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Study on the Project Management Environment

Elements of Project Management and their intercorrelation

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Abstract

This thesis addresses two problems that have been identified in numerous project-based organisations, namely, the relatively low ratio of successfully executed projects and the difficulty in implementing effective and sustainable organisational learning from previous failures. The long-term aim of this thesis is improvements in project performance in the case company, supported by an effective Lessons Learned process, ultimately contributing to increased shareholder value as well as improved Customer satisfaction and job satisfaction for the Project Manager and other stakeholders.

The research problem was addressed by formulating four research questions related to selected elements of the project management environment and their intercorrelation. The research questions were in turn approached through a study, consisting of a literature review of the project management environment and an on-line survey, that was sent out to project managers and managers of project managers in several countries in the northern European region within the case company's organisational structure.

Based on an analysis of the survey responses, recommendations on improvements on aspects related to the project management environment in the case company, were proposed, in order to support the case company in reaching the long-term aim.

Language: English	Key Words:	PMO, Project Management, Project Performance, Lessons Learned

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Abstrakt

Den här avhandlingen tar upp två problem som har identifierats i flertalet projektbaserade organisationer, nämligen den relativt låga andelen framgångsrikt genomförda projekt och svårigheten att effektivt och hållbart implementera organisatoriskt lärande från tidigare misslyckanden. Det långsiktiga målet med denna avhandling är förbättringar av projektprestanda i fallföretaget, med stöd av en effektiv lärdomsprocess, vilket i slutändan bidrar till ökat aktieägarvärde samt förbättrad kundnöjdhet och arbetstillfredsställelse för projektledaren och andra intressenter.

Forskningsproblemet angreps genom att formulera fyra forskningsfrågor relaterade till utvalda delar av projektledningsmiljön och deras samverkan. Forskningsfrågorna behandlades i sin tur genom en studie, bestående av en litteraturgenomgång av projektledningsmiljön och en enkätundersökning, som skickades ut till projektledare och chefer för projektledare i flera länder i den nordeuropeiska regionen inom fallföretagets organisationsstruktur.

Baserat på en analys av enkätsvaren formulerades rekommendationer om förbättringar av aspekter relaterade till projektledningsmiljön i fallföretaget, för att stödja fallföretaget att nå det långsiktiga målet.

Språk:	Engelska	Nyckelord:	PMO, Project Management, Project Performance, Lessons Learned

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Abbreviations

ERM	External Relationship Management
IPM	Integrated Project Management
IRM	Internal Relationship Management
IS	Information System
PBM	Project Business Management
PBO	Project-Based organisation
PM	Project Manager
PMBOK®	Project Management Body of Knowledge
PMI	Project Management Institute
PMO	Project Management Office
PMP®	Project Management Professional
POM	Production and Operations Management
TRAM	Time Role Analysis Matrix

1 Introduction

According to a report commissioned by the Project Management Institute (PMI) the demand for project managers is growing faster than the demand for workers in other occupations. In fact, a 33% increase in the project management-oriented labour force is predicted through 2027 in the 11 countries studied, corresponding to no less than 2,2 million project-oriented roles each year (Project Management Institute, 2017). One could claim that this is a consequence of the fact that the world has grown more and more complex, i.e., the context within which services and products are being produced have in almost all respects significantly moved away from the Henry Ford way of thinking *("Any customer can have a car painted any colour that he wants so long as it is black"*) towards accommodating highly customised and specialised needs, often realised through projects. Customers simply no longer accept product or service limitations forced upon them by suppliers such as limited colour choices or design options (Fisher 2011). Eve (2007) further points out: *"There is an unmistakable trend in the move of the world's best companies towards adopting project management as a ''way of working'' rather than simply a methodology or tool set"*.

For any project to be successful, a skilled, able and willing project manager is needed to manage the project from its start to finish. Consequently, for every project manager to be successful, a well working and efficient project management environment is required to effectively accommodate the project manager in their endeavour. This is important not only in order to make the project itself a success, but equally important as a means to support and inspire the project manager to develop their skillset and help the project manager stay motivated throughout both ongoing project(s) and more generally, and perhaps more importantly, throughout the project manager's career.

For the purpose of sustaining and developing processes related to project management, such as coaching, training and certifying project managers, overseeing and governing project execution, appointing project managers to projects, to name a few, many organisations have adopted the concept of the Project Management Office (PMO). The naming and implementation model of the PMO may vary greatly depending on the organisation, however, the general principles of the PMO are more or less the same across

organisations, i.e., that of being an organisational mechanism used to handle aspects related to project management in a coordinated way.

1.1 The project management environment

For the purpose of this thesis, the following elements of the project management environment, and their intercorrelation, are studied; *The Project Management Office (PMO)*, the *Project Manager (PM)* and the *Project* (Figure 1-1).

Figure 1-1 - The project management environment (source: Author)

The *Project Management Office* is the organisational umbrella-entity within the organisation, under which functions related to project management are coordinated and developed. The PMO concept is discussed in further detail in section 2.1.

The *Project Manager* is the person in charge of the project, usually being accountable both financially and technically for the project. It is the PMs responsibility to lead the project team in order to achieve the set goals of the project. The PM's role is further discussed in section 2.2.

The *Project* is the undertaking itself through which a set of predefined outcomes (services and/or products) are produced in order to gain some benefit for the organisation itself, and equally (if not more) importantly, for the financier of the project, i.e., the customer. The

project in general, and *project performance* more specifically, is discussed in detail in section 2.3.

1.2 The Case Company

This thesis was commissioned by the organisation ABB Energy Industries – Finland (case company), which is part of the global ABB group. Below follows a drilldown of the ABB organisation from the top, down to the local organisation in question (case company).

The ABB Group is a Swedish-Swiss multinational corporation headquartered in Zürich, Switzerland, with a revenue of ~$26 billion, employing approximately 105.000 professionals worldwide and serving customers in more than 100 countries. ABB is divided into four Business Areas: *Electrification*, *Process Automation*, *Motion* and *Robotics & Discrete Automation*. ABB is traditionally seen as product company and although project management and project execution[1] is present within ABB, the *product* mindset (as opposed to *project* mindset) is deeply rooted within the ABB corporate culture.

The Process Automation business area, which provides integrated automation solutions to various customer segments, is on the other hand very much project oriented, conducting most of its business through projects. The following categories of projects (in terms of monetary value) are defined within the Process Automation business area:

- Extra Small (XS): below 1 MUSD
- Small (S): 1 – 5 MUSD
- Medium (M): 5 – 15 MUSD
- Large (L): 15 – 50 MUSD
- Extra Large (XL): Above 50 MUSD

The Process Automation business area employs approximately 21.500 professionals, of which around 1000 work as project managers. The Process Automation business area is divided into the following divisions: *Energy Industries*, *Process Industries*, *Marine & Ports*, *Turbocharging* and *Measurement & Analytics*.

[1] In this context *project execution* refers to customer projects, as opposed to internal projects or research and development (R&D) projects, which are very prominent throughout ABB (Author's note)

The Energy Industries division employs approximately 8000 professionals worldwide, of which around 500 work as project managers. The energy Industries division is geographically divided into five different areas, so-called *HUBs*; *Americas*, *Northern Europe*, *Central & Southern Europe*, *Asia* and *India, Middle East & Africa*. The Energy Industries division serves customers within various segments, such as *Oil*, *Gas*, *Chemicals*, *Pharmaceuticals*, *Power Generation* and *Water*.

ABB Energy Industries – Northern Europe employs approximately 2000 professionals, of which around 100 work as project managers. Energy Industries – Northern Europe covers seven countries: *Norway*, *Denmark*, *United Kingdom*, *Ireland*, *Finland* and *Sweden* and serve customers in the segments *Chemical and refining*, *Oil and Gas*, *Power and Water* and *Others*[2]. The organisation *Energy Industries – Northern Europe* is internally commonly referred to as *HUB Northern Europe*.

ABB Energy Industries – Finland (case company) employs approximately 100 professionals, of which 12 work as project managers, approximately 60 work in engineering (design, in-house testing and on-site commissioning) and the rest work in sales, service, support functions and management. The main office is located in Vaasa and additionally there are local offices in Tampere and Vantaa.

ABB Energy Industries – Finland supplies digital, automation and electrical solutions to the energy industry within the customer segments *Hydro Power*, *Engine Power*, *Thermal Power* and *Nuclear Power*. The segments are each lead by a business segment manager (*Thermal Power* and *Nuclear Power* being organisationally combined into one segment). The case company is organised as a balanced matrix, type C[3] as defined by Hobday (2000). Additionally, lifecycle services are provided to all four customer segments through the case company's service department.

The case company is a pure project organisation, which means that any materials, components or systems that are part of deliveries to customers are purchased (either internally from other ABB units, or externally from 3rd parties), i.e., the case company do not perform manufacturing itself. The majority of projects executed in the case company

[2] Aquaculture, Control Room Solutions and Food & Beverage (Author's note)

[3] Type C is a balanced matrix with stronger project management authority (Hobday 2000)

fall within the categories *Extra Small* and *Small* as defined by the Process Automation business area.

Currently, as the case company does not have a fully centralized PMO[4] in place (the project managers are organisationally assigned to the various business segments), some PMO related functions are managed within the business segments and some outside the business segments. Generally, PMs are assigned to projects by the business segment manager, however, in some cases cross-segment discussions are held in order to determine who is the most suitable PM for a given project, for example due to strained resource situation or if the project does not distinctly fall under any of the segments. Projects are followed up on several levels; monthly project reviews are conducted on the segment level and quarterly project reviews are conducted on the unit level (i.e., case company level). Large, sometimes cross-border, projects may also be reviewed on a regional (Energy Industries - Northern Europe) or global (Energy Industries division) level.

1.3 Research problem

This thesis addresses two problems that have been identified in many project-based organisations (PBOs) and that have been extensively researched and debated in the literature, namely, the relatively low ratio of successfully executed projects and the difficulty in learning effectively and sustainably from previous (project) failures on an organisational level. It is easy to see why there is a strong motivation for addressing these problems; project failures (and the inability to learn from them) not only cost companies money, and thereby deteriorate their earnings and value, but also affects other aspects of the company, such as employee job satisfaction and employer reputation and attractiveness.

1.4 Purpose and aim

The purpose of this thesis is to study elements of the project management environment (Figure 1-1) and their intercorrelation in order to provide recommendations, based on which aspects of the project management environment can be improved in the case

[4] It is noteworthy that the term PMO (Project Management Office), while being used by the management, is currently not generally recognized by the broader audience in the case company, although such an area of responsibility and organisational structure currently exists to some extent (Author's note)

company (ABB Energy Industries – Finland). Such aspects may be organisational set-up, ways of working, process descriptions, general guidelines, etc.

The long-term aim of this thesis is improvements in project performance, supported by an effective Lessons Learned process, ultimately contributing to increased shareholder value as well as improved Customer satisfaction and job satisfaction for the Project Manager and other stakeholders.

1.5 Delimitations

Various types of project management methodologies (*Traditional*, *Agile*, *Extreme*, *Hybrid*, etc.) are described and debated in the literature. Although the case company to some extent utilises other project management methodologies than *Traditional*, research into various types of project management methodologies is beyond the scope of this thesis. Instead, project management is researched on a general level and topics and aspects of project management covered in this thesis are assumed to be universal and as such not dependent on the project management methodology.

Depending on which definition of the PMO you choose, various organisational functions may be considered as falling under the PMO concept in addition to project management, for example, engineering, procurement, logistics, etc. Such functions are not included in the scope of this thesis, rather, this thesis focuses on the core project management functions as defined by the *ABB Project Management Framework*[5].

As the purpose of this thesis is to provide recommendations for improvements; possible implementation of the recommendations, and consequently, verification of the long-term aim is beyond the scope of this thesis.

[5] A set of guidelines compiled into a coherent handbook, supporting the project manager in their day-to-day work. The ABB Project Management Framework follows the principles of the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition of the Project Management Institute (PMI) and the ISO Standard 21500:2012 (Author's note)

1.6 Thesis structure

The thesis is structured into seven sections according to the following:

Section 1 – Introduction: Short introduction to the subject and the case company. Presentation of the stated research problem and the purpose and aim of the thesis as well as applicable delimitations of the study.

Section 2 – Literature review: Review of the literature on the subject, grouped according to the studied elements of the project management environment. This section further includes the formulation of the research questions.

Section 3 – Research methodology: Presentation of the chosen research method and data collection process as well as presentation of the responses to survey questions, grouped according to relevance to the formulated research questions. This section does not include any further analysis or interpretation of the survey responses; such analysis and interpretations are covered in section 4.

Section 4 – Discussion: Discussion, analysis and interpretation of the survey questions in relation to the formulated research questions. Formulation of improvement recommendations for the case company, as well as presentation of limitations related to the study.

Section 5 – Conclusion: Conclusions on the study, including thesis evaluation and proposals for further studies

Appendices are listed in Section 6 and a list of references is provided in Section 7

2 Literature review

The literature review is divided into three sections in line with the elements of the project management environment, as defined in section 1.1; The Project Management Office (section 2.1), The Project Manager (section 2.2) and The Project (section 2.3).

2.1 The Project Management Office

For the past few decades, the term PMO (Project Management Office) has been used to describe "an organisation within an organisation" that is responsible for project management related activities. The need for the PMO stems from the need for large enterprises to apply more formal business management principles, practices and processes in their portfolios and programs (Hubbard & Bolles, 2012). Although PMOs to some extent can be thought of as independent units or departments, usually PMOs are well integrated into the organisation. Hobbs (2007) notes that the PMO is not a stand-alone entity, instead it represents an integral part of the host organisation's project management activity. Hobbs and Aubry (2007) further note that PMOs do not exist in a vacuum, rather they imbue culture and context of their respective organisations. This is an important notion since the organisational context is a vital factor to take into consideration regarding the implementation and maintenance of the PMO (Hobbs and Aubry 2007). This viewpoint is further stressed by Aziz (2014), who states that a clear understanding of what the PMO can (and should) do for the organisation is a prerequisite for building a successful PMO. The literature provides several viewpoints on what constitutes a successful PMO, for example Block (1999) defines the following "*Seven Secrets of a Successful Project Office*[6]".

- Rein in the runaway projects
- Assist project start-ups and establish an estimating and risk process
- Review and manage the project portfolio
- Conduct project reviews and audits
- Organize and manage the resource pool
- Identify and develop project managers
- Establish and enforce a project management process

[6] Block uses the term *project office*, instead of PMO (Author's note)

Hubbard and Bolles (2012) additionally point out the that positioning of the PMO at the highest level of the organisation has a direct influence on various aspects of the PMO, such as the acceptance of the PMO across the enterprise, the PMOs level of authority and autonomy, the long-term sustainability of the PMO and the PMOs ability to fulfil its role.

The literature contains various definitions of the PMO. According to the Project Management Body of Knowledge (PMBOK® Guide) of the Project Management Institute (PMI), the PMO has the following definition: *"A project management office (PMO) is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques."*. The PMO definition by Rozenes and Vitner (2009), represents a subset of PMI's definition of the PMO; *"The project management office is a professional entity that defines and maintains the standards of processes related to project management, within the organisation."*. Rad and Raghavan (2000) define the PMO as *"A project management office is the organizational entity that provides institutional focus to project management procedures"*. A further definition of the PMO is provided by Rad (2001), who say that the PMO is an *"administrative mechanism by which a focal point is provided for organisational project management activities."*.

2.1.1 Motivation for the PMO

The literature provides ample argumentation for the existence of the PMO. Rad and Raghavan (2000) point out that a well though-out and implemented project office[7] is potentially a remedy for project failure. Rad (2001) elaborates extensively on the needs for a PMO, one being the desire to stabilize runaway projects. Rad (20o1) further points out that the effectiveness of a competent team of project managers can be magnified significantly if they have the full suite of PMO services at their disposal. Hubbard and Bolles (2015) note the importance of properly implemented project management principles, processes and practices and their impact on the enterprise's business factors, such as time to market, cost to market, quality and customer recognition. Jerbrant (2013) names the need to increase the number of successful projects and the standardisation of the performance of individual projects as primary goals of creating a PMO. Crawford (2011,

[7] Rad and Raghavan use the term *project office*, instead of PMO (Author's note)

p. XXXIX) further notes that there is a clear connection between organizational performance and PMO maturity, as indicated in Figure 2-1[8].

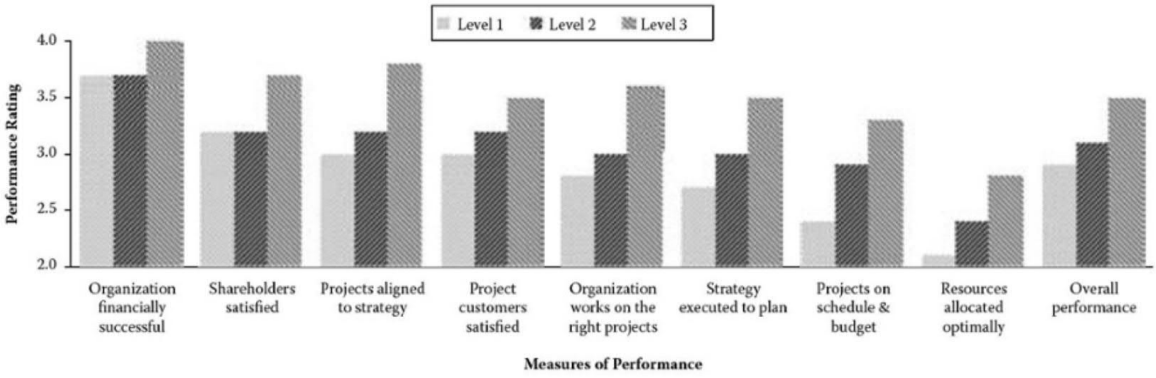

Figure 2-1 - Organizational performance by level of PMO maturity (Crawford 2011, p. XXXIX)

2.1.2 Challenges with the PMO

While there exist well documented motivations for the PMO's existence; the PMO doesn't come without its challenges. One of the key findings from a study by Hobbs (2007) reveal that there is a lack of consensus regarding the legitimacy of the PMO. The study suggests that while 50% of PMOs are valued by their organisation, the other 50% are being challenged by the organisation. The literature provides many examples of important aspects to consider when setting up or restructuring a PMO, which, if not dealt with correctly, may lead to decreased support of the PMO by the organisation. For example, Hobbs, Aubry, and Thuillier (2008) note that mandate to implement a PMO may be given without a clear image of what it might require. Hobbs et al. (2008) further list the following tensions as consequences of restructuring of a PMO:

- Economical tension
- Political tension
- Client relationship tension
- Standardisation/flexibility tension or business versus process orientation
- Controlling the project machine tension

Research by Hubbard and Bolles (2012) on organisations that had recently set up a PMO (or were in the process of setting up a PMO) showed that approximately 45% of the PMOs

[8] Maturity is rated on a scale from Level 1 to 5 (immature, established, grown up, mature, best in class). Only levels 1-3 are listed because too few Level 4-5 PMOs responded to draw accurate conclusions. (Crawford 2011, p. XXXIX)

ceased to exist during the survey period, due to reasons such as the PMO did not deliver identifiable business benefit, the PMO was unsuccessful in defining its purpose or role, or the PMO lacked sufficient executive support.

Hobbs and Aubry (2007) point out the importance of implementing a PMO under the correct assumptions by concluding:

> *"The literature promoting PMOs presents them as a best practice with obvious positive effects on project, program, and organizational performance. The reality is quite different. Many PMOs are struggling to show value for money and some are failing, causing a very high mortality rate among PMOs. Practitioners and organizations would be well advised not to implement a PMO under naïve assumptions of value for money or because PMOs are popular."* (Hobbs & Aubry, 2007)

2.1.3 Types of PMO

There exists a plethora of types of PMOs and consequently the PMO may be given different levels of authority, depending on its place in the organisation. A study by Hobbs and Aubry (2007) reveal that there exists an extreme variety in the way organisations structure their PMO. Casey and Peck (2001) stress the importance of understanding the differences between various PMO setups and how they solve different problems and that the PMO is no silver bullet for addressing organisational change, i.e., a *one-size-fits-all* solution does not exist. Crawford (2011, pp. 31-34) suggests that a PMO can exist at any one (or at all) three levels within an organisation: *The Project Control Office* (typically focusing on one complex project), *Business Unit PMO* (supporting and integrating a large number of projects) and *Strategic PMO* (corporate level PMO). A full review of various proposed PMO setups in the literature is beyond the scope of this thesis, however, proposals by Casey and Peck (2001) and Hubbard and Bolles (2015), ranging from *light*[9] PMO to *heavy*[9] PMO, are presented below.

Casey and Peck (2001) list three types of PMO, which they call *Weather Station*, *Control Tower* and *Resource Pool* as depicted in Figure 2-2.

[9] The terms *light* and *heavy* PMO are sometimes used to depict a passive/supporting PMO (with low authority) versus an active/proactive PMO (with high authority) (Author's note)

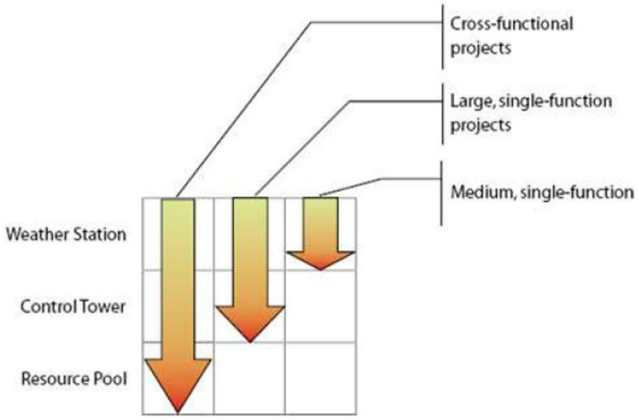

Figure 2-2 - Sample deployment of PMO Functions (Casey & Peck 2001)

The *Weather Station*, as the name suggests, represents a monitoring function that tracks and reports events, without directly influencing them, thus having a somewhat limited authority. The *Control Tower* sees project management as a business process that needs to be protected and nurtured, it does so by establishing, enforcing and improving standards for project management and by consulting on how to follow such standards. The *Resource Pool* extends the PMO authority further to include supervision of project managers thereby ensuring that projects are executed correctly.

Hubbard and Bolles (2015) introduce the term PBM (Project Business Management) as a way to cover most types of project management related functions and organisations (including those described, not using the acronym *PMO*). According to Hubbard and Bolles (2015) the majority of PBM organisations fit into one of seven categories as presented in Table 2-1.

PBM Titles (Business Focus)	Managerial Focus	Common Titles/Names Currently in Use
Enterprise PMO (Strategic)	• Provide project business management on an Enterprise-wide basis. • Ensure project work is congruent with the enterprise purpose, vision, mission, and strategic business plan across the enterprise. • Oversee Division and Business Unit PMOs. • Operate as a Project Management Center of Excellence.	▪ Enterprise Project Management Organization/Office ▪ Portfolio Management Organization/Office ▪ Project Portfolio Management (PPM) Organization/Office ▪ Corporate Project Management Organization/Office
Division PMO (Tactical)	• Provide project business management on a Division-wide basis. • Manage Project-Portfolio(s). • Manage Project-Programs as required. • Oversee Business Unit and Project PMOs.	▪ Portfolio Management Organization/Office ▪ Project Portfolio Management (PPM) Organization/Office ▪ Program Management Organization/Office
Business Unit PMO (Operational)	• Provide project business management across the Business Unit. • Manage Project-Program(s). • Manage Projects as required. • Oversee Project PMOs, Project Offices, and Project Support Organizations.	▪ Program Management Organization/Office ▪ Project Management Organization/Office
Project PMO (Operational)	• Provide management of a single, mission-critical or major project, which is typically large and complex, (and whose success affects multiple areas of the enterprise).	▪ Project Management Organization/Office
Project Office (Operational)	• Provide direct support of a single non-complex project. • If directed, manage the Project.	▪ Project Organization/Office
Project Support Organization (PSO) (Administrative)	• Provide administrative support of one or more non-complex projects.	▪ Project Support Organization/Office ▪ Project Controls Organization/Office
Project Management Center of Excellence (PMCoE) (Methodology)	• Establish and implement project business management standards, methodology, practices, tools, templates, education, training, and project management competency on an enterprise-wide, division, business unit, or project basis.	▪ Corporate Center of Excellence

Table 2-1 - Functional Titles and Focus for each type of PBM Organization (Hubbard & Bolles 2015)

The type of PMO naturally also has an impact on the size (in terms of headcount) of the PMO. Key findings from a study (based on a survey collecting the descriptions of 500 PMOs) by Hobbs (2007), reveal that most PMOs have very little personnel other than the project managers. The personnel distribution of PMOs, according to the study by Hobbs (2007), is presented in Figure 2-3.

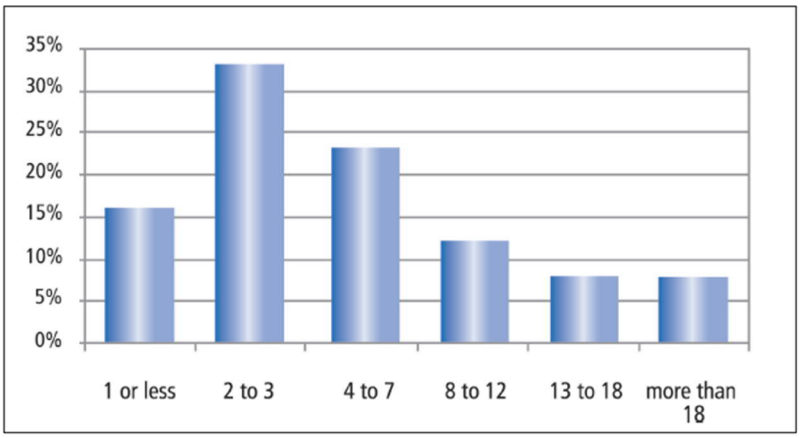

Figure 2-3 - Personnel of PMO Excluding Project Managers (full-time equivalents) (Hobbs 2007)

Singh, Keil and Kasi (2009) conclude that managers carefully need to consider the trade-off between implementing a *light* versus *heavy* PMOs, pointing out that while *light* PMOs may not have the same impact on the organisation as *heavy* PMOs, the implementation success probability is higher for *light* PMOs, compared to *heavy* PMOs.

2.1.4 The role and functions of the PMO

The role of the PMO, and by extension; the functions contained within the PMO, has also been extensively researched and debated in the literature. Müller, Glückler and Aubry (2013) argue that the PMO relate in different ways to their stakeholders through the following three roles: *serving* (e.g., by offering support functions), *controlling* (e.g., enforcement of project management standards) and *partnering* (e.g., knowledge sharing). According to Müller et.al. (2013) the differences between the three roles lie in the relationship symmetries (or asymmetries); ranging from a dominant role (controlling) and a collegial role (partnering) to a complementary/dependent role (serving).

Rad and Raghavan (2000) note the following aspects as roles and functions of the PMO:

- serving as a mechanism for organizational continuity in project management experiences and lessons-learned
- facilitating the integration of project management activities into organizational policies and procedures
- providing a logical clearinghouse for project team communications and for planning documents
- facilitating the desired consistency in policies and procedures
- serving as a centre of competence for project personnel

- coordinating training
- constructing an infrastructure for necessary tools
- providing the desired consulting on project management issues specific to ongoing projects

Rad and Raghavan (2000) additionally point out that one of the core management functions of the PMO is conflict management. Rad (2001) further name consulting, mentoring, training, augmenting, clear-housing, archiving and promoting as PMO services. While the literature mostly uses terms such as *role* and *function* to describe the PMO, other terms are also used in the literature, for example, Dai and wells (2004) use the term *feature* when they identify the following categories of features as belonging to the PMO:

- Developing and maintaining PM standards and methods
- Developing and maintaining project historical archives
- Providing project administrative support
- Providing human resource/staffing assistance
- Providing PM consulting and mentoring
- Providing or arranging PM training

The literature further provides numerous examples of ranking the importance of the functions contained within the PMO. While a detailed study of the functions (and their ranking) of the PMO is beyond the scope of this theses, a ranking of 27 functions of the PMO according to importance from a survey by Hobbs (2007) is provided as a reference in Table 2-2.

PMO FUNCTION	% OF PMOS WHERE IMPORTANT
Report project status to upper management	83%
Develop and implement a standard methodology	76%
Monitor and control project performance	65%
Develop competency of personnel, including training	65%
Implement and operate a project information system	60%
Provide advice to upper management	60%
Coordinate between projects	59%
Develop and maintain a project scoreboard	58%
Promote project management with organization	55%
Monitor and control performance of PMO	50%
Participate in strategic planning	49%
Provide mentoring for project managers	49%
Manage one or more portfolios	49%
Identify, select and prioritize new projects	48%
Manage archives of project documentation	48%
Manage one or more programs	48%
Conduct project audits	45%
Manage customer interfaces	45%
Provide a set of tools without an effort to standardize	42%
Execute specialized tasks for project managers	42%
Allocate resources between projects	40%
Conduct post-project reviews	38%
Implement and manage database of lessons learned	34%
Implement and manage risk database	29%
Manage benefits	28%
Conduct networking and environmental scanning	25%
Recruit, select, evaluate and determine salaries for project managers	22%

Table 2-2 - PMO functions in decreasing order of importance (Hobbs 2007)

Numerous articles in the literature point out the role the PMO has in the linking of various layers and aspects of an organisation. Block (1999) defines the project office's[10] long-term vision as project management knowledge transfer throughout the organisation, making it part of the organisation's culture. Similarly, according to Jerbrant (2013), the PMO serves a link between the projects and the strategy, as he notes that it is often the responsibility of the PMO to create a connection between the company's overall strategy and the project landscape. This way of thinking, however, remains somewhat revolutionary in some organisations (Crawford 2011, p. 5). Rad (2001) notes that the PMO plays a role in project selection consistent with the organisation's strategy. Hubbard and Bolles (2015) further note that the PMO has a role in the bridging between the organisation's silos[11], and that

[10] Block uses the term *project office*, instead of PMO (Author's note)

[11] The term *silo* is often used to depict the isolating phenomena that may exist between functions, departments or units within an organisation (Author's note)

any PMO's organizational structure is determined by how the company creates and uses business units as part of its culture and operations.

While there are plenty of proposals for the role and functions of the PMO in the literature, a clear agreement on what exactly the PMO's role is has not been reached. Dai and wells (2004) note that a standard set of what they call *PMO presence features* has not yet been agreed upon, neither in theory, nor in practice. This argument is further stressed by Hobbs (2007), who points out that although the PMO is a well-established concept that has been studied extensively, there is still lack of consensus on many critical aspects of the PMO.

The authority level of the PMO within the organisation can be considered one of the decisive factors determining the PMOs role in the organisation and by extension, its influence throughout the organisation. In a survey by Hobbs (2007), covering 500 PMOs, the distribution of the decision-making authority by the PMO was mapped according to Figure 2-4.

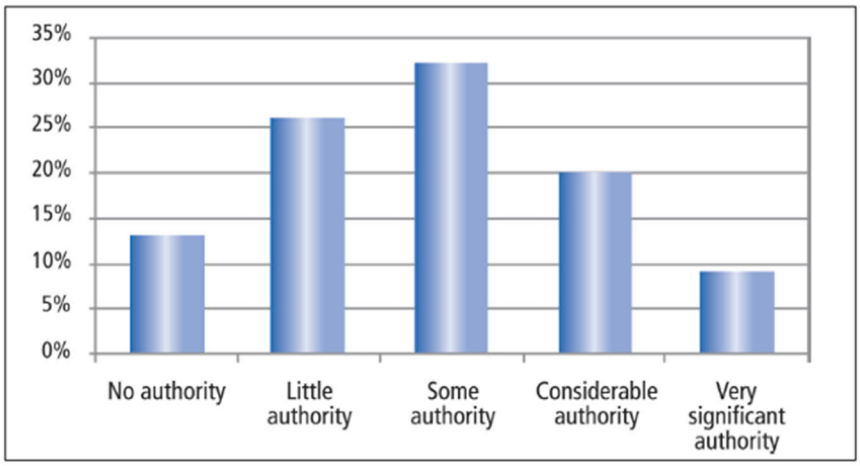

Figure 2-4 - Decision-Making Authority of PMOs (Hobbs 2007)

Hobbes (2007) notes that while the decision-making authority is more or less normally distributed, there exists high variance (as can been seen from Figure 2-4).

2.2 The Project Manager

Needless to say, the Project Manager (PM) plays an important role in any project-based organisation (PBO). Consequently, the role and responsibilities of the PM is debated extensively in the literature. The project manager is the individual who is accountable for delivering a project safely according to given constraints, i.e., on time, within budget and

according to the desired performance or quality standards, as determined by the client (Sommerville, Craig and Hendry, 2010). Several authors point out the ever-expanding responsibility span of the PM, for example, Bourne and Walker (2005) note that in addition to the traditional project control elements (time, cost and scope), the PM must also be in control of the project relationships (stakeholders), while operating in an environment that can be both turbulent, uncertain and unstable. Bierwolf, Romero, Pelk, and Stettina (2017) further point out that the responsibilities of the PM have expanded from managing the classical (triple constraint) triangle (time, budget and scope), towards including aspects such as strategic thinking, leadership, change management and communication skills.

As the scope of responsibilities of the PM has expanded over time, naturally follows the challenge of finding PMs that are equipped to effectively and thoroughly assume the roles that correspond to the required responsibilities. A Time Role Analysis Matrix (TRAM) based study by Sommerville et.al. (2010), in which the various roles the PM assumes in the projects were arranged into four categories (social, commercial, technical and survival), suggests that there is no such thing as a project manager that would fit all categories and thereby would engage in all categories effectively. While the literature seems to suggest that the PM is expected to be somewhat of a "jack of all trades", some of the PM's tasks can, and thereby should be delegated. This is pointed out by Turner and Müller (2003), who note that while the PM is responsible for motivating the project team to achieve the project's purpose and objectives and managing the project in relation to its objectives, tasks such as planning, execution and control of the work should be delegated.

As the PM has an important role to fill in the PBO; follows that by serving as a PM, key experience and insight into virtually all functions of the PBO is gained. Consequently, having served as a PM is considered a good platform for further advancement in many PBOs. This is noted by Block (1999), who claims that *"being a project manager is the road to success within the organisation"*, while at the same time noting that the majority of organisations are unaware that their project managers are critical to their success.

The PMs positioning in the PBO in terms of being responsible solely for the project versus also participating in the organisations' strategic work, is also debated in the literature. On this topic, Müller and Turner (2007a), somewhat surprisingly, conclude that strategic outlook and vision are unimportant (if not harmful) for PMs, and consequently propose

that PMs should leave strategical thinking to others and instead focus on the tasks needed to achieve the goals of the project. Quite to the contrary, Shenhar, Levy and Dvir (1997) conclude that PMs can no longer afford to be disconnected from the strategic and long-term objectives of the organisation.

2.2.1 PM Competencies

The skill set and competencies of the PM have been studied extensively in the literature. Crawford (2000) notes that while project management competencies clearly are vital factors in project success, it remains a quality that is difficult to quantify. Aitken and Crawford (2008) point out the importance of behaviours as a means to achieve effective project management, in addition to being able to apply project management skills. Fisher (2011) acknowledges that skill sets for managing people may be required for different types of projects, such as Information Systems (IS), Integrated Project Management environments and the construction industry. The literature contains varying proposals for mapping the competencies of the PM against various aspects of project management, sometimes referred to as *dimensions*. One such mapping is presented by Bourne and Walker (2004), who propose a three-dimensional model of project management according to Figure 2-5.

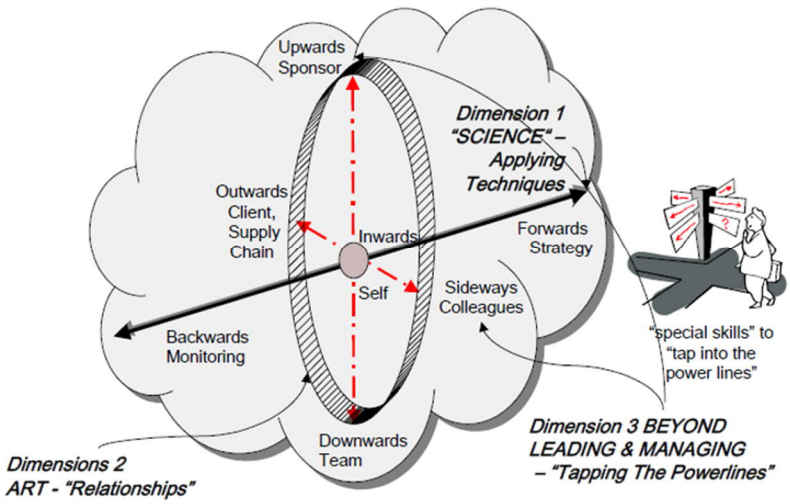

Figure 2-5 - Dimensions of project management (Bourne and Walker 2004)

According to Bourne and Walker (2004), Dimension 1 represents the monitoring and controlling of the project (develop plans, schedules, reports, lessons learnt, etc.), or the

forwards- and backwards-looking dimension, that require traditional project control skills and techniques (so-called *hard skills*). Dimension 2, the *inwards-, outwards and downwards- (and partly upwards-[12]) looking dimension*, represents management of client needs, suppliers, the project team and self-management. This dimension requires leadership and people management skills (so-called *soft skills*). Heagney (2016, 27) prioritises these so-called *people skills* by claiming that they are the "*first skills*" a PM needs. Dimension 3, or the *sideways- and upwards looking dimension*, represents the ability to "*tap into the powerlines"*, by satisfying the needs of a project's most influential stakeholders, such as senior management and the PM's peers. Bourne and Walker (2004) argue that understanding the power source that drives the organisation and knowing how to utilise such energy influences project success. Bourne and Walker (2005) further note that the ability to focus on the stakeholder's expectations in dimension 3, demands significant *interpersonal skills*. Bourne and Walker (2004) also argue that those with the ability to tap into the powerlines will be able to defuse potential crises before disaster strikes. In a similar fashion, Pinto (2000) stresses the importance of being able to understand office politics by noting that such an ability is a prerequisite for successful project management and concludes that therefore PMs cannot afford to ignore organisational politics (for better or for worse).

As many of the aspects of project management within the three dimensions, as defined by Bourne and Walker (2004) (Figure 2-5), represent some kind of relationship with another party (internal or external), it follows that relationship management is an important characteristic of project management. A study by Meng and Boyd (2017), focusing on Project-based relationship management, rank the top five roles of the PM in Internal Relationship Management (IRM) and External Relationship Management (ERM) according to the following:

Top five roles of PMs in IRM:

- Creating good communication channels with team members
- Developing trust between project manager and team members
- Encouraging open and effective communication between team members
- Fostering trust between different team members

[12] According to Bourne and Walker (2004) *"Managing upwards to the obvious set of senior management stakeholders is generally considered to be part of dimension 2.".*

- Listening carefully and responding and responding actively to team members

Top five roles of PMs in ERM:

- Developing trust between own team and other project parties
- Facilitating open and effective communication between own team and other project parties
- Developing long-term business relationship with client
- Establishing a good dialogue with local social communities
- Developing long-tern business relationships with suppliers

Meng and Boyd (2017) conclude that while client satisfaction is more influenced by ERM, the effort spent on IRM by PMs is rarely less than the effort spent on ERM, due to that IRM has a greater impact on project performance (time, cost and quality) than ERM. The influence of people management skills in relationship management is also studied in the literature, for example, in a study by Fisher (2011), six specific people managing skills and the associated behaviours are identified as presented in Table 2-3.

Skill	Behaviour
Understanding behavioural characteristics	Be genuine and open and honest with others. Show openly that you believe in your team members' abilities. Show an open and authentic concern for others that is based on true feelings and not on invented ones. Develop an understanding of the relationship between behaviours and feelings and how you can make this work for you in your teams. Adopt a repertoire of behaviours so you can deal with people in different situations and circumstances.
Leading others	Show a high level of motivation towards innovation to inspire others to become more creative and innovative. Adopt a leadership style that is appropriate to the situation, for example, situational, transitional, visionary or charismatic. Ensure that your team members comply with your wishes. Apply directive, firm or demanding behaviours according to the attitudes and behaviours of your team members.
Influencing others	Convince, influence or impress others in order to support their agenda, or the desire to have a specific impact or effect on others. Influence others by selling them the benefit, for example, why they should change so they can see the benefit and make the appropriate changes to their behaviour or attitude. Share with others what it feels like to work in a highly successful team so they adopt the behaviours that are associated with success. Influence team members to unblock the values and beliefs people have to help them develop better. Share with others what it feels like to work in a highly-valued team.
Authentizotic behaviour	Show open concern for others. Accept people for what they are and do not try to force them to change. Empower people by delegating tasks to them and ask them to take on board more responsibilities. Develop an understanding of what makes the other person tick and what is important to that person. Show genuine concerns and feelings for the needs of others. Make people feel good about work, themselves, others and the project itself.
Conflict management	Establish the root causes of the conflict by talking to others openly and honestly to find out. Concentrate on the work issues and do not get personal. Show loyalty, integrity, trust, help and support when dealing with conflicts. Be tolerant and prepared to compromise. Observe behaviours of team members to sense early when conflicts begin to develop, and then take corrective actions to resolve these.

Cultural awareness	Develop, display and apply an awareness of the cultural differences of team members. Show an understanding and knowledge of the values and beliefs of other cultures. Adapt some of other people's own home country behaviours appropriate to the situation when managing people from diverse cultures. Adopt cultural awareness behaviours to manage people in their projects effectively. Show an open optimism about cultural differences and show views that confirm that you see cultural diversity as an enhancement to your own values and beliefs.

Table 2-3 - Six specific skills and behaviours of an effective people project manager (Fisher 2017)

Fisher (2011) concludes that the application of specific behaviours linked to skills related to effective people project management is of paramount importance. Similarly, in a study by Blaskovics (2016), he concludes that the personal characteristics of the PM (along with the attitude) are highly important in achieving success. The literature also provides examples of ranking of various PM skill sets, in comparison to each other. As an example of such a ranking, results from a study by El-Sabaa (2001), that focuses on how different skill-sets associate with successful management performance (classified according to sector), are presented in Figure 2-6.

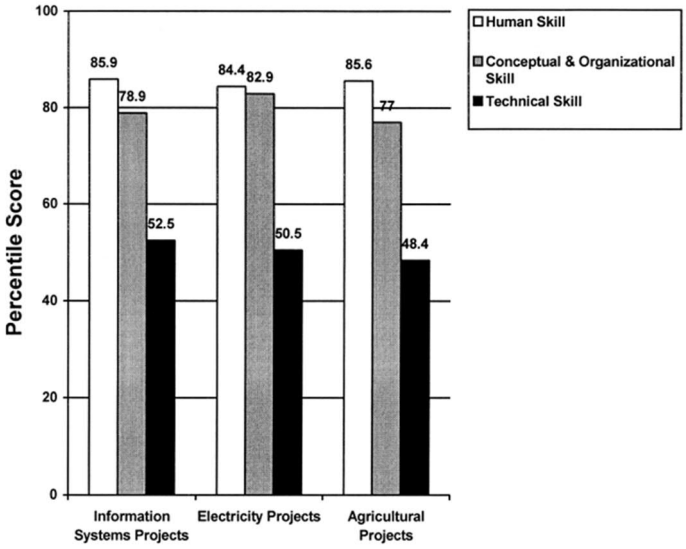

Figure 2-6 - Relative importance of project manager skills in each sector (El-Sabaa 2001)

El-Sabaa (2001) concludes that human skills have the greatest influence on project management practices, while technical skills have the least influence. This notion is further stressed by Hyväri (2006), who imply that as project management tools and methods are well developed and widely used, the focus needs to be shifted towards development of leadership skills.

PM competencies are usually formalised in some way in PBOs, the perhaps mostly used method being certification of PMs through training. In addition to any certification scheme

that the PBO may have developed in-house, various institutions provide external certification[13] of PMs. While there exists a multitude of such certification programs, perhaps the most well-known ones are the certifications provided by the Project Management Institute (PMI), of which one of the most prominent is the PMP® (Project Management Professional) certification, which is utilized by ABB to some extent. On the topic of PM certification, Müller and Turner (2007b) conclude that while certification constitutes a condition for high performance, it is not a sufficient condition. Rozenes & Vitner (2009) further point out the importance of training by noting it as an important factor that enables successful performance throughout a project's lifecycle.

Loufrani-Fedida and Meissonier (2015) propose a *multilevel approach* regarding competences; Individual level of competencies, Collective level of competencies and Organisational level of competencies, and note that while each level of competencies are essential for any PBO, the three levels should not be seen as isolated, rather; the three levels coexist and are interrelated. As such, Loufrani-Fedida and Meissonier (2015) propose that management should not only focus on individual competencies of the project managers, but also on *"organizational integrative competencies"*.

Although the literature contains various approaches on the subject of project management competencies, there is little debate whether such competencies have an influence on the project performance, or not. The consensus is that there is a clear relationship between the two; Crawford (2005) identifies a direct relationship between the two, and as a further extension; a relationship between project performance and organisational performance, as indicated in Figure 2-7.

Figure 2-7 - Relationship between project management competence and organisational performance (Crawford 2005)

[13] The case company uses a combination of in-house and external certification of PMs (Author's note)

2.2.2 Assigning the PM

Assigning the "right person for the job" is considered to be as important within project management as within any other field, if not even more so, due to the high expectations by senior management on the project manager and the otherwise multifaceted nature of the PM role. This notion is pointed out by Dvir, Sadeh and Malach-Pines (2006), who conclude that greater project success can be ensured by creating a better fit between PMs and their projects. Several different aspects, such as experience level of the PM, skillset and leadership style of the PM, timing, PM workload, etc., need to be considered when assigning a PM to a project, some of which are elaborated further on below.

In terms of mapping the PM type and skillset to projects, the literature provides several studies and examples. Results from a study by Dvir et.al. (2006), that aims to map the PM type to project type, suggest that (project) managers who are high in perceiving (flexible, preferring unpredicted events, rather than pre-planned events) and who are high in intuition (prefers development over production) prefer *high-tech*[14] projects. On the other hand, (project) managers who tend to dream and rebel against authority (having an avoidant attachment style) prefer *derivative*[15] and *platform*[16] type projects. Müller and Turner (2007a) conclude that *"different leadership styles are appropriate for different type of projects"*. Müller and Turner (2007a) further elaborate on the project-type versus leadership-style relationship, by noting that aspects like *sensitivity* and *communication* are important on fixed price contracts, while aspects such as *influence* and *communication* are of importance on *remeasurement*[17] contracts. Thus, Müller and Turner (2007a) mention *communication* as an important trait in both cases (Author's note). Müller and Turner (2007a) further conclude that a transactional leadership style is appropriate for engineering projects.

[14] Projects characterized by a high level of technological uncertainty (Dvir et.al. 2006)

[15] Projects that produce new products that present only modest improvements to older products (Dvir et.al. 2006)

[16] Projects that produce a new generation of products, but with low technological uncertainty (Dvir et.al. 2006)

[17] Under a re-measurement (or remeasurement) contract, the price to be paid for the whole work is to be ascertained by measurement in detail of the various parts of the work and the valuation of the work done by reference to a schedule of prices included in the contract. (https://en.wikipedia.org/)

Hodgson, Paton, and Cicmil (2011) further note that engineering organisations often rely on project managers, usually elevated from the position as technical specialist, under the assumption that a level of technical expertise is a prerequisite for overseeing technical aspects of the work process. On this subject, Heagney (2016, pp. 25) points out that the PM role is often incorrectly seen as technical by management, due to the fact that many PMs have a technical background. Additionally, Hodgson et.al. (2011) conclude that there exists a gap between expectations and reality for technical professionals who take on project management positions.

In terms of timing, Müller and Turner (2007b) propose that PMs should be assigned to the project at the earliest stage and lead the project up to the commissioning stage, as PMs responsible for a wider project life cycle tend to be more successful.

Another relevant aspect to keep in mind when assigning PMs to projects is the number of projects a PM is expected to be able to handle simultaneously; Kuprenas, Jung, Fakhouri and Jreij (2000) claim that this is perhaps the most important factor affecting a PMs performance and note that ideally each PM should be assigned only one project. However, as Kuprenas et.al. (2000) point out, this is a luxury no one can afford given the competitive nature of the design and construction industry. Thus, Kuprenas et.al. (2000) propose that there should be a balance between the number of projects any given PM is responsible for and the expected performance of those projects. Kuprenas et.al. (2000) conclude that the PM's experience is the most important factor used when assessing the number of projects, a PM is capable of managing, as indicated in Figure 2-8.

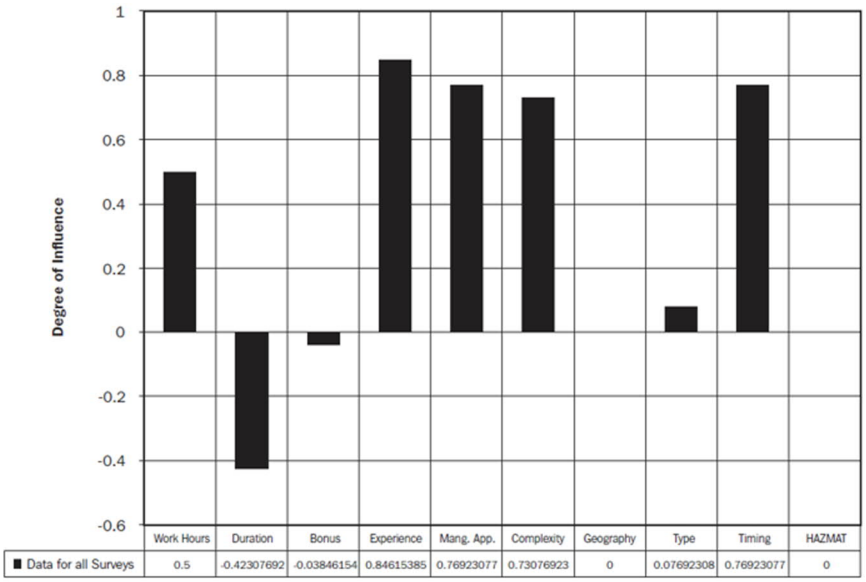

Figure 2-8 - Influence of Project and Personal Factors on Project Manager Workload (Kuprenas et.al. 2000)

An additional consideration that needs to be taken into account when assigning PMs to projects is the importance of matching the experience and capability level of the PM against the project. This fact is pointed out by Müller and Turner (2007b), who note that project managers should not be given projects that are beneath their management capabilities, as they seek challenges.

Loufrani-Fedida and Missonier (2015) recommend that practitioners should stop searching for the right, ideal PM who possesses all of the vital project competencies and that the focus instead should be on sharing responsibilities between individuals. This notion is further stressed by Aitken and Crawford (2008), who conclude that there are a number of personality characteristics, which importance to project management performance is debated. Consequently, Aitken and Crawford (2008) note that when it comes to defining the personality profile of a successful project manager, the *one-size-fit-all* approach is not feasible.

2.3 The Project

According to the Project Management Body of Knowledge (PMBOK® Guide) of the Project Management Institute (PMI), a project is defined as follows: *"A project is a temporary endeavor undertaken to create a unique product, service, or result."*. As execution of projects lies at the core of every PBO's operations, consequently good project

performance (on average) is a prerequisite for the PBO's sustainable existence. Eve (2007) recognizes that project management performance is dependent on a number of key elements that need to be synchronised correctly in order to enable the company to maximise its performance and investment, as indicated in Figure 2-9.

Figure 2-9 - Key elements of project management performance (Eve 2007)

In order to ensure successful synchronisation of such key elements, a certain level of trust is expected between individuals responsible for the various elements. On this notion, Kerzner (1987) notes that there exists an "*atmosphere of trust*" between the PM and the line managers within companies that have achieved excellence in project management, and further notes that a strong commitment to project management by the senior management is a prerequisite for such a trust to develop.

2.3.1 Project Success

The definition of project success and the conditions for project success is extensively covered in the literature. Various aspects can be considered when defining the success of a project, some of which are presented here. The vantage point can be considered such an aspect. On this topic, Rad (2001) notes that the major difference between how the client defines project success versus how the project team defines project success, is the fact that success factors, as perceived by the client, "*focus on the outward appearance of the product*", while the projects team's definition of project success stems from "*a focus on activities and measures that produce the project deliverable*". Müller and Turner (2007b) further note that success criteria differ depending on the project type and industry.

Shenhar, Levy and Dvir (1997) suggest that project success should be thought of using four hierarchical dimensions (*Project efficiency*, *Impact on Customer*, *Business Success* and *Preparing for the Future*), to be addressed differently depending on the timeframe and the project itself. Consequently, Shenhar et.al. (1997) argue that assessing success is time-dependent, in relation to the relative importance of the four dimensions, as indicated in Figure 2-10.

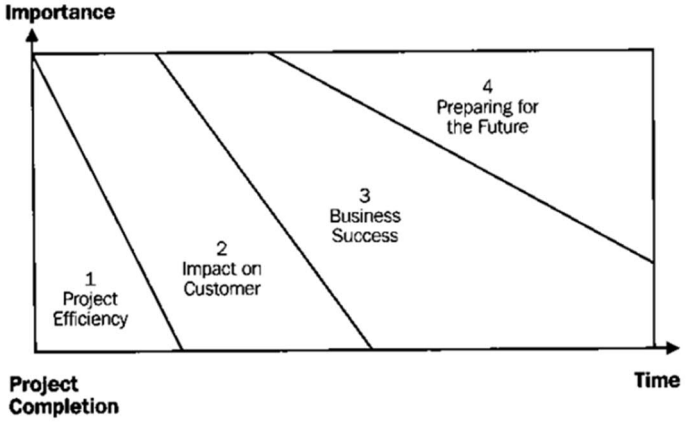

Figure 2-10 - Relative Importance of Success Dimensions is Time-Dependent (Shenhar et.al. 1997)

Shenhar et.al. (1997) conclude that the measures for assessment (of project success) should be based on the organisations strategic goals and need to be defined before initiation of the project. Christenson and Walker (2004) further argue that a project vision (and the communication and maintenance of the project vision) has a significant impact on project success. Christenson and Walker (2004) additionally note that a deep understanding of the organisational culture and history, in addition to exceptional communication skills, is required in order to create an effective project vision.

Pinto and Mantel (1990) identify three aspects of project performance, against which assessment in regards of project success or failure can be made; *the implementation process itself*, *the perceived value of the project* and *client satisfaction*. Pinto and Mantel (1990) conclude that project performance assessment should be based on several criteria and further point out the relativistic *eye-of-the-beholder* -viewpoint, by noting that what one organisation considers a project failure might be considered a success by another.

The importance of the activities carried out in the early stages of a project is stressed by many authors, for example, Dvir, Raz and Shenhar (2003) point out the importance of defining the project goals and its deliverables requirements in the initial stage of a project

and that no effort should be spared on this activity, further noting the importance of the involvement of the customer or end-user in the process. Although Dvir et.al. (2003) did not find any correlation between the implementation of planning procedures and project success in their study, they point out that "*at least a minimum level of planning in required*". Munns and Bjeirmi (1996) also point out the importance of early interaction in the project lifecycle by noting that the project team will not be able to save a project that suffers from poor early decision making.

For the purpose of this study, the definition of project success by Globerson and Zwikael (2002) is used (as it to a large extent corresponds to the case company's definition of process success):

> *"Project success is measured as the ability to complete the project according to desired specifications and within the specified budget and the promised time schedule, while keeping the customer and stakeholders happy."* (Globerson and Zwikael 2002)

2.3.2 Project Failure

While project success is the desired outcome of any project; occasionally some projects will inevitably fail, consequently it lies in the interest of any PBO to minimize the number of such projects (in relation to successful projects). Rad and Raghavan (2000) note that the general consensus is that project failure rates are high throughout various industries, ranging from *knowledge-based* areas (IT, telecommunications, pharmaceuticals, etc.) to *traditional* areas (construction, international development, etc.).

The literature contains various definitions of (and reasons for) project failure. Thamhain (1999) identifies four barriers to project performance; *Different Points of View* (between various groups of the organisation or within the project team), *Role Conflict* (due to that project team members often have multiple reporting lines), *Power Struggles* (due to the fact that individuals in powerful positions elsewhere in the organisation exert their authority on the project team) and *Group Think* (phenomena that may occur in highly internally connected teams that have developed a "*sense of detachment and elitism*", resulting in a reluctance to explore different points of view).

Pinto and Mantel (1990) note that while certain characteristics strongly relate to project failure, it is difficult to define precisely what constitutes project failure. Dvir et.al. (2003) point out the importance of planning by noting that while planning does not necessarily

guarantee project success, project failure is a guaranteed outcome of lack of planning. Munns and Bjeirmi (1996) list the following factors for project management failure:

- Inadequate basis for the project
- Wrong person as the project manager
- Top management unsupportive
- Inadequately defined tasks
- Lack of project management techniques
- Management techniques misused
- Project closedown not planned
- Lack of commitment to the project

Block (1999) further identifies poor and inconsistent estimating as one of the major causes of project failure and additionally points out that the independent and arrogant attitude of the PM, that stems from the belief that project problems are temporary, often is a major contributor to a project's failure.

Early prediction of project failure and intervention is crucial to steer a project back onto the correct track in order to minimize damage done and mitigate any further damage. Pinto and Mantel (1990) point out that factors that can be used to predict project failure differ depending on the phase of the project (early strategic phase versus later operational phase). Block (1999) lists the following symptoms as early warning signs of a runaway project:

- Inadequate project planning
- Faulty task management
- Poor reporting and communications
- Infrequent status meetings
- Insufficient documentation
- Abrupt schedule changes
- Project disorganization
- Muddled business objectives
- Extreme project complexity
- Escalating costs
- Too many project team meetings

Globerson and Zwikael (2002) stress the responsibilities of the PM (being fully accountable for the project) by noting that the PM has a responsibility to identify events that could impact the project negatively and the PM should therefore develop plans in order to mitigate such events[18].

2.3.3 Lessons Learned

Regardless of whether projects are deemed to be successes or failures, it is imperative for any PBO that lessons learned are looped back into the organisation; be it positive experiences that can be capitalized on in future projects or negative experiences that should be avoided in future projects. The *glass-half-empty* approach to lessons learned is that it is notoriously difficult to learn from previous mistakes, or as the German philosopher Georg Wilhelm Friedrich Hegel (1770 – 1831) famously said: *"We learn from history that we do not learn from history."*. A more modern version of this quote is presented by Block (1999), who says that *"What we learn from lessons learned is that we don't learn from lessons learned"*. This seemingly inherent aspect of human behaviour suggests an ineffectiveness in the lessons learned process; while most PBOs are good at capturing and documenting lessons learned, only a quarter of the lessons learned are actually transferred to new projects (Crawford 2011, pp. 266-267), as depicted in Figure 2-11.

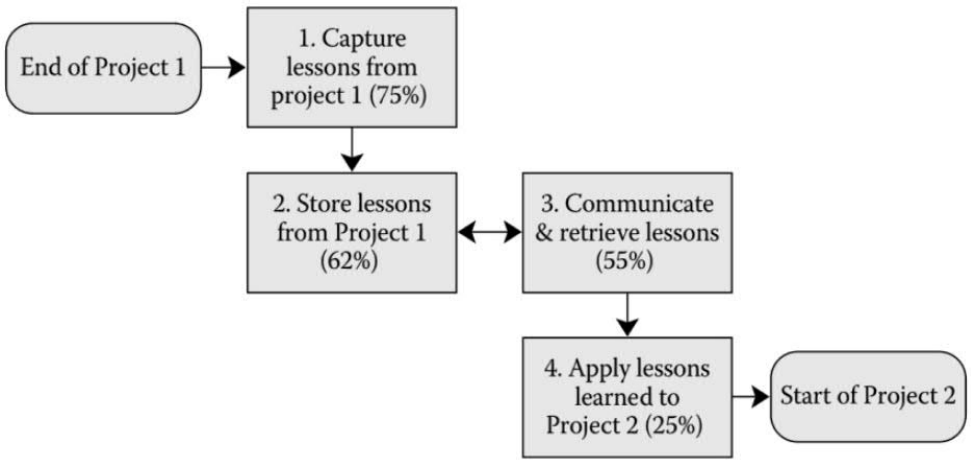

Figure 2-11 - The knowledge gap in project management (Crawford 2011, p. 267)

[18] Such a continuous activity by the PM throughout the project is generally referred to as *Project risk Management*, one of the *knowledge areas* defined in the PMBOK® (Author's note)

Results from a survey by Williams (2008) identifies the transfer of lessons learnt within an organisation as one of the major obstacles of learning from projects; while nearly half of the respondents (47,8%) recognised that lessons learned are transferred to the project team, only 35,6% of the respondent acknowledged that lessons learnt are transferred to other project teams and only 22,2% of the respondents agreed that lessons learned are transferred elsewhere in the organisation. The survey by Williams (2008) further shows that only 8,4% of the respondents agreed that they put in enough effort into the lessons learned process and the main reason (67%) for this low number was indicated as lack of employee time. The study by Williams (2008) further indicates a significant discrepancy between the importance (as perceived by PMs) of various practices for learning lessons and their actual usage, as indicated in Figure 2-12.

Figure 2-12 - Practices organisations should be doing to capture lessons and those which are actually done (Williams 2008)

Regardless of the many times pessimistic view on lessons learned, it is nevertheless seen as an important aspect of project management and is extensively covered in the project management literature. Crawford (2011, pp. 261-262) points out the PMOs role in the lessons learned process by noting that it is the PMO that is responsible for gathering lessons learned from completed projects and ensuring that such knowledge is available for future use. Various levels of learning are also described in the literature, ranging from personal learning to organisational learning. Bierwolf et.al. (2017) talk about the concept of the learning organisation, i.e., expanding the lessons learned loop from a single project outward to a broader context. According to this concept, Bierwolf et.al. (2017) introduce the concept of Double Loop learning that evolves the learning process from a *corrective cycle* to a *learning cycle* according to Figure 2-13.

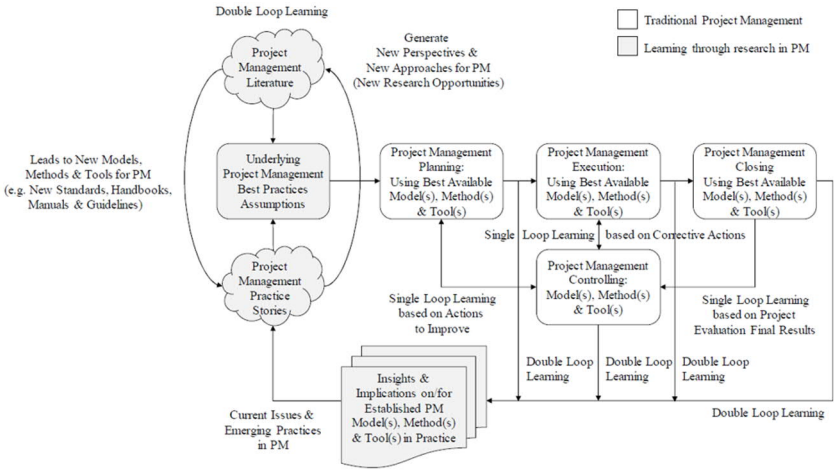

Figure 2-13 - From Single Loop Learning in Projects to Double Loop Learning in PM Profession (Bierwolf et al. 2017)

Bierwolf et al. (2017) propose that the PM should engage into a *learning cycle*, instead of merely a *corrective cycle* and further suggest that this promotes traits such as *knowledge transfer* and *networking* to become essential PM skills that should be developed. Bierwolf et.al. (2017) further note that feedback loops can emerge from each of the major steps in the project, not just the end. This notion is also stressed by Kotnour (2000), who concludes that lessons learned should not only be generated at the end of the project, rather it is beneficial to have a large number of lessons learned producing actions. The importance of continual improvement is further stressed by Crawford (2011, p. 262), who notes that lessons learned can be included throughout the project's lifecycle. McClory, Read and Labib (2017) further expand the learning methodology by introducing a *triple loop* learning model according to Figure 2-14.

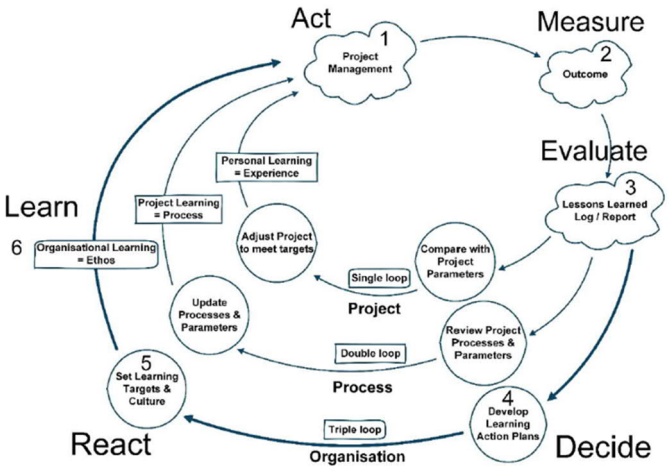

Figure 2-14 - Triple-Loop Project Learning (McClory et.al. 2017)

According to McClory et.al. (2017); *Single loop (Project) learning* corresponds to the personal learning that stems from the actions carried out in the project in order to meet the targets. *Double loop (Process) learning* corresponds to the team level learning, whereby project-level parameters and organisational policies are updated based on assessments of the processes and parameters. Lastly, *Triple loop (Organisation) learning* is relevant for the whole organisation, as learning targets and cultural values and goals are updated through this loop (via the PMO). Turner (2016, 151) stresses the importance of continuous improvement by noting that, in order to gain any real benefit, the lessons learned from projects have to be incorporated into the procedures. Kotnour (2000) uses the terms *Intra-project learning cycle*[19] when describing how knowledge is created and shared within a project, with the aim to identify and solve problems specific to the projects. Further, Kotnour (2000) uses the terms *Inter-project learning cycle*[20] when describing how lessons learned are shared across projects in order to apply and develop new knowledge.

One method (among others) that is often used by organisations to capture, and more importantly; to learn from lessons from previous projects is the usage of some kind of lessons learned database, to which ideally all members of the organisation have access. McClory et.al. (2017) stress the importance of a well-managed lessons learned database, listing aspects such as de-duplication has to be ensured, removal of out-of-date material and proactive problem resolution. However, McClory et.al. (2017), further note that while investments in the lessons learned process (such as a database) many organisations gain little or no visible benefit.

An additional well-known challenge regarding the lessons learned process, particularly when it comes to negative lessons learned, is the importance of avoiding blaming and finger pointing. When processing positive lessons learned, it is easy to praise an individual for a job well done, on the other hand; when dealing with negative lessons learned, it is important to keep the focus on the issue, not the person. Atkinson, Crawford, and Ward (2006) touches on this subject by noting that cultural issues (related to perception of failure) may be a reason for failing to report important lessons for the future. This is further noted by Kotnour (2000), who conclude that the learning process must also be

[19] Comparable to the *Single loop*, as defined by McClory et.al 2017 (Author's note)

[20] Comparable to the *Double loop*, as defined by McClory et.al 2017 (Author's note)

accompanied by an atmosphere that encourages team members to freely confess errors and explore problem solutions.

2.4 Research questions

The literature contains a multitude of studies and research related to the elements of the project management environment, and their intercorrelation as defined in section 1.1. While the literature covered in section 2 only represents a subset of the available literature on the subject, I believe it to be sufficient enough for the purpose of this thesis, which aims to address the subject on a broader "bird's-eye view" level from the management perspective as opposed to a detailed study on each of the elements.

In order to address the purpose and aim of this thesis, as defined in section 1.4; four research questions were formulated through a clock-wise journey around the project management environment (as defined in section 1.1), starting and ending at the PMO, as indicated in Figure 2-15. The 1st research question [RQ1] addresses the organisational positioning of the PMO, and thereby the PMO's role overall; *What is a suitable type of PMO?* As assigning the most suitable PM to the project is an important factor contributing to project performance, the 2nd research question [RQ2] is formulated as; *What aspects should be considered when assigning the Project Manager?* The 3rd research question [RQ3] focuses on the correlation between the project manager and the project itself; *How can the PM influence Project performance?* The 4th research question [RQ4] addresses the aspect of organisational[21] learning from previous projects and is formulated as: *How can the Lessons Learned process be improved?*

[21] The main focus is on how the organisation (i.e., the case company) best could learn from previous experiences, i.e., *Triple-Loop Project Learning* (McClory et.al. 2017) as depicted in Figure 2-14.

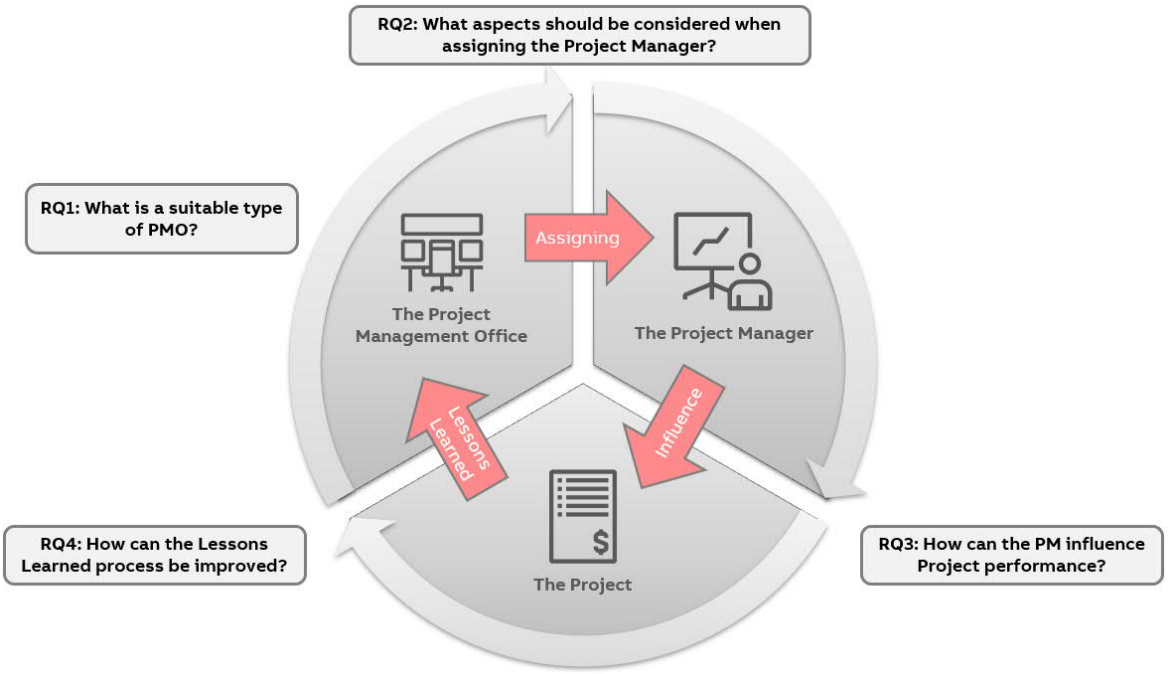

Figure 2-15 - The research questions in the context of the project management environment (source: Author)

The main aim of this study is not to seek or propose definitive answers to the proposed research question, rather to propose recommendations (as outlined in section 1.4), according to which the case company can act, in order to address the aspects raised in the research questions in a suitable manner.

3 Research Methodology

The literature provides numerous models when it comes to selecting the appropriate research methodology, research methods[22] and study types. One such model is proposed by Ellis and Levy (2009), who introduce a PLD model for deriving the study type as depicted in Figure 3-1.

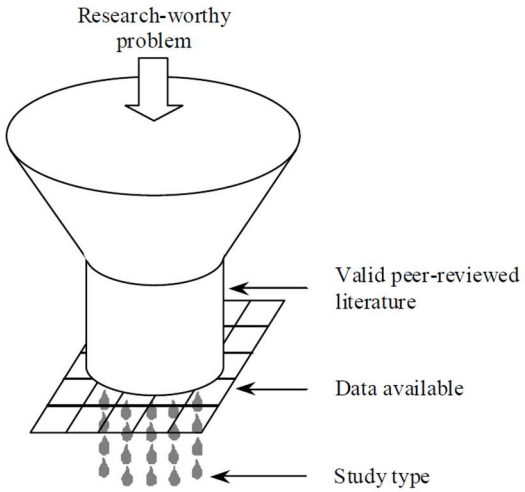

Figure 3-1 - The PLD model for deriving study type (Ellis and Levy, 2009)

According to Ellis and Levy (2009); the appropriate study type is derived from the research-worthy problem (P), serving as input for the selection of type of research, after which the range of applicable research approaches is funnelled down by the valid peer-reviewed literature (L). Lastly, the available data (D) serves as the ultimate filter in the selection of the study type. Kothari (2004, pp- 112-113) further lists the following factors to consider, when selecting the appropriate data collection method:

- Nature, scope and object of enquiry[23] - Matching the method to the research.
- Availability of funds - Matching the method to the available budget
- Time factor - The time available to the researcher
- Precision required - The required data precision

Kothari (2004, pp. 95-111) additionally presents advantages and disadvantages of various data collection methods, such as *Observation*, *Interview*, *Questionnaires* and *Schedules*.

[22] The difference between *research methodology* and *research method* is not further elaborated on in this thesis, e.g., Kothari (2004, pp. 7-8) provides an explanation on the difference. (Author's note)
[23] According to Kothari (2004, p. 112) this is the most important factor affecting the choice of the method.

Malhotra and Grover (1998) note that the survey approach is the pre-eminent method used in studies within the POM (Production and Operations Management) area. Further, McIntyre (2014, pp. 84) point out that the potential to attain data from a large group of people is one of the main strengths of the survey method. Consequently, taking the above into consideration and the fact that a significant portion of the studies in the literature covered in section 2 derive their data from surveys; a survey (questionnaire) based data collection method was selected for the purpose of this study. While the mere fact that a large portion of the studies conducted in the field rely on surveys as a data collection method, does of course not automatically qualify the survey as the most appropriate data collection method, it does however lend some credibility to the strategy. Additionally, the fact that this study aims to gather information on what various individuals *think should be done*, as opposed to *how things are done*, further give credence to the selection of the survey as the data collection method, as a survey is a good way to measure individuals' *attitude*, rather than the actual *behaviour* (McIntyre, 2014, pp. 85).

Another data collection method that initially was considered for this study, is data collection of actual data from previous project performance. This method was, however, discarded due to potential challenges in the actual data collection, such as dissimilarities in systems in different countries and data confidentiality[24].

3.1 Data collection

While the aim of the research is to provide improvement recommendations to the case company (ABB Energy Industries – Finland), the survey was sent out to a broader organisation (ABB Energy Industries – Northern Europe, i.e., one level up from the case company, refer to section 1.2). This was done for two reasons; firstly - to get a broader sample and, secondly - to enable the possibility for other organisations (countries) within ABB Energy Industries – Northern Europe to utilise the results of this study locally; either directly or by performing own analyses, using the survey responses.

Prior to sending out the survey to the broader audience, a test survey was sent out to a small subset of PMs in the case company (one from each of the main business segments),

[24] Data analysis of actual project performance data would however be a suitable continuation of this research on a local level and is thus proposed as a recommendation for future research, see section 0 (Author's note)

in order to collect feedback on how the survey could be improved. Based on the feedback received from the test survey, small adjustments were made to the questions included in the survey.

The survey was sent out vias e-mail as an on-line survey to PMs and managers of PMs in ABB Energy Industries – Northern Europe (Norway, Denmark, United Kingdom, Ireland, Finland and Sweden). The survey comprised 19 questions, a composition break-down of the survey questions (demographic vs. subject related, research question relation and question type) is presented in Figure 3-2.

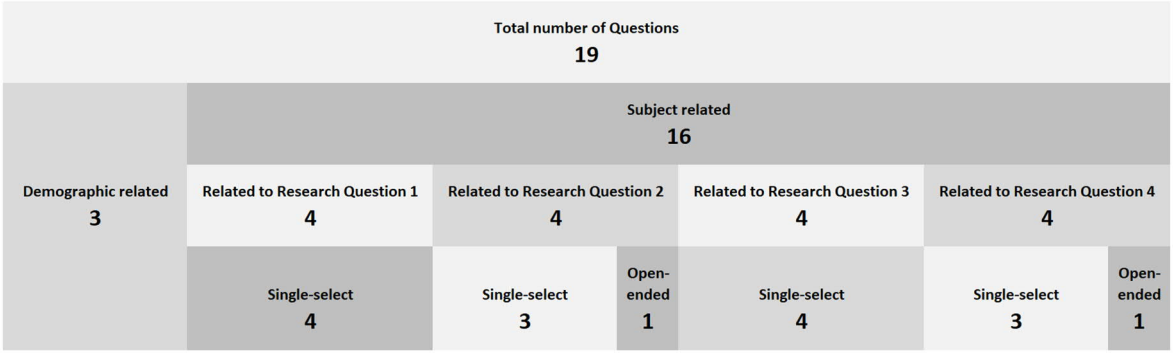

Figure 3-2 - Composition of survey questions

The survey questionnaire[25] is presented in Appendix 1. In order to maximize the number of responses the survey was kept open for a relatively long time (from late May 2021 to early September 2021).

3.2 Survey Responses

Due to similarities between the organisations in term of size, only the survey responses from Finland, Sweden and Denmark were used as input for result analysis (Norway and United Kingdom representing a significantly larger organisations than the case company and Ireland representing a smaller organisation than the case company). The number of individuals the survey was sent out to and the number of responses is presented in Figure 3-3.

[25] In the survey questionnaire, the internally used term *HUB* refers to the organisation *ABB Energy Industries – Northern Europe*

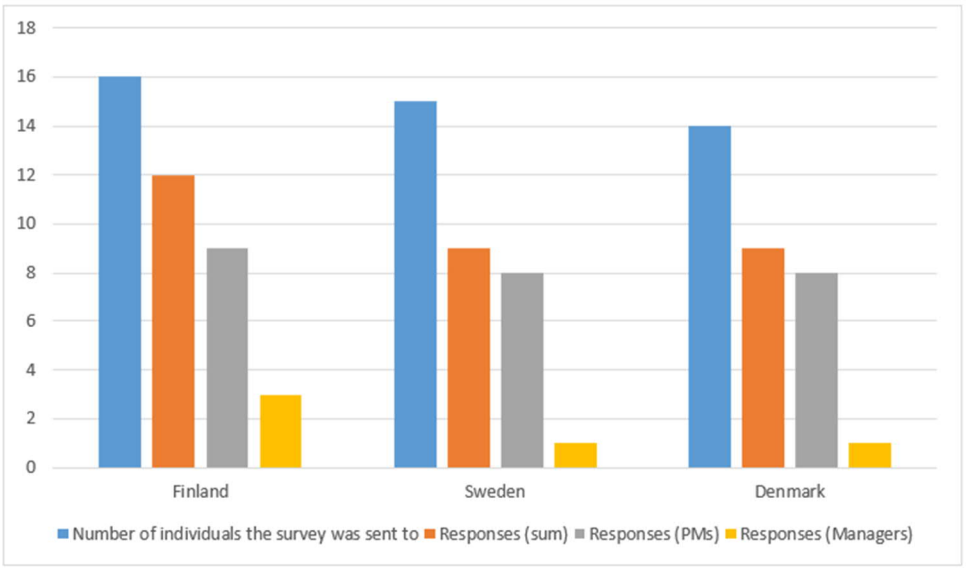

Figure 3-3 - Survey responses

The survey was sent out to 45 individuals (Finland, Sweden and Denmark) and out of the 30 responses, 25 were from PMs and 5 from managers of PMs (Figure 3-3).

The calculated response rates for the survey are:

- Finland: 75%
- Sweden: 60%
- Denmark: 64%
- Combined: 67%

The average time used for responding to the survey was approximately 10 minutes[26].

The average number of years of experience related to project management is 12,2 years for PMs and 14,4 years for managers of PMs, with a combined average of 12,6 years. The total combined number of years of experience related to project management is 376,5 years. The distribution of years of projects management related experience for all respondents, as well as for project managers only, is presented in Figure 3-4.

[26] When calculating the average time usage, responses with a time usage over 30 minutes (5 responses out of 30) were discarded (considered outliers), assuming that a time usage of more than 30 minutes was most likely due to interrupting factors (Author's note).

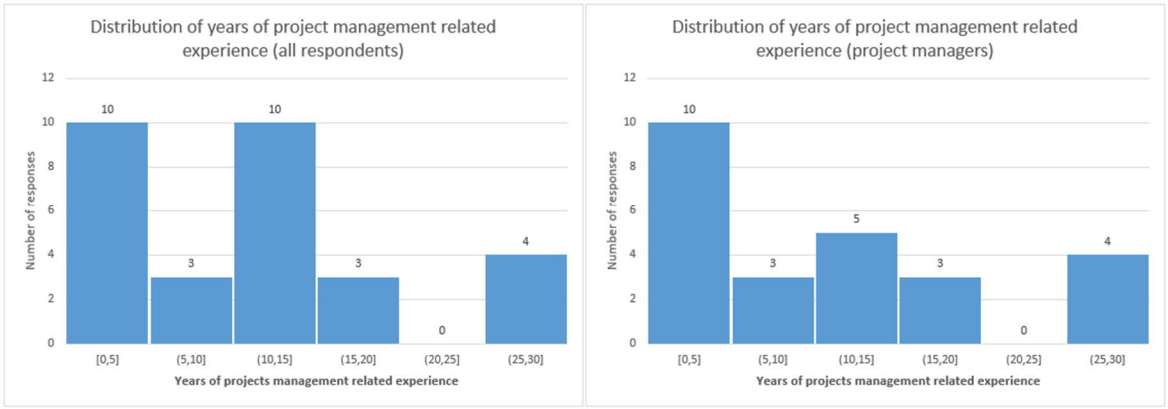

Figure 3-4 - Experience distribution (all vs. PMs)

As can be seen from the difference between the left-hand histogram and the right-hand histogram in Figure 3-4, all managers fall within the range 10-15 years of experience.

3.2.1 Research question 1 [RQ1]

In this section, survey responses related to research question 1 [RQ1] (*What is a suitable type of PMO?*) are presented. The corresponding survey questions are the questions 4-7 as listed in Appendix 1.

The distributions of survey responses related to question 4 (*The overall responsibility for project execution should belong to…*) and are presented in Figure 3-5.

Figure 3-5 - Survey responses (Question 4)

No significant difference between responses given by PMs and responses given by managers could be observed regarding survey question 4. A (perhaps) noteworthy correlation could be observed between the responses to survey question 4 and years of project management work experience; all respondents with more than 15 years of project management work experience (7 respondents) were of the opinion that the overall responsibility for project execution should belong to the PMO.

The distributions of survey responses related to question 5 (*In order to optimize organisational performance, the project managers should organisationally belong to…)* are presented in Figure 3-6.

Figure 3-6 - Survey responses (Question 5)

No significant difference between responses given by PMs and responses given by managers could be observed regarding survey questions 5. No correlation to years of project management work experience could be observed in the responses to question 5.

The distributions of survey responses related to question 6 (*In order to maximise the benefit of having a PMO, the responsibilities of the PMO should include…*) are presented in Figure 3-7.

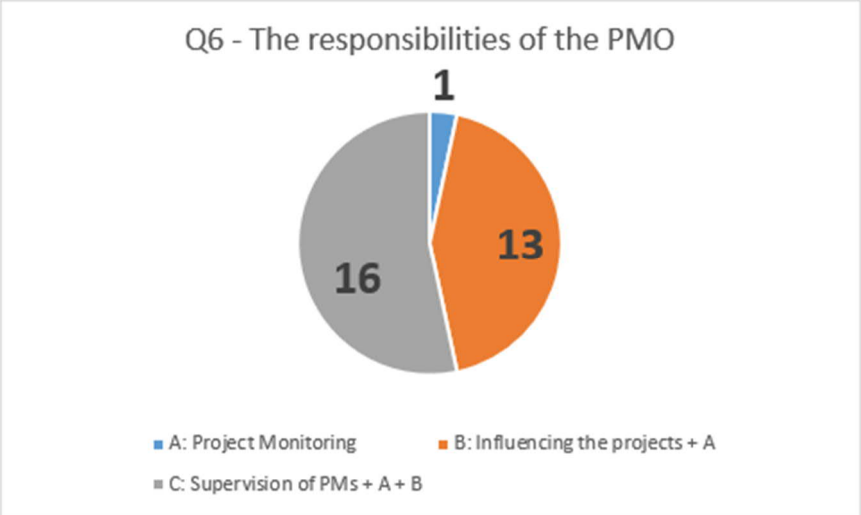

Figure 3-7 - Survey responses (Question 6)[27]

[27] Refer to Appendix 1 for the full-text version of the response options

In the responses to survey question 6, a slight difference could be noted between the responses given by PMs and the responses given by managers; the single response indicating that the PMOs responsibility should only include monitoring of projects was given by a PM. No correlation to years of project management work experience could be observed in the responses to survey question 6.

The distributions of survey responses related to 7 (*In order to effectively implement the overall business/segment strategy (local / HUB / global), I believe that the PMO should…)* are presented in Figure 3-8.

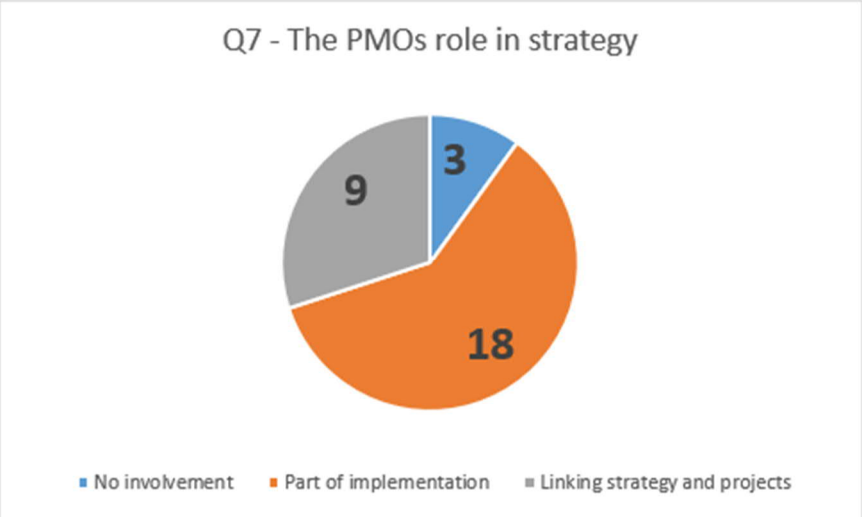

Figure 3-8 - Survey responses (Question 7)[28]

In the responses to survey question 7, a slight difference could be noted between the responses given by PMs and the responses given by managers; the three responses indicating that the PMO should not be involved in the implementation of the overall strategy were all given by PMs. No correlation to years of project management work experience could be observed in the responses to survey question 7.

[28] Refer to Appendix 1 for the full-text version of the response options

3.2.2 Research question 2 [RQ2]

In this section, survey responses related to research question 2 [RQ2] (*What aspects should be considered when assigning the Project Manager?*) are presented. The corresponding survey questions are the questions 8-11 as listed in Appendix 1.

The distribution of survey responses related to question 8 (*Of the two following options, I believe that it is better if…)* is presented in Figure 3-9.

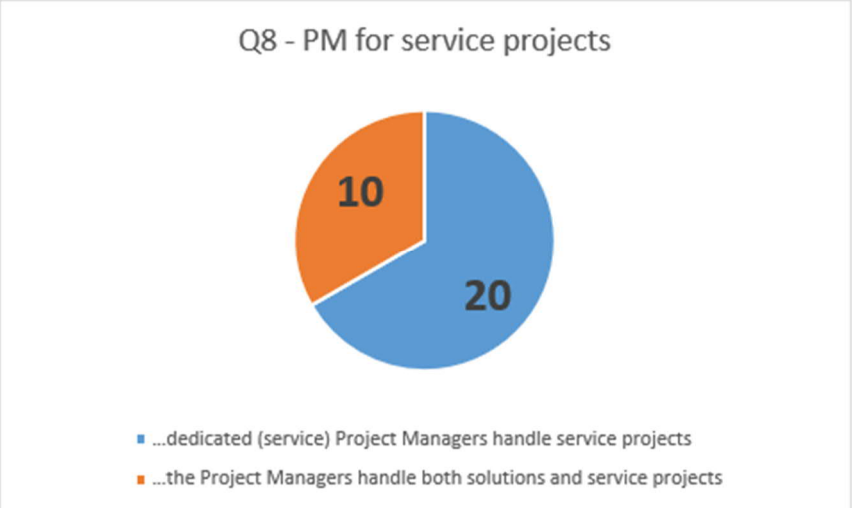

Figure 3-9 - Survey responses (Question 8)[29]

No correlation to years of project management work experience or role (PM / manager) could be observed in the responses to question 8.

The distribution of survey responses related to question 9 (*In order to create a good balance between selecting the most SUITABLE Project Manager for a project, versus selecting the Project Manager based on AVAILABILITY, I believe that…)* is presented in Figure 3-10.

[29] The term *solutions* is used within the case company to describe projects not classified as service projects

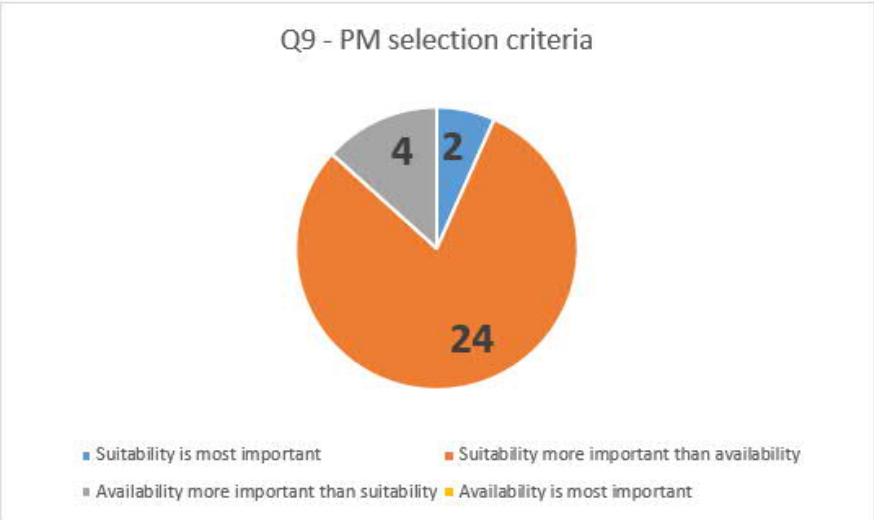

Figure 3-10 - Survey responses (Question 9)[30]

All of the managers responded *"Suitability is more important than availability"*, while no one was of the opinion that availability should be the only factor to consider when selecting the PM. No correlation to years of project management work experience could be observed in the responses to question 9.

The distribution of survey responses related to question 10 (*I believe that the Project Manager's technical competences (engineering, electrical, automation, etc.) ...)* is presented in Figure 3-11.

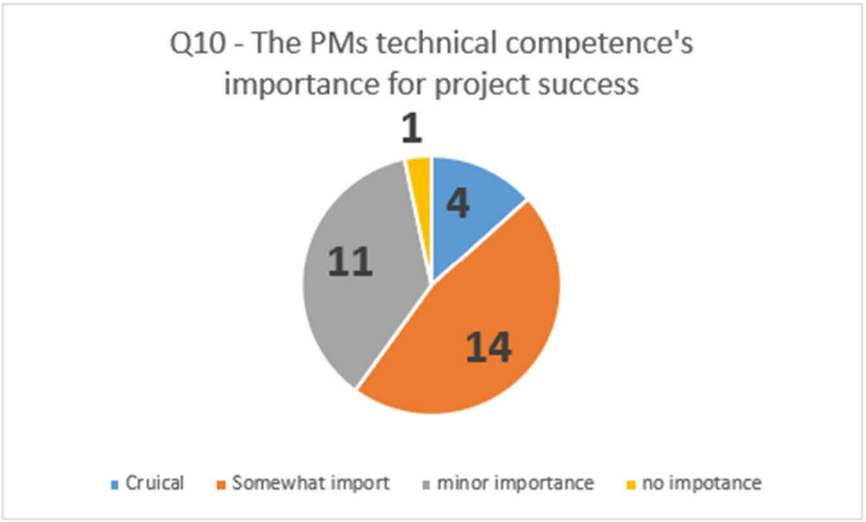

Figure 3-11 - Survey responses (Question 10)[31]

[30] Refer to Appendix 1 for the full-text version of the response options
[31] Refer to Appendix 1 for the full-text version of the response options

All of the managers responded *"minor importance"*. No correlation to years of project management work experience could be observed in the responses to question 10.

Most of the respondents included the phrase *project complexity* in their responses to Question 11 (*In Your opinion, what is the single most important factor to consider, when determining how many projects a Project Manager can handle at one time (project complexity, project size, project type, ...*), as can be seen in Figure 3-12.

Figure 3-12 - Word cloud generated[32] from responses to question 11

[32] Generated at https://www.wordclouds.com/

3.2.3 Research question 3 [RQ3]

In this section, survey responses related to research question 1 [RQ3] (*How can the PM influence Project performance?*) are presented. The corresponding survey questions are the questions 12-15 as listed in Appendix 1.

The distribution of survey responses related to question 12 (*I believe that it is important for Project Managers to have a good understanding of the overall business/segment strategy (local / HUB / global), in order to ensure good project performance.)* is presented in Figure 3-13.

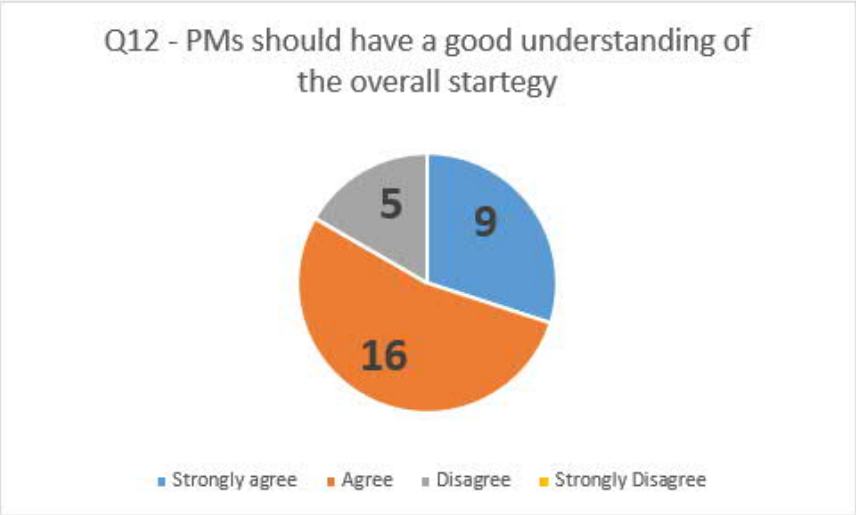

Figure 3-13 - Survey responses (Question 12)[33]

All of the managers responded either "*Strongly agree"* or "*Agree"* to question 12. No one responded "*Strongly Disagree*" to question 12. No correlation to years of project management work experience could be observed in the responses to question 12.

The distribution of survey responses related to question 13 (*Regarding so-called HARD skills (project planning, forecasting, risk management, etc.) and SOFT skills (leadership, communication, etc.); I believe that…)* is presented in Figure 3-14.

[33] Refer to Appendix 1 for the full-text version of the response options

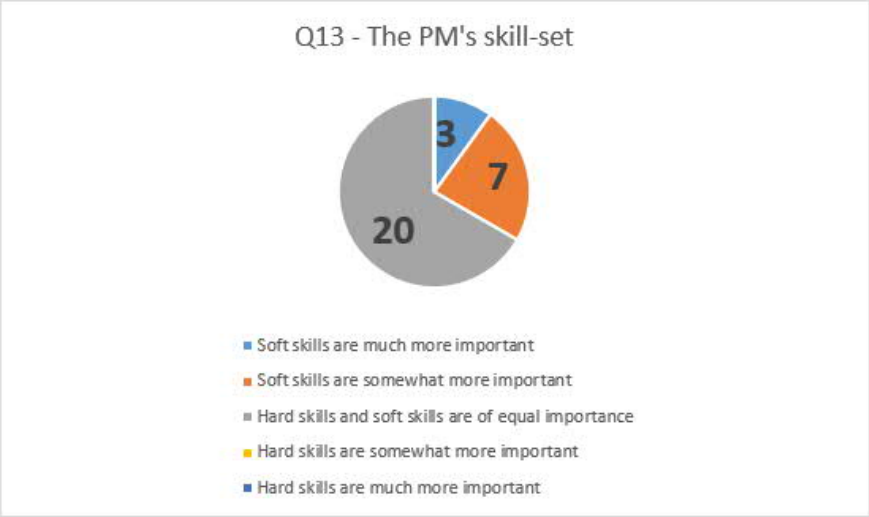

Figure 3-14 - Survey responses (Question 13)

No significant difference between responses given by PMs and responses given by managers could be observed regarding survey question 13. No one responded either "*Hard skills are somewhat more important*" nor "*Hard skills are much more important*". No correlation to years of project management work experience could be observed in the responses to question 13.

The distribution of survey responses related to question 14 (*I believe that official Certification of the Project Manager…)* is presented in Figure 3-15.

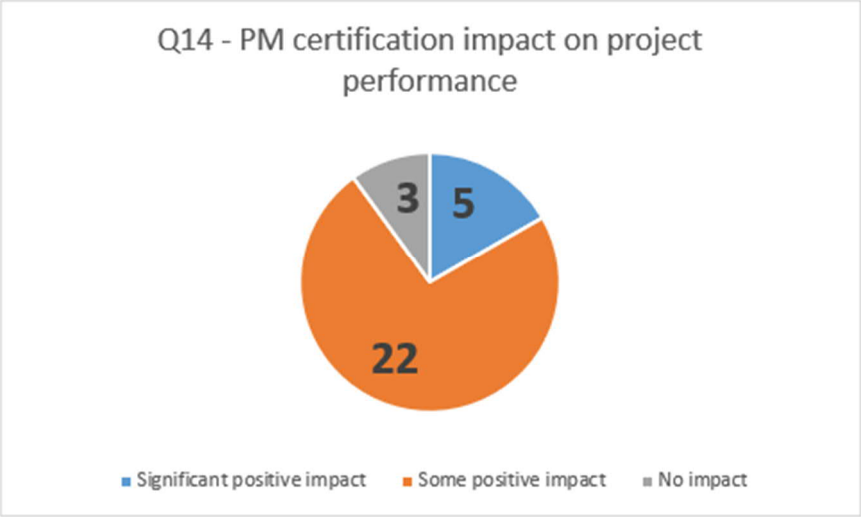

Figure 3-15 - Survey responses (Question 14)[34]

[34] Refer to Appendix 1 for the full-text version of the response options

All of the managers responded "*Some positive impact*" to question 14. No correlation to years of project management work experience could be observed in the responses to question 14.

The distribution of survey responses related to question 15 (*I believe that development and active usage of a Project Execution Plan (sometimes called Project Plan)…)* is presented in Figure 3-16.

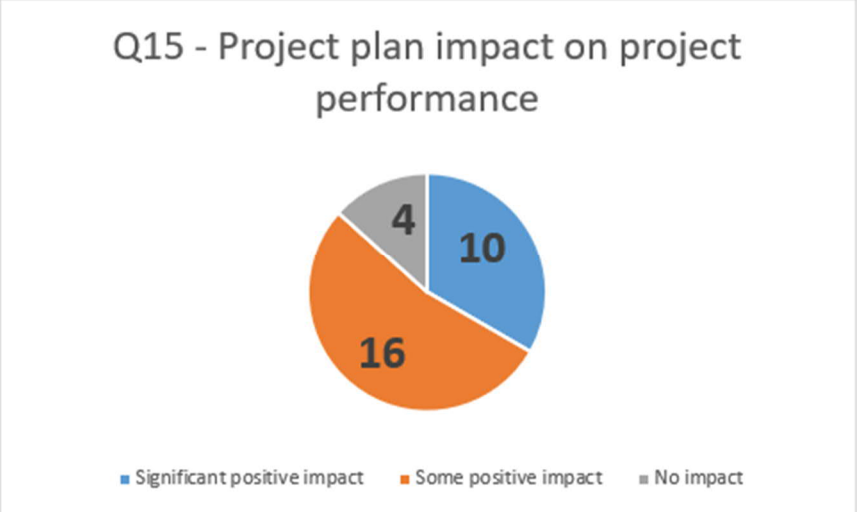

Figure 3-16 - Survey responses (Question 15)[35]

All of the managers responded "*Some positive impact*" or "*Significant positive impact*" to question 15. A small correlation to the years of project management work experience was observed; three out of four PMs who responded "*No Impact*" had five years or less of project management experience.

[35] Refer to Appendix 1 for the full-text version of the response options

3.2.4 Research question 4 [RQ4]

In this section, survey responses related to research question 1 [RQ4] (*How can the Lessons Learned process be improved?*) are presented. The corresponding survey questions are the questions 16-19 as listed in Appendix 1.

The distribution of survey responses related to question 16 (*I believe that capturing of Lessons Learned from projects should be done…)* is presented in Figure 3-17.

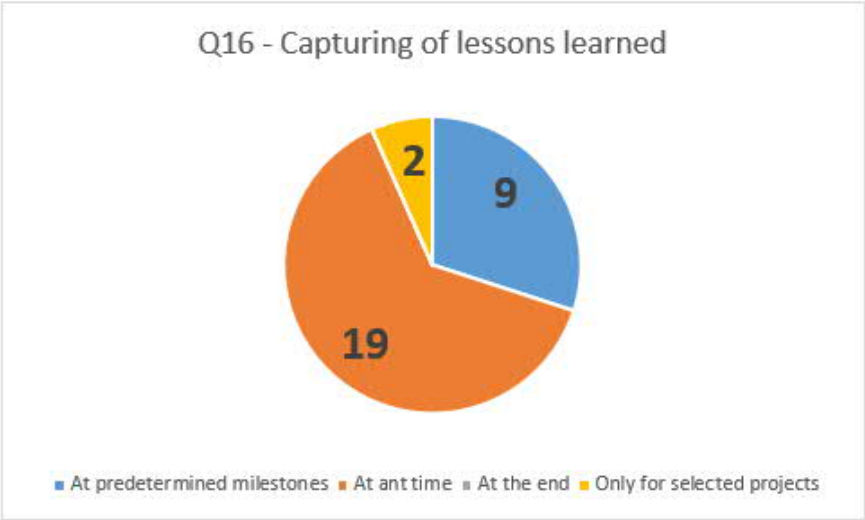

Figure 3-17 - Survey responses (Question 16)[36]

No significant difference between responses given by PMs and responses given by managers could be observed regarding survey question 16. Both of the responses "*Only for selected projects*" were from PMs. No one responded "*At the end*". No correlation to years of project management work experience could be observed in the responses to question 16.

The distribution of survey responses related to question 17 (*I believe that updating of guidelines and instructions based on Lessons Learned from projects is…)* is presented in Figure 3-18.

[36] Refer to Appendix 1 for the full-text version of the response options

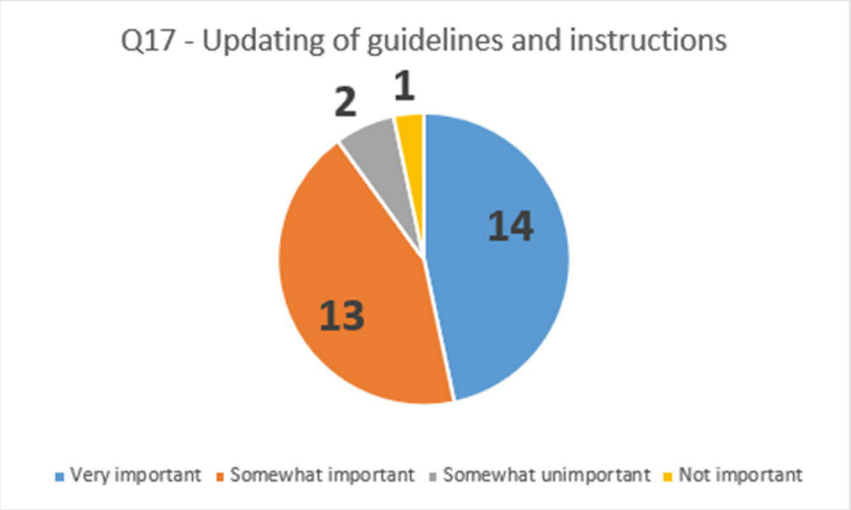

Figure 3-18 - Survey responses (Question 17)

Four out of five managers answered "*Very important*" to question 17. No significant correlation to years of project management work experience could be observed in the responses to question 17.

The distribution of survey responses related to question 18 (*Do you think there should be database for registering of Lessons Learned from projects?)* is presented in Figure 3-19.

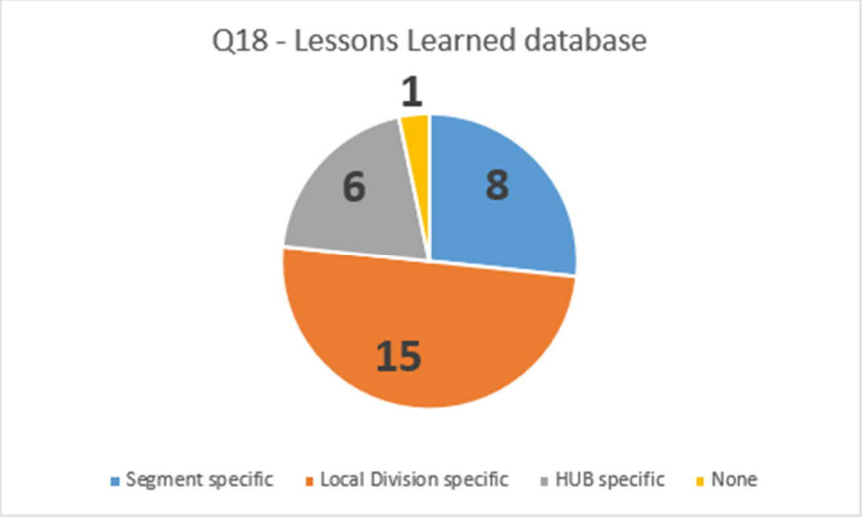

Figure 3-19 - Survey responses (Question 18)

No significant difference between responses given by PMs and responses given by managers could be observed regarding survey question 18. No significant correlation to years of project management work experience could be observed in the responses to question 18.

The responses to question 19 (*Studies have shown that only approximately 25% of Lessons Learned from projects are actually transferred to new projects. In Your opinion, what is the main reason for this low number?)* are listed in Appendix 2. As there is currently a procedure in place in the case company regarding the lessons learned process, only responses from Finland (i.e., the case company) are analysed further (there might be different processes in place in other countries, and therefore, responses from other countries might not reflect the situation in the case company).

Common themes from the responses from the case company respondents are grouped together in Figure 3-20.

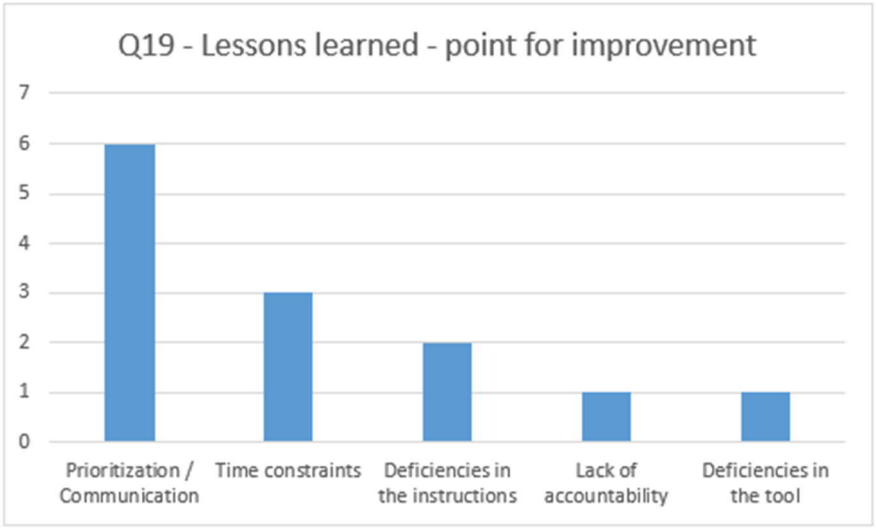

Figure 3-20 - Survey responses – grouped per theme (Question 19)

4 Discussion

A combined response rate of 67% for the survey can be seen as well above average (Nulty, 2008) for an on-line survey and can consequently be interpreted as an adequate basis for further analysis. The fact that all managers have a work experience of more than 10 years related to project management is unsurprising; one would expect managers (of PMs) to have a certain level of work experience related to project management. It is perhaps noteworthy that none of the mangers have more than 15 years of work experience related to project management, i.e., all of the 7 respondents with more 15 years of work experience are PMs.

No or little correlation was observed between the survey responses and years of work experience related to project management; only regarding survey questions 4 and 15 a small correlation was observed.

4.1 Research question 1 [RQ1]

The purpose of research question 1 [RQ1] (*What is a suitable type of PMO?*) and related survey questions (questions 4-7) is to provide recommendations on a possible PMO implementation in the case company.

As the case company currently has a setup more focused on business segments, with the PMO concept more in the background as a functional entity, rather than an organisation entity, survey questions 4-6 were formulated in order to provide input on possible development directions for the PMO. As can be seen from Figure 3-5 (Question 4); a clear majority of the respondents were of the opinion that responsibility for project execution should lie with the PMO (as opposed to the business segment). Although not directly stated, this implies that the role of the business segment, on the other hand, would lean more towards overall strategy, business planning and budgeting, etc., as opposed to being responsible for the day-to-day project execution. This development corresponds to a transition from the *Weather station* type PMO towards a *Control Tower* type PMO according to the types of PMO defined by Casey and Peck (2001), see Figure 2-2.

Further, a clear majority of the respondents were of the opinion that PMs should organisationally belong to the PMO (Figure 3-6, Question 5) as opposed to the business

segment, which corresponds to a further transition towards the *Resource Pool* type of PMO, as defined by Casey and Peck (2001), see Figure 2-2. Looking at the responses to survey question 6 (Figure 3-7) a similar pattern can be observed, however not as clearly; while 25 out of 30 respondents were of the opinion that PMs should organisationally belong to the PMO (Figure 3-6, Question 5), only 16 out of 30 respondents were of the opinion that supervision of PMs should be included in the responsibilities of the PMO (Figure 3-7, Question 6).

Survey question 7 was formulated to provide input on the PMOs role in the implementation of the overall strategy. As can be seen from Figure 3-8 (Question 7), a clear majority (27 out of 30) were of the opinion that the PMO should be either fully responsible for linking the overall strategy to the projects or at least be part of implementing the strategy.

Consequently, the consensus among PMs and managers of PMs seems to be that strengthening of the PMO concept is desirable.

Based on the findings related to [RQ1]; improvement recommendations [R1] and [R2] are stated (Appendix 3).

4.2 Research question 2 [RQ2]

The purpose of research question 2 [RQ2] (*What aspects should be considered when assigning the Project Manager?*) and related survey questions (questions 8-11) is to provide recommendations on how to select the most appropriate PM for a project.

As the case company broadly speaking executes two types of projects; so-called *solutions* projects and *service* projects, which to their nature are somewhat dissimilar, survey question 8 was formulated to provide input on the selection of PM for *solutions* project vs. *service* project. As can be seen from Figure 3-9, a majority (although perhaps not a very clear majority) of PMs and managers of PMs were of the opinion that there should be dedicated PMs for service projects. This corresponds to some extent to findings by Dvir et.al. (2006) and Müller and Turner (2007a) (see Section 2.2.2) who stress the importance of selecting the PM for a certain type of project based on the PMs profile.

To further gain insight into the importance of the profile of the PM when assigning a PM to a project, survey question 9 was formulated. As can be seen from Figure 3-10, a clear majority (26 out of 30) of PMs and managers of PMs were of the opinion that suitability is important when assigning a PM to a project. This finding is supported by e.g., Dvir et-al. (2006), who stress the importance of creating a greater fit between the PMs and their projects (see Section 2.2.2).

As the majority of the case company's personnel have a technical background, and consequently most of the PMs have a technical background, survey question 10 was formulated to gain insight into the importance of technical competences of the PM. From Figure 3-11 can be seen that there is no clear consensus among the respondents regarding this subject. However, it is worth noting that among managers there is a clear consensus, as all of the managers were of the opinion that technical competences are of minor importance to project success. This is a somewhat interesting finding as it suggests that PMs and managers have a distinctly different view on this subject (18 of the PM were of the opinion that technical competence are either crucial or somewhat important to project success). The fact that managers seem to diminish the value of the PM's technical competences, does not necessarily suggest that technical competencies should be disregarded altogether when selecting a PM for a project, mainly due to two reasons: Firstly, it might be so that in projects where the PM uses his or her technical abilities to manage the project successfully, it might go unnoticed by managers. Secondly, it highly depends on whether a lead engineer has been assigned to the project, or not. In projects, where a lead engineer has been assigned, the PM can assume a more "managerial" role, while in projects where no lead engineer is assigned, the PM is forced to take a more active role in technical/engineering matters.

If comparing to the literature, both similarities and differences can be observed. On the one hand, there is a correlation between the actual situation in the case company and the literature, as most of the PMs have a technical background in the case company and the literature (Hodgson et.al., 2011) suggests such a connection in engineering organisations. On the other hand, while the literature suggests that the PM role is often seen as technical by management (Heagney, 2016, pp. 25), the responses by managers to survey question 10 seem to indicate the opposite.

Survey question 11 was formulated to gain an insight into what factors predominantly influence the workload of a PM, and by extension determines the number of projects a PM can manage at any given time. While *project complexity* did stand out in the response (Figure 3-12), it is fair to say that the responses might have been biased, due to the fact that *project complexity* was given as a response example in the question. Nevertheless, *project complexity* is surely one of the most important factors to consider when assigning projects to PMs as it greatly influences the PMs workload. Interestingly, *PM experience*, was mentioned only by one respondent (PM), although it is pointed out as the most important factor by Kuprenas et.al. (2000), see section 2.2.2.

Based on the findings related to [RQ2]; improvement recommendation [R3] is stated (Appendix 3).

4.3 Research question 3 [RQ3]

The purpose of research question 3 [RQ3] (*How can the PM influence Project performance?*) and related survey questions (questions 12-15) is to provide recommendations on how the PMs can be empowered to influence project performance in a positive direction.

Survey question 12 was formulated in order to gain insight into the link between the overall strategy of the case company and the daily work of the project manager. As can be seen from Figure 3-13, a clear majority was of the opinion that the PM should have an understanding of the overall strategy (25 out of 30 responded either *agree* or *strongly agree* to the question). Interestingly, the literature provides arguments both for (e.g., Shenhar, et.al., 1997) and against (e.g., Müller and Turner, 2007a) PMs involvement in strategical thinking. Strategy is communicated on many levels in ABB; in fact, there is strategy planning and communication on all the levels listed in 1.2. As the strategy gets filtered down through the organisation, sometimes the message might get lost. Consequently, in a company of the size and complexity of ABB, it might not be the easiest task to translate the strategy into concrete actions on the project level, I however, believe that it is important that the PMs have a good understanding of the overall strategy for the benefit of the projects.

Survey question 13 addresses the skill set of the PM, in terms of so-called *soft skills* versus so-called *hard skills*. From the responses can be seen (Figure 3-14) that the majority (20 out

of 30) responded that hard skills and soft skills are of equal importance. This might be due to the fact that such a "middle option" was given as a response option[37]. It is noteworthy that all the remaining respondents (10) responded that either soft skills are somewhat more important or much more important than hard skills. Thus, an incline towards soft skill can be seen from the responses to this question, which is in line with observations by others, e.g., El-Sabaa (2001) and Hyväri (2006). It is noteworthy that while ABB's training program for PMs traditionally has focused more on the hard skills, an increased focus on soft skills has been noted in recent years.

From the responses to survey question 14, can be seen that a clear majority (27 out of 30) of the respondents are of the opinion that official certification of PMs has either some positive impact or significant positive impact on project performance. From a common-sense point of view, this is more or less obvious, i.e., that development of competencies has a positive effect, a notion that is corroborated extensively in the literature, e.g., Rozenes & Vitner (2009) and Crawford (2005).

As good planning of any project (be it anything from building your own house to executing multi-million-dollar international projects) is imperative, survey question 15 was formulated to gain insight on how the importance of a documented project plan is perceived among PMs and managers of PMs. As can be seen from the responses (Figure 3-16, Question 15) a clear majority (26 out of 30) were of the opinion that the development and active usage of a project plan has either some positive impact or significant positive impact on project performance. It is noteworthy that out of the four PMs that were of the opinion that a project plan does not have any impact on project performance, three have five years or less experience of work related to project management. Although this study does not include any correlation study between project planning and actual project performance (only the gathering of *opinions* regarding the usage of a project plan), the results are in line with results by Dvir et.al. (2003).

Based on the findings related to [RQ3]; improvement recommendations [R4] and [R5] are stated (Appendix 3)[38].

[37] In the test survey, the middle option was not included, however it was added on request by one of the respondents in the test survey. (Author's note)
[38] The responses to survey question 12 were also taken into consideration when formulating improvement recommendation [R2]

4.4 Research question 4 [RQ4]

The purpose of research question 4 [RQ4] (*How can the Lessons Learned process be improved?*) and related survey questions (questions 16-19) is to provide recommendations on how the organisational lessons learned process can be improved in the case company.

Survey question 16 was formulated in order to gain insight in how the PMs and managers of PMs perceive lessons learned should be captured in terms of timing and continuity. As can be seen from Figure 3-17 (Question 16); no one was of the opinion that lessons learned should be captured only at the end of a project. A clear majority (19 out of 30) were of the opinion that lessons learned should be captured at any time throughout the project. This resonates very well with the literature, as many authors have proposed the same, e.g., Kotnour (2000), Crawford (2011, p. 262) and Bierwolf et.al. (2017), who all point out that lessons learned should be captured throughout the lifecycle of the project. Similarly, the *ABB Project Management Framework* guide states that *"The lessons learned process is continuous, begins in the tender phase and continues through the entire project execution phase"* (Peper, 2017).

There are several mechanisms available for "closing the loop" when it comes to lessons learned, such as team meetings, specific lessons learned session and communication of lessons learned via various channels (e-mails, social media, etc.). While such mechanisms are essential parts of the lessons learned process, they do not directly address the *organisational learning* aspect of lessons learned as they are intermittent and temporary in their nature. One mechanism that aims to address the permanence aspect of the lessons learned process is to updated guidelines and instructions based on experiences collected via the lessons learned process. Survey question 17 addresses this aspect, and as can be seen from the responses (Figure 3-18), a clear majority (27 out of 30) were of the opinion that updating of guidelines and instructions based on lessons learned from projects is either *somewhat important* or *very important*, i.e., similar to the conclusion posed by Turner (2016, 151).

Survey question 18 was formulated in order to gain insight into the opinions related to the usage of a formal database as part of the lessons learned process. While there exist different opinions on the type of database (segment, local division or HUB specific), as can be seen from Figure 3-19, an overwhelming majority (29 out of 30) of the respondents were

of the opinion that there should be some kind of database available for registering of lessons learned from projects. This finding is well in line with findings by e.g., McClory et.al. (2017), who point out the importance of a well-administered lessons learned database.

While survey questions 16-18 address the fairly straightforward *"What should we do?"* - aspects of the lessons learned process, survey question 19 addresses a more complex issue, namely, *"Why are we not doing it?".* Looking at Figure 3-20, two main themes can be identified: *Prioritization / Communication* and *Time constraints*. Further improvements to the instructions were also suggested by more than one individual.

Consequently, while there seems to be a clear understanding of what actions need to be performed in order to utilise the lessons learned process in the projects, the actual performance of such actions is not being done. This finding resonates well with finding by Williams (2008), who also found a similar gap between how organisations perceive the importance of usage of formal procedure and the actual usage of such formal procedures in relation to capturing lessons learned (Figure 2-12).

Based on the findings related to [RQ4]; improvement recommendations [R6], [R7] and [R8] are stated (Appendix 3).

4.5 Limitations

As many of the studies referenced in this study cover other geographical regions and/or other business disciplines, as compared to the case company, results from such studies may not be directly comparable to the context within which the case company operates. Any such geographical, cultural, etc. differences have not been accounted for; instead, it is assumed (for the purpose of this study) that the studied project management principles and aspects apply universally across such dimensions.

5 Conclusion

In this section, an executive summary of the thesis is presented. Further, the thesis is evaluated against various research quality criteria and recommendations for future research are presented.

5.1 Executive summary

This thesis focuses on two problems that are common within project-based organisations (PBOs), namely, the relatively low ratio of successfully executed projects and the challenges related to capturing lessons learned from previous project failures and sustainably incorporate such learnings into the operating framework of the organisation.

In order to address the stated (research) problems, a study was performed on selected elements of the project management environment in the case company; namely the *Project Management Office* (PMO), the *Project Manager* and the *Project* (Figure 1-1). The research problem was approached by formulating four research questions related to the selected aspects of the project management environment and their intercorrelation (Figure 2-15).

The study comprised a literature review of the elements of the project management environment and an on-line survey addressed to project manager and managers of project managers in the case company. The responses from the survey were used to interpret the desired development direction in the case company against the backdrop of the theoretical framework. Finally, improvement recommendations were formulated (Appendix 3) based on the findings, with the help of which the case company can aim to reach the long-term goal of improvements in project performance supported by an effective Lessons Learned process.

The formulated improvement recommendations ([R1] – [R8]) relate to the various aspects of the project management environment according to Figure 5-1.

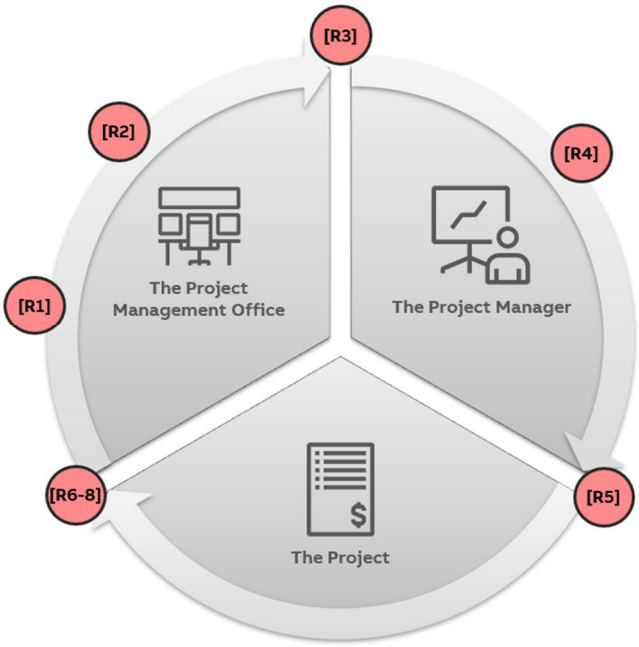

Figure 5-1 - Improvement recommendations in relation to the Project Management environment

The proposed improvement recommendations (Appendix 3) come with varying degrees of implementation challenges; some might be fairly straightforward to implement, while others might need considerable planning and buy-in from relevant stakeholders. For example, when/if implementation of a PMO is carried out (improvement recommendation [R1]), the challenges that come with the implementation should be considered (Section 2.1.2).

5.2 Thesis evaluation

The research contained within this thesis is evaluated against the research quality criteria *Reliability*, *Validity* and *Relevance*.

According to Greener and Martelli (2020, pp. 44), *reliability* ca be interpreted as repeatability over time. Often the term *reproducibility* is used in this context, i.e., to what extent could the result of the study be reproduced by someone else, given the same input data. In terms of *reliability*, the responses received from the on-line survey that was conducted as part of this study, could be used by other party to formulate similar improvement recommendations on a general level as the author. However, as the author is familiar with the case company in detail, it would most likely be challenging for other party to formulate the implementation recommendations to the same detail level.

Greener and Martelli (2020, pp. 44-45) propose three ways of distinguishing validity in research; *face validity*, *construct validity* and *internal validity*. The term *face validity* refers to the ability for a non-researcher (i.e., a lay person) to identify that the chosen research method is valid, i.e., that is makes sense (Greener and Martelli, 2020, pp. 44-45). In terms of *face validity*, I propose that it is fairly easy to see that the chosen research method can be considered suitable, although other methods could have been used as well. The term *construct validity* refers to the fact that the chosen method should actually measure what is intended to be measured (Greener and Martelli, 2020, pp. 45). Further, Greener and Martelli (2020, pp. 45) point out that this is an important aspect to consider in on-line type surveys. In order to be able to effectively use the responses from the survey, a fair amount of time and consideration went into formulating the survey questions into a logical train of thoughts. Additionally, a test survey was sent out to a smaller audience, to be able to fine tune the questions in order to minimize any risk of misunderstanding. Consequently, while there certainly may be a risk that some of the respondents may have misunderstood some question(s) (as with any on-line survey), I still believe that the questions were formulated in such a fashion that a desired level of *construct validity* could be reached for the purpose of this study, with the exception of survey question 11, that may have biased the responses, and was therefore omitted from further analysis. *Internal validity* refers to the causality between various factors (Greener and Martelli, 2020, pp. 45). Although the overall causality between the studied elements of the project management environment is assumed to be somewhat unidirectional (as presented in Figure 2-15), the reality is of-course much more complex. For the purpose of this study, however, I believe that a reasonable level of *internal validity* has been achieved.

The research quality criteria *relevance* refers to the fact that the research should be relevant, i.e., that the time and money put into the research should not be wasted. I believe that this study is highly relevant for the case company as it to a large extent deal with aspects of organisational performance that currently are high on the agenda in the case company.

5.3 Future research

Two main areas for further research were identified during this study.

This study is based on the opinions gathered through an on-line survey, rather than examining existing project performance data. Therefore, a suitable continuation to this study would be to examine the relation between the elements contained within this study and actual performance data from projects, in order to gain more insight into the actual cause and effect relationship between actions and outcome.

As one of the proposed recommendations ([R3]) relates to profiling of project managers, this leaves room for a more in-depth study into the actual profiling process. Such a study could cover many other relevant aspects related to profiling (e.g., from the realm of social sciences), than what has been covered in this study.

5.4 Closing words

The elements covered in this thesis represent a fraction of a fraction of all the multifaceted and vastly complex aspects of a domain that has been extensively studied and debated for a long time, namely, *Project Management*. While there are probably as many ways to manage projects as there are project managers, project-based organisations strive to create a coherent operating environment, supported by processes and guidelines in order to support their business in a favourable way. This thesis has aimed to provide recommendations to the case company in its mission to further develop said environment in a positive direction, that will support the case company in reaching the (somewhat ambitious) stated long-term aim of this thesis; *Improving project performance, supported by an effective Lessons Learned process, ultimately contributing to increased shareholder value as well as improved Customer satisfaction and job satisfaction for the Project Manager and other stakeholders*.

To what extent that prophecy holds true, only time will tell...

6 Appendices

Appendix 1 – Survey Questionnaire

Appendix 2 – Responses to survey Question 19

Appendix 3 – Improvement recommendations for the case company

7 References

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1. Please select Your Local Division *

- ◯ NO – Norway
- ◯ UK – United Kingdom
- ◯ SE – Sweden
- ◯ DK – Denmark
- ◯ FI – Finland
- ◯ IE - Ireland

2. Please select Your role in the organisation *

- ◯ PM – Project Manager
- ◯ Head of PM (or similar managerial role related to project management)

3. Please enter Your work experience related to Project Management [Years] *

Enter your answer

4. The overall responsibility for project execution should belong to... *

Note: The term 'PMO' is not used in all local division within the HUB.

- ◯ ...The Project Management Office (PMO)
- ◯ ...The Business Segment

5. In order to optimize organisational performance, the project managers should organisationally belong to... *

Note: The term 'PMO' is not used in all local division within the HUB.

- ◯ ...the Project Management Office (PMO)
- ◯ ...the Business Segment

6. In order to maximise the benefit of having a PMO, the responsibilities of the PMO should include... *

Note: The term 'PMO' is not used in all local division within the HUB.

- ◯ A: Monitoring of projects, without directly influencing them
- ◯ B: In addition to (A); Influencing the projects by developing and enforcing project management processes, guidelines and instructions
- ◯ C: In addition to (A) and (B); Supervision of project managers

7. In order to effectively implement the overall business/segment strategy (local / HUB / global), I believe that the PMO should... *

Note: The term 'PMO' is not used in all local division within the HUB.

- ◯ ...be fully responsible for creating a link between the overall strategy and the projects
- ◯ ...be part of implementing the overall strategy, but the main responsibility should lie elsewhere (e.g., the business segment)
- ◯ ...not be involved in implementing the overall strategy and instead focus on the functional aspects of project execution (processes, guidelines, PM certification, etc.)

8. Of the two following options, I believe that it is better if... *

- ◯ ...the Project Managers handle both solutions and service projects
- ◯ ...dedicated (service) Project Managers handle service projects

9. In order to create a good balance between selecting the most SUITABLE Project Manager for a project, versus selecting the Project Manager based on AVAILABILITY, I believe that... *

- ◯ ...suitability is most important (could even be the only factor that should be considered)
- ◯ ...suitability is more important, but availability has to be taken into account
- ◯ ...availability is more important, but suitability has to be taken into account
- ◯ ...availability is most important (could even be the only factor that should be considered)

10. I believe that the Project Manager's technical competences (engineering, electrical, automation, etc.) ... *

- ◯ ...are crucial for project success
- ◯ ...are somewhat important to project success
- ◯ ...are of minor importance to project success
- ◯ ...are of no importance to project success

11. In Your opinion, what is the single most important factor to consider, when determining how many projects a Project Manager can handle at one time (project complexity, project size, project type, PM experience, etc.)?

Enter your answer

12. I believe that it is important for Project Managers to have a good understanding of the overall business/segment strategy (local / HUB / global), in order to ensure good project performance. *

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree

13. Regarding so-called HARD skills (project planning, forecasting, risk management, etc.) and SOFT skills (leadership, communication, etc.); I believe that... *

- ◯ ...the hard skills are much more important than soft skills for project success
- ◯ ...the hard skills are somewhat more important than soft skills for project success
- ◯ ...both hard skills and soft skills are equally important for project success
- ◯ ...the soft skills are somewhat more important than hard skills for project success
- ◯ ...the soft skills are much more important than hard skills for project success

14. I believe that official Certification of the Project Manager... *

- ◯ ...has a significant positive impact on project performance
- ◯ ...has some positive impact on project performance
- ◯ ...has no impact on project performance

15. I believe that development and active usage of a Project Execution Plan (sometimes called Project Plan)... *

- ◯ ...has a significant positive impact on project performance
- ◯ ...has some positive impact on project performance
- ◯ ...has no impact on project performance

16. I believe that capturing of Lessons Learned from projects should be done... *

- ◯ ...at the end of the project
- ◯ ...throughout the project, at predetermined milestones
- ◯ ...throughout the project, at any time
- ◯ ...only for selected projects

17. I believe that updating of guidelines and instructions based on Lessons Learned from projects is... *

- ◯ ...very important
- ◯ ...somewhat important
- ◯ ...somewhat unimportant
- ◯ ...not important

18. Do you think there should be database for registering of Lessons Learned from projects? *

- ◯ Yes – Segment specific
- ◯ Yes – Local Division specific
- ◯ Yes – HUB specific
- ◯ No

19. Studies have shown that only approximately 25% of Lessons Learned from projects are actually transferred to new projects. In Your opinion, what is the main reason for this low number? *

Enter your answer

Responses given by managers (5):

You only learn from own mistakes. Lessons Learned by others shall be repeated 10-15 times before the message is adopted.

the need to rush into a new project, close-out meetings and hand-over from sales to pm meetings are not covering lessons learned

It can be hard to find a way to distribute and save lessons learned in a way that makes it easy to find the wanted data, I you don't know exactly what data you are searching for.

"not prioritzing to look for experiences"

Time constraints when starting a new project

Responses given by project managers (25):

Lack of accountability

Lessons learned are not logged and there might be missing in the framework to check lessons learned in for example initiating phase.

Time and communication

It is not clear where to find lessons learned data. Specially now when people are working home office a lot of small talk information is lost. Lessons learned could have potential to help that if communicated well.

This is not in focus when new projects are started as the projects are usually already delayed when resourcing are finally decided. This could be part of the handover sales->PM process where the LL for that specific projects are discussed. Should already be a massive part of tendering to identify risks.

Lessons learned to be added in the hand-over checklist (Sales to PM).

Maybe we don't have a useful tool

Not enough follow up.

Lack of active communication / maintaining lessons learned "awareness" systematically inside organization.

Missing structure for informing of lessons learned and how to implement them

PM's are not put in a position (does not meet) where they can exchange experience.

The Lessons Learned are not known / distributed to the individual PM's

availability of leasson learn for similar projects

People are not aware that there are lessons learned, or where they can be found. Lessons learned are therefore not only important for PMs, but also engineering, sales and service.

every project is unique

Available lessons learned are not structured and not communicated where and what to find.

Lack of time to follow up on the lessons learned, as well as the availability of a good database.

Time Constraints

Lack of time

no specific way/place to access LL

Lack of time (PM) and lack of understanding of importance (Sales)

The availability of lessons learned and the quality of the lessons learned. Not only what happened also what should we have done instead.

They are not part of the kickoff or part of handover. Lessons learned is seen as something done after every project, rather than something to be looked on before starting a project.

lack of time

Lack of time and lack of understanding the usefulness and importance of this

[R1] The case company should consider strengthening its PMO concept, including supervision of PMs as part of the PMOs responsibility, while observing the potential challenges with the PMO.

[R2] The linking of the projects to the overall strategy should be part of the PMO's responsibilities, by keeping strategy on the agenda as part of the operational duties.

[R3] Profiling should be considered when assigning PMs to projects, i.e., try to find the best fit between the PM and the Project, hence, strive for profile optimisation (suitability) rather than calendar optimisation (availability)[39]. Profiling should include elements such as leadership style, PM's own interest, type of project, level of technical competence required, etc.

[R4] Ensure to keep continued/increased focus on the development of the skill set for the PMs, including certification of the PMs, as part of the PMO's responsibilities.

[R5] Further development of guidelines for project planning and ensure adequate support for PMs in project planning, using available tools[40] and techniques.

[R6] Emphasize the importance of the lessons learned process through increased communication and discussion around the subject and thereby raise the priority of the subject.

[R7] Develop the functionality (as needed) of the lessons learned database[41] and ensure proper maintenance of the lessons learned database (including removal of duplicate information, etc.).

[R8] Adequately update guidelines and instructions based on findings from the lessons learned process, in order to ensure organisational learning in the long term

[39] This will inevitably lead to some PMs being under-utilised and some PMs being over-utilised at any given time. As long at such over- or under-utilisation does not impact aspects such as well-being, development, project performance, etc. negatively, the case company should allow for such fluctuations temporarily.
[40] One such very prominent tool is *Integrated Project Management* (IPM), currently being rolled out in the case company.
[41] This activity has to be very well coordinated with relevant stakeholders and should be based on real need