well-established PMO offered well-placed strategy, prioritized projects, saved resources, efficient project timeline and rigid organizational structure. Thus, the comparison between companies with and without PMO boils down simply to the structured processes and management. Hence, it can be suggested that a PMO implementation process can provide an effective statistical advantage.

This thesis provided a practical blueprint to establish a PMO. It collected the heterogeneous mixture of available professional literature and diluted a scientific homogeneous fluid of common practices from the interviewed multinational companies. The common practices were identified from an organizational project management point of view, with missed opportunities considered in hindsight. Finally, the thesis proposed a conceptual PMO blueprint which provides a step-by-step guide to establish a PMO in an organization where project complexity and growth of project volume is identified as potential bottleneck. The backbone of the results being various proposed frameworks, two large-scale quantitative surveys from 2006 and 2020, and validation of the proposal with structured qualitative interviews.

With the rapid choice of companies to establish PMO, this framework can aid as a steppingstone towards a methodology which is dynamic in nature and can cater to the diversity of organizations with various objectives to save time and resources. However, this framework is a potential indicator since it is approved by a subjective point of view of the author.

This framework is a tool that requires testing and validation. It is expected that new organizations with a desire to establish a PMO as well as organizations with an established PMO both benefit from this framework. The limited amount of data available in the context of a PMO framework caused limitations to the study but has left headway to welcome future modular changes. Collaboration with various companies has already begun and is expected to set a new milestone for future PMO frameworks.

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APPENDIX

Case companies' representatives:

Nokia: Jukka Palo
KONE: Maria Suorsa
TSIT: Kimmo Peltonen
Etteplan: Kaj Palmroth
Metso Outotec: Tiina Aaltonen
KPMG: n/a
TietoEVRY: Sirpa Harju
Evac: Jaakko n/a
Relex: Mikko n/a

Topics that were not covered, open to future applications:

ITIL process documentation, coordination and harmonization.
Business support from IT side.
Operating model documentation, implementation and oversight.
SLA definition/term for different systems and services
Company performance before and after PMO

What comprises the PMO Model's pillars:

Strategy	Governance	Project and portfolio management	Resource management	Training
Support top management	Measure KPIs	Manage interdepartmental dependencies	Resource planning	Mentoring PMs
Identify and prioritise projects	Projects allocation and prioritisation	Prepare reports	Resource allocation	Training project workers
Communicate strategic changes	Define methods, guidelines and frameworks	Moderate monthly/weekly project status call	People excellence	Facilitate knowledge sharing
Profitability and growth of services	Apply and monitor the processes	Monitor data quality	Capability management	Upkeep training environment
Harmonisation	Develop PM charter/manual	Communicate project data	Remotisation	
Project steering	Manage PM tools	Coordinate multi-project environment	Centralisation	

Structured Questions:
Does your PMO:

- Describe PMO in a case study? If yes, can you provide the study?
- Report project status to upper management?
- Develop and implement a standard methodology? If not native, what methodology?
- Monitor and control project performance?
- Develop competency of personnel, including training?
- Implement & operate a project management information system (or a portfolio)?
- Promote project management within the organization?
- Participate in strategic planning?
- Provide mentoring for project managers?
- Identify, select and prioritise new projects?
- Facilitate knowledge exchange?
- Implement and oversee project governance?

Open ended questions:

- Why did you decide to introduce a PMO into the company?
- What were the basis of establishment?
- If you divided current business unit into a PMO, was there division of roles/budget?
- How were resources allocated?
- Was separate budget allocation needed?