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An Investigation into the Practice of the Project Management Office (PMO) concept in the German Developer, Contractor and Project Management sectors

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Declaration

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CHAPTER ONE: INTRODUCTION

1.1 Background

Within the last few years, companies have come to recognize the competitive advantage that 'management by projects' can provide in fast changing business environments (Kerzner *2000).* The effective adoption of a project-based approach and associated project management (PM) practices are seen as having the potential to improve overall organizational performance by both enhancing the prospects for improved project performance and minimizing the likelihood of failure (Munns & Bjeirmi 1996). However, adopting a project approach does not come without problems. One of the main challenges in a project approach to the managers of organizations stems from the one-time nature of projects. Jessen (1992) suggests that because of this, organizations may not consistently derive the benefits of previous project experience due to a lack of effective knowledge transfer between projects. To remedy this problem and maximise the benefits to the organisation of applying PM, companies are giving increasing attention to concepts such as knowledge management (KM). Organizations are increasingly considering 'knowledge' to be a strategically important resource and the ability of an organization to learn is considered the most strategically important capability for a business (Zack 1999; Drucker 1995; Senge 1994).

Integrating PM practices with other management practices and processes such as KM, Total Quality Management, Concurrent Engineering, Risk Management and Change Management has become a coping mechanism for many organisations operating in volatile business environments (Kerzner 2000). Companies have come to realize that leveraging knowledge gained on projects is an important resource to improve performance and have started to look for strategies that help them to achieve 'excellence' and 'maturity' in PM and help formally "manage" this intellectual property gained on projects (Kerzner 2003).

One of the strategies that many companies are adopting for the structured collection, distribution, and updating of the intellectual property gained on projects and to facilitate

their maturity in PM practices is the 'project management office' (PMO) (Dai & Wells 2004; PMI 2004a; Santosus 2003; Rad & Levin 2002; Bates 1998). This is referred to by different writers alternatively as the project office (PO) (Englund *et al.* 2003; Kerzner 2003; Turbit 2003; PMI 2000a), PM centre of excellence (COE) (Kerzner 2001) or Project support office (PSO) (Marsh 2001; Marsh 2000).

The function of the PMO has evolved over time (Kerzner 2003): Before the 1990's, the task of the project management office was to act as a customer centre where the main objective was for an organization, typically large defence and aerospace contractor companies, to get 'closer' to their customers by setting up a unit dedicated to particular customers (Kerzner 2003). After the 1990's, accompanying the tremendous interest in PM (Kerzner 2000), other companies have shown interest in setting up PMOs (Dai & Wells 2004; Kerzner 2003). During this period, the function of PMOs shifted from servicing a specific customer to servicing the corporate body and it was through this evolution that the PMO attained much of the functions associated with it today. Currently, the functions performed by PMOs include (Dai & Wells 2004; Englund *et al.* 2003; Kerzner 2003; Crawford 2002; Rad & Levin 2002; Bates 1998)

- documenting lessons learned on projects;
- disseminating information;
- PM mentoring;
- developing methodologies, standards and templates for PM;
- PM benchmarking;
- planning for and effecting continuous improvement strategies;
- PM training and education;
- providing human resources/staffing assistance for projects;
- acting as a home of project managers;
- formalizing project selection through project portfolio management;
- customer relationship management;
- supporting corporate strategic planning, etc.

All these activities are believed to be made more effective through the existence of this organizational entity. Thus the PMO is now considered as the focal point of project and PM related practices (Dai & Wells 2004; Kerzner 2003; Santosus 2003; Rad & Levin 2002) and recognised as the place where a company's PM activities and KM endeavours intersect (Crawford 2002).

Depending on the level of maturity of the PMO within a given organization, this organizational entity can be set to perform some or all of the above activities ranging from supporting a single project to the enterprise-wide strategic alignment of the organization (Hill 2004; Rad and Levin 2002). Hence a PMO may mean different things for different organizations and individuals (PMI 2000a) although all consider it as a road map to maturity in the application of project management practices (Casey & Peck 2001).

It is perceived that the adoption of this concept adds value to the knowledge management and PM practices that may already have been implemented by firms. Block and Frame (1998) suggest that an *ad hoc* approach to PM practice leads to inefficiencies while the establishment of a PMO can foster consistency and nurture PM professionalism. Similarly, Rad & Levin (2002) claim that one of the main functions of the PMO, both at the project and enterprise level, is in knowledge management with instilling a PM culture and professionalism at the heart of its charter; 'by far, the most exciting functions of the PMO are to instil a project management culture and to facilitate the organizational recognition of the project management profession' (Rad & Levin 2002:2). Implementation of PMO is thus considered part of a larger effort by an organization to bring it to a higher level of project management capability and competency (Bates 1998).

1.1.1 The Practice of PMOs within the Construction Industry

High customer demand, stiff competition, low profit margins, etc. are forcing the construction sector to look into and question the efficiency of its conventional transient, sequential and separate project delivery system (Flanagan *et al.* 1998; Egan 1998). Egan (1998) suggests that this sequential, separate project delivery system prevents the

industry from learning from its previous projects and establish a long term strategy of PM maturity and supply chain relationship. Moreover, it is suggested that as construction evolves, it can and will start to learn and benchmark ideas from outside industries such as manufacturing and IT (Egan 1998). These industries are believed to be faster in adopting new technologies and management philosophies and strategies, including the PMO concept (Dai & Wells 2004).

The delivery of construction projects involves different stages that require the formation of virtual, temporary multi-disciplinary organizations that consist of the client and a diverse supply chain (Carrillo *et al.* 2004). On completion of the project, this virtual team frequently disbands without post-project reviews and without capturing or disseminating the lessons learned during the project (ibid) and leading to a chronic loss of knowledge.

The construction industry heavily relies on its expertise, both individually and collectively, throughout the project life cycle. This expertise consists of both tacit knowledge which is highly personal, derived from experience and difficult to articulate, and explicit knowledge which is formalised and codifiable in the form of specifications or code of practices, etc. (Nonaka & Takeuchi 1995; Koskinen 2004). Both are necessary for a project's successful completion. To properly exploit this intellectual property, however, there is a need to provide the infrastructure that would allow the capture, distribution, updating and proper utilization of tacit knowledge, through forums such as networks, mentoring, etc. and explicit knowledge through media such as intranet knowledge portals (Carrillo *et al.* 2004). These infrastructures of Lessons Learned Information System, Earned Value Information System, Risk Management Information System, Performance Failure Information System, etc. (Kerzner 2003) are crucial for effective utilization of knowledge generated on projects and archiving it as an intellectual property of the company for future use.

Rad and Levin (2002) claim that much of the capabilities currently described as those of PMO exist either separately or in aggregate in the project-driven organizations (Kerzner 2000) of the construction, aerospace and defence sectors. These capabilities include KM

endeavours. For example, the idea of knowledge management such as the capturing of tacit knowledge in Expert Systems and Knowledge-Based Systems has been around in the construction industry since the 1980s (Allwood 1989) though this idea of capturing personal experience on IT systems has not been very successful (Carrillo *et al.* 2004). There are some indications, however, that the formal concept of the PMOs has been adopted more *rapidly* in the newer technological areas, (e.g. the IT industry) than in the *older*, more mature industries such as construction (Dai & Wells 2004).

Thus, the ideas underlying knowledge management and the concept of the PMO are not likely to be new to the construction industry. What ***is*** new is the terminology used and the increased awareness that 'knowledge should be managed in a more structured manner' (Carrillo 2004:632) and that project management practices should be dealt in more formalized and structure way. Therefore, it can be argued that whilst organisations may not be using the label of PMO or any of the other terms assigned to it today, PMO practices may well be applied within the construction industry although this may be done discretely without having a responsibility assigned to an individual or group.

In addition to looking at ways to manage this intellectual property, it is in the interest of companies within the industry to institutionalize their PM practices and instil PM culture and PM professionalism. This will help to continuously improve their performance and give companies a sustainable competitive edge, through the adoption of the PMO concept. In short, it can be argued that it is to the advantage of the companies in the sector to formally 'manage' the knowledge they acquire on projects and promote holistic PM practices and culture through a responsible champion so as to remain competitive in volatile business environments. Studying the adoption of the Project Management Office concept thus provides a means to investigate how the concept can provide coherence to often disparate or discrete existing practices and lead to improvements in an organization's existing practices on projects.

1.1.2 Context of the Study

The construction industry was used as the context of the research study with the Germany construction industry taken as a case-in-point.

The construction industry is particularly suitable for study in that the transient and fragmented nature of construction projects requires the formation of virtual, temporary, multi-disciplinary organizations consisting of the client and the supply chain and that this has led to a chronic loss of knowledge when compared to other industries (Barlow & Jashapara 1998; Egan 1998). To curb this chronic loss of knowledge and improve the often discrete practices of PM, companies in the industry are starting to assign responsibility to specific managers for delivering objectives of the KM strategy and improve practices of PM (Carrillo *et al.* 2004; Dai & Wells 2004).

Within the construction industry (hereafter described as the AEC sector), the scope of the research will be limited to analysing the practices of the PMO within the contractor, developer and project management companies of the German construction industry. These sub-sectors are chosen on the logical assumption that they have the higher levels of PM expertise and that they are the critical organizations concerned with integrating the construction supply chain. Research is the 'art of the possible' (Buchanan et al. 1988:55) and there is always a degree of opportunism in developing a research endeavour. The availability of funds from DAAD, and the opportunity to perform research in Germany was combined with the opportunity to gain the benefits of the strong industry contacts of one of the researcher's supervisors in viewing the selection of the German construction sector. However, there are also strong academic reasons for choosing the German AEC sector: It is an prime example of a technologically advanced, mature construction industry with a body of standardized practices. Like all such mature construction sectors in developed countries it is adapting to the introduction of modern management thinking and is of necessity open to adopting 'new' technologies, management philosophies and improvement strategies. At the same time it is also perceived as being particularly conservative (Müsch 2003). Therefore such an industry will exhibit a range of maturities

in the application of new concepts such as the PMO ranging from the early adopters through to the conservative majority. .

1.2 Research Problem

Generally the construction sector is labelled as a 'conservative industry' which adopts new technologies and practices at a slower rate compared to other industries such as the IT, manufacturing and the automotive and is one that invests very little capital in, research & development and training (Egan 1998). The industry's continued reliance on a sequential and separate project delivery system, which is meant to minimize risks and changes through thorough descriptions of specifications and contracts, is believed to be an effective barrier to using the skills and knowledge of contractors and suppliers in design and planning of the projects and establishing a long term working relationship (Latham 1994).

Although it is blamed of concentrating on some specific tools and techniques rather than adopting ways and strategies which help acquire excellence and maturity in PM (Morris 1994), construction has always been a project-oriented industry and contributed much to the development of modern PM (Burke 2003). Morris (1994) argues that PM is about the total process of a strategic approach to 'management of projects', not just about realizing a specification to time, cost and quality on a given project. To this end, he advises the industry (construction) to concentrate on holistic PM practices that improve the sector companies' PM competency and maturity to reap maximum benefits that PM is believed to bring.

The PMO is seen as an organizational entity that helps organizations to acquire a higher level of PM competency and thereby consistent successful delivery of projects. It is receiving a wide attention in other industry sectors such as the IT, manufacturing and pharmaceuticals (Dai & Wells 2004). However, despite the argument that the concept of the PMO exists either as a real or virtual entity within construction (Rad & Levin 2002), there appears to be no literature or previous studies depicting the adoption of the concept

within construction and identifying or discussing the perceived advantages that it may bring to companies in the sector.

Following on from the argument that construction has failed to adopt a holistic approach to project management, this study assumes that adopting the PMO concept and improving on it helps *organizations* within the construction sector achieve a higher level of PM competency. Thus investigating the adoption of this entity within construction and looking into the specific roles it plays as well as the challenges experienced in its implementation and operation will help to look into ways how the construct can be adopted and improved by the sector companies in their quest for a higher level of PM competency and maturity.

1.3 Research Questions

From the above research problem, the following research questions can be framed:

- Do companies within the industry take ownership of this organizational entity as either real (with appointed responsible champion) or virtual entity and how does this differ between different sectors of the industry?
- What are the perceived advantages that this organizational entity brings to companies and what are the main success factors in implementing the PMO as the centre of project and PM related practices?
- What are the barriers faced by the companies in implementing this organizational entity and what are the possible ways of alleviating these obstacles?

1.4 Aims and Objectives

This study aims to analyze the adoption of the PMO concept within the construction sector companies of the German construction with specific interest of looking into the possible advantages it might bring, the obstacles that could be faced in its implementation and possible ways of alleviating these obstacles. The objectives that will be used to achieve this aim are:

- Investigate the adoption of PMO within German construction industry;
- Explore PMO's profile within companies within specific parts of the sector that have high levels of PM expertise: developers, contractors and project management companies;
- Inves*tigate* the role of the PMO in adding value to project related KM strategies and delivering its mission as being the focal point of best PM practices;
- Establish the success factors associated with effective implementation of the PMO within the industry;
- Investigate barriers to PMO adoption, and the extent to which these are determined by the industry context; and
- Identify ways that firms can implement the PMO as a roadmap to achieve excellence in PM and tackle with the difficulty in delivering the objectives of KM strategy

1.5 Research Methodology

A relativistic research paradigm as applied to survey methodology (Easterby-smith *et al.* 2002; Hussey & Hussey 1997) was adopted for the study. An internet data collection method was employed to collect data on recognition of the PMO concepts in the construction industry and its implementation profile, its believed advantage for the companies, the obstacles faced in implementing it, etc. This data was analysed to come up with a possible way of improving the advantages and curbing the obstacles faced by the companies in their aspiration to implement the PMO as a roadmap to achieve excellence in PM and tackle with the difficulty in delivering the objectives of KM strategy. The research used a company/organizational level unit of analysis (Easterby-Smith et al 2002).

The methods employed include:

- A critical review of relevant literature from various sources to explore the theoretical background of the PMO and the practice in different industries;

- A descriptive survey that involves collection of both qualitative and quantitative data through distribution of a questionnaire. The survey was conducted through an online questionnaire hosted on the web-page of a German higher education institution.

1.6 Research outcomes and significance of the study

Construction is an enormously important part of any economy. Economic growth depends on the physical infrastructure that is delivered by the construction industry and its key participants. It is by far the most important way in which societies create new value (Winch 2002). Thus improving the performance of this industry through effective and efficient PM practices will have a bottom line effect on a given economy and society as a whole.

Studying the adoption of the PMO concept within the industry, which is assumed to be the focal point of PM related practices, and exploring associated success factors will thus create an opportunity to explore how this concept can be used to facilitate the sector companies' strategic approach to 'managing project management' and thereby maturity in PM practices. It also gives an insight how much/far the companies within the industry have gone towards the holistic strategic approach of 'management of projects' rather than concentrating in adopting a specific tool or technique.

This dissertation research work thus anticipates identifying some key success factors which help in effective implementation of PMO and improve its application and contribution to improve effectiveness of PM practices in the construction industry. It also tries to come up with ways of alleviating the challenges that the companies face in implementing PMO by looking into PMO practice from the different sector companies of the industry.

1.7 Scope and limitations

This study is a snapshot of current practices of the PMO within the sector that can serve as a departure point for further detailed study in the area. To this end then, the research only concentrates on tracking some basic practices of the concept based on the views of respondents. *It focuses* on exploring the rate of adoption of the PMO concept by companies within the sector and tracks some of the experiences of thess companies. It, does not, however seek to quantify the benefits companies have derived from adopting the PMO concept. Neither does it test the effectiveness of the PMO in improving the factors it is assumed by the literature, to deliver. Instead, the research is concerned with the process of adoption of the concept and tracking down the functions the PMO can deliver.

1.8 Structure of the report

This dissertation report contains seven chapters:
Chapter 2 provides an overview of project management competency and maturity concepts and discusses factors that should be in place for excelling in PM.

Chapter 3 presents a thorough description of the Project Management Office concept and its practice as an entity to achieve a higher level of PM competency and maturity.

Chapter 4 provides an overview on the construction industry in general and the German construction industry in particular, and the PMO practices within the industry.

Chapter 5 argues for and describes the methodology used in conducting this research.

Chapter 6 presents and analyses the data captured by the survey instrument as designed in chapter 5 and summarises the findings thereof.

Chapter 7 presents conclusions about the proposition and the research problem and makes recommendations for subsequent research.

CHAPTER TWO: PROJECT MANAGEMENT PRACTICE AND CULTURE

2.1 Introduction

This chapter reviews the history and practice of project management. It discusses the concept of competence and maturity in project management practices and processes and provides some practices that facilitate competence and maturity in PM. The chapter also describes and provides highlights of some supporting initiatives and practices, such as integrating processes, culture, behavioural excellence, that complement PM and help achieve improvement in PM practices.

2.2 The development of modern PM

Associated with the construction of the Great Pyramids of Egypt and the Wall of China, the history of project management is often dated back to circa 2500BC (Burke 2003). However, despite archaeologists' suggestions that the construction of the Pyramids was one of the largest 'fill-in jobs' ever undertaken by mankind, and with no documented evidence, discussion of the management techniques used can only be conjecture.

Modern day project management traces its root to Henry Gantt's development of the bar chart, otherwise known as the Gantt Chart, in the early 1900s. However, project management as a management 'discipline' or recognisable body of knowledge only emerged during the 1960s when companies in the construction, defence and aerospace industries started to use tools and techniques- such as the critical path method (CPM)- requiring new sets of skills, knowledge and expertise to be developed in their application. Even at this stage of development of PM, it was the use of specific tools and techniques such as CPM that was the focus of attention rather than the use of a holistic strategic approach of management of projects (Morris 1994).

More recently, beginning in the late 1980s and early 1990's and largely associated with the recession in America (Kerzner 2001), companies from different sectors (which were

originally not known for a project-based production) such as manufacturing, IT, leisure, nuclear, health and pharmaceutical, mining, oil and gas, (Cooke-Davis & Arzymanow 2003; Söderlund 2003; Kerzner 2001) have started to embrace the management by projects way of conducting business as a potential source of competitive advantage. There are a variety of reasons put forward for this shift (Graham & Englund 2004; Burke 2003; Verma *1995*) including:

- Rapidly changing environments, fierce competitive markets, powerful environmental lobbies etc. all of which encouraged companies to look for a more agile and adaptable models of management.
- The tasks that organizations were facing had become more complex and cross disciplinary demanding more sophisticated and flexible organizational approaches.
- The size and scope of projects (in different industries) required the development of more effective management systems for planning and controlling project performance, schedules and cost/budget, etc

Project management has come to be viewed as the most convenient management philosophy to deal with these multi-fold problems (Graham & Englund 2004; PMI 2004; Kerzner 2003; Crawford 2002; Verma 1995). Burke (2003) propounds; 'in this sink or swim, adopt or die environment, project management and 'management by projects' are paying real solutions' (ibid:14). Hence Kendall & Rollins (2003) feel able to say '[t]oday, project management is regarded as a strategic competency for the organization and, as such, can significantly improve the organization's future competitiveness' (ibid: x).

In parallel with this interest shown by industry, PM has established itself as one of the core management disciplines in academia and an increasing number of project management institutions and associations offer education and training in contemporary PM principles and conduct research to capture and formalize accepted practices into the global body of knowledge and curricula of certification programmes.

This shift toward management by projects as a way of conducting business is because organizations have come to recognize the competitive advantage PM can provide in fast changing business environments. The effective adoption of a project based approach and the associated PM practices are seen by organizations as having the potential to improve overall organizational performance by both enhancing the prospects for project performance and minimizing the likelihood of failure (Munns & Bjeirmi 1996).

To reap the full competitive advantage that PM promises requires firms to do more than shifting the way of conducting business from managing ongoing operations to management by projects. Organizations need to embrace the full practices and culture of PM and work towards achieving maturity and excellence in PM competence. Many - practitioners and academicians alike - relate project management performance and effectiveness to project management competency and maturity (PMI 2004; Rad & Levin 2002; Fransis & Skulmoski 1999) and argue that organizational project management maturity and competency concepts are promising constructs that, if properly dealt with and improved, empower organizations successfully deliver projects on a consistent basis.

2.3 Project management competence and maturity

2.3.1 PM competence

Many definitions of competence exist. For example, Frame (1999) describes competence as consistently producing desired results while Rad and Levin (2002) consider competency as a group of related knowledge, skills, attitudes and behaviours that influence performance. For example, Rad & Levin (2002: 43) claim that 'it is generally accepted that competency encompasses knowledge, skills, attitudes and behaviours that are causally related to superior job performance.' This definition is in very close agreement with PMBOK's definition of project management as 'the application of knowledge, skills, tools and techniques to project activities in order to meet project requirements' (PMI 2004: 8). When tied to the definition of competence given above, this definition implies that to excel in PM, organizations need to have a certain competency

level among their project team which, in turn, is related with the maturity in project management of the organization (Skulmoski 2001).

Skills and knowledge form the foundation of competence and can be acquired in different ways. For example, project managers and project team members can learn the major PM - related theories and techniques that assist achieve better performance in a project environment from previous experience and/or by formal training and education and/or by studying texts on the subject such as the PMBOK guide.

The PMBOK, which has become the de-facto standard for project management, identifies eight key generally accepted knowledge areas and practices (the ninth being integration of the eight key bodies of knowledge) of project scope, time, quality, cost, human resource, communication, risk and procurement management that project managers need to be competent in

Aside from the eight generally accepted knowledge areas and the ninth knowledge area of project integration management, the PMBOK guide recommends project managers to improve their competencies in general management knowledge and practices such as negotiation, leadership, communication, problems solving, influencing the organization and in the application area knowledge and practices. For example, if the project manager is to project manage in the construction sector, he/she needs to be competent in the industry practices and norms of that sector to successfully deliver the project.

While skills and knowledge form the foundation of competency, other soft values such as traits, motives, self image and social role are also a part of competence (Skulmoski 2001; Cohen et al. 2001):

- *Traits*: a trait is a characteristic way in which a person responds to stimuli (Maslow 1970). People who believe that they have control over their future have the efficacy trait. In projects, when such people encounter a problem, they take

the initiative to discover solutions. Thus, intuitively, the efficacy trait is desirable for project participants and project teams need to be selected accordingly.

- *Motives*: motive is another character which can influence the competence of a person. Motives drive people's behaviour (Maslow 1970; Boyatis 1982). People who are motivated to improve or compete against a standard have the achievement motive (Cohen *et al.* 2001). Thus, when people with a high achievement motives are given measurable objectives in the project setting, they are more likely to work to achieve the objectives.

- *Self image*: another dimension of competency is a person's self image. Self image refers to a person's perception of oneself and one's capability. A positive self-image of one's capability will help a person work on a novel project even though the person has not previously performed the assigned task.

- *Social role*: social role is a person's perception of the social norms and behaviours that are acceptable to the group or organization to which he/she belongs. Professionalism, punctuality, preparedness, etc. are all behaviours that may be important norms of particular project team and as such may define the culture of an organization.

Thus to improve the PM competency of their employees and hence the collective competency of the organization, organizations need to continuously empower their work force with contemporary project management techniques and theories (and other supporting disciplines) and create an environment conducive for self improvement, team work and mutual respect.

2.3.1.1 Recognition of PM competence

There are many professional associations which offer certification for project management competency. The purpose of these professional certifications, as any other

professional certification, is to provide public recognition of the capabilities of an individual in the project management area.

One of the most wide-spread certification schemes in the PM area is the PMI's project management professional (PMP) certification.

To be eligible for the PMP c redential, one must first meet specific educational and project management experience requirements and agree to adhere to a code of professional conduct. As stipulated in the criteria, applicants need at least 35 hours of PM education and 7,500 hours experience in a position of responsibility and leading and directing specific tasks, which are to be identified from PMP examination specifications within eight years from the date of application, and 60 months of project management experience (4,500 hours experience as a leader and 36 hours of PM experience for baccalaureate degree holders). These criteria of experience in PM, which was included recently, is meant to assess and give recognition to the 'soft' competencies of an applicant which can't readily be assessed in paper based exams.

The final step to becoming a PMP is passing a rigorous multiple-choice examination designed to objectively assess and measure one's ability to apply project management knowledge in the following six domains: initiating the project, planning the project, executing the project, monitoring and controlling the project, closing the project, and professional and social responsibility.

Thus as an indicator of their employee's competence in PM, organizations can encourage their employees to assess their project management competence relative to these benchmarks

However, it must be noted that PMP is only for individual assessment and recognition of PM competencies. There aren't any organizations or professional bodies which specifically provide recognition for collective organizational project management competency. Some standard organizations such as the European Foundation for Quality

Management (EFQM), the International Standard Organization (ISO) and the corresponding national standard agencies who are concerned with quality management do assess firm's processes and might look at project management in an indirect fashion. Moreover, implemented correctly, the PMI's PMBOK® Guide (along with project manager competency development framework (PMI 2002)) and the ISO 10006:2003 guideline for quality management in projects, a guide line based on total quality management principles (ISO 2003) to improve project management performance, can be taken as a benchmark and organizations can assess their competency accordingly. However, it must be borne in mind that none of these guidelines or frameworks are meant for certification or assessment of performance.

2.3.2 PM maturity

The PMI's Organizational Project Management Maturity Model (OPM3) defines organizational project management as 'the systematic management of projects, programmes, and portfolios to achieve an organization's strategic goals' (executive guide to OPM3™: 2). The degree to which an organization practices this type of (organizational) project management is what is referred to as its organizational project management maturity.

Organizational project management focuses on the correlation between an organization's capabilities in the management of projects, programs and portfolios and its effectiveness in implementing strategy. This means developing not only the facility to accomplish individual projects - important as this is- but also developing an overall organization that is oriented towards treating as many endeavours as possible as projects and managing them individually and collectively in such a way as to support the organization's strategic goals.

While individual projects can be seen tactical, organizational project management is strategic as it reflects on an organization's business strategy and provides a high-level perspective and regulation of critical resources that directly impact business performance.

Seen in this light then, successful organizational project management is a decisive strategic advantage in this highly competitive economy (Fahrenkrog et al. 2003).

Thus, if organizational project management can arm the organization with such a strategic advantage, the basic question that organizations need to address to improve their PM capability is thus, how does an organization go about improving itself in this area and achieve the organizational PM maturity level necessary to give or maintain a competitive edge?

Improving organizational project management maturity is a long process that demands resources and sustained commitment. It is a continuous, iterative process whereby an organization continuously assesses itself and improves its processes and practices to match contemporary, generally accepted, best processes and practices. To embark on the improvement journey, an organization firstly needs to know what specific organizational project management related practices, knowledge, skills, tools and techniques have been proven consistently useful. Secondly the organization needs a method of assessing its current state of organizational project management practices against desired practices. Thirdly, the organization needs to know how to improve itself against the specific capabilities it has identified as requiring improvement (Fahrenkrog et al. 2003).

In an attempt to address these needs, numerous individuals, organizations and professional associations have developed various maturity models and methodologies that can assist organizations to improve their organizational project management maturity level. Some of them are discussed below.

2.3.2.1 Organizational project management maturity model

Just as individuals benefit from achieving personal maturity, organizations can also benefit from achieving organizational project management maturity. To assist organizations to achieve maturity in organizational PM, a number of different models have been developed including the University of Calgary's SMART project-based

maturity model (Francis & Skulmoski 1999), Software Engineering Institute's (SEI) Capability Maturity Model (CMM) (SEI 2000), Kerzner's Project Management Maturity Model (PMMM) (Kerzener 2001) and PMI's Organizational Project Management Maturity Model (OPM3) (PMI 2004).

The universal assumption underlying these PM maturity models is that improved project performance is more likely if the organization is more mature in its PM processes (Skulmoski 2001). Related to this, subsidiary assumption behind these models is that, organizations that embark on improving their organizational project management maturity by following some maturity model benefit through improved project performance, enhanced marketing opportunities and a structured path to improvements (Saures 1998).

This review does not attempt to explore the detail of each of the above maturity models since this is beyond the scope of the study. Nevertheless, the following section briefly discusses the PMI's OPM3. The reason why only this model, and not the others, is discussed here is that, the PMI model was developed in order to be an 'international standard' for PM maturity while the rest were developed either for some specific sectors (such as the SEI's CMM for the ICT sector) or developed for specific national market conditions (e.g. Kerzener's PMMM in the US).

Developed as an international standard (hence not merely a model) for organizational project management maturity and containing over 600 'best practices' (as 'reported' by the PMI), 3,000 capabilities and 4,000 relationships between capabilities; the PMI's OPM3 is designed to help organizations assess and improve the state of their organizational project management maturity. It helps organizations in understanding organizational project management concept, its maturity and providing tool that help assess PM practices. It offers the key to organizational project management maturity with three interlocking elements of knowledge, improvement and assessment as shown in Figure 2.1 next page. The knowledge element lets organizations uncover hundreds of 'best practices' and shows them how to use the information available in OPM3. The

assessment element assists organizations evaluate their current situation and identify their areas in need of improvement while the improvement element helps them map out the steps needed to achieve their goals

The model provides practices associated with organizational project management, *capabilities* that are prerequisite or that are aggregate to each 'best practice', the observable outcomes that signify the existence of a given capability in the organization. Key performance indicators (KPI) and metrics that provide the means to measure the outcomes, the pathways that identify the capabilities aggregating to the 'best practice' being reviewed (i.e. interdependency of capabilities and 'best practices'), etc. are also included in the model.

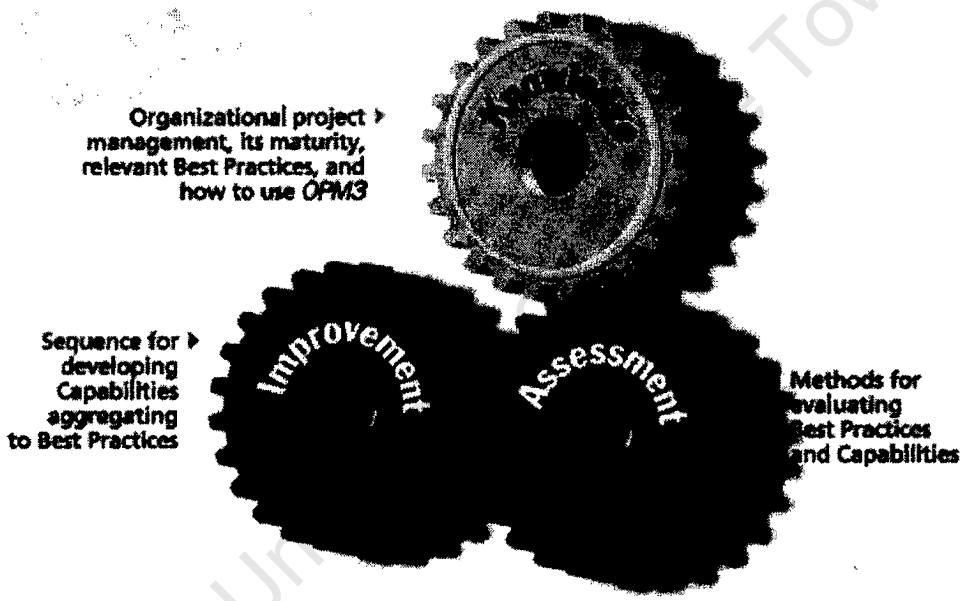

Figure 2: 1 Elements of OPM3: Knowledge, Assessment and Improvement (Adopted from PMI 2004)

Thus, with all its facilities, the model/standard can be seen as a very important tool for organizations to standardize, measure, control and continuously improve their organizational project management maturity level, which in turn, as discussed above, can lead to improved project management performance.

2.3.3 Project management competence and maturity interface

Competency and maturity complement and reinforce each other. Competency is mediated by organizational project management maturity and organizational PM maturity can be improved relatively easily if the working staff of the organization are competent. Conversely, even though project participants possess a particular competence, it may not be put to effective use if the organization inhibits it - hence an organizational project management maturity and competence misfit occurs. In this respect, Skulmoski (2001: 1) asserts that, '[t]he general belief is that if both competency and maturity are improved, then the likelihood of project success is also improved'. Thus it is crucial that organizations keep this critical interface smooth and harmonious.

2.4 Strategic planning for improved PM competence and maturity.

As discussed in the above section, in today's demanding business environment, shifting the way of conducting business from the conventional operation type to 'management by projects' alone doesn't make organizations successfully flourish in business. To reap the full competitive advantage that PM promises and excel in business, they need to embrace the full practices and culture of PM and work towards achieving excellence in the best PM practices. To achieve that, they need to devise a strategy.

Strategic planning for PM is the development of strategies and processes that help to instil the best PM practices and culture within an organization and help to achieve a higher level of maturity in organizational project management. It needs to consider all aspects of the organization: hard and soft skills (technical and human dimensions) ranging from the technical and theoretical competence of employees through to working relationships among employees and managers and the company's corporate structure and culture. Thus strategic planning for PM is devising methods to improve an organization's PM capabilities. It includes development of standard methodologies for PM (or adopting the best-fit available models and methodologies) which can repeatedly be applied as in models discussed above, institutionalize the project management processes, conducting

training, education and mentoring in PM, adopting and improving in 'other' initiatives and disciplines that can improve and complement PM, etc. (Kerzner 2000; Levin & Skulmoski 1999)

Institutionalizing project management and details of how to improve an organization's *project management* competence and maturity will be presented in the next chapter when the concept of the PMO as the centre of PM related activities is discussed. The section below concentrates on 'other' initiatives that an organization should encourage to improve project success and, in parallel, project management maturity.

2.4.1 Initiatives that enhance PM maturity and project success.

Successful implementation of organizational project management competency doesn't depend only on fostering the PM and related practices but also improving on other aspects of the organization. There are 'other' disciplines that an organization should also improve on to improve its PM excellence. For example, the key general management skills such as negotiation, conflict management, human resource management skills complement and foster PM competency of a project team, hence an organization's need to improve the competency of its team in such areas. Skulmoski (2001) claims that the question of what other initiatives should an organization encourage in order to improve project success and PM maturity is not conclusively answered. In an attempt to fill this void, Kerzner (1998) identifies six main areas, some of which are also suggested by the PMBOK, where both Kerzner and the PMI claim organizations need to concentrate to achieve excellence in project management. These areas are: integrated processes, culture, management support, training and education, informal project management and behavioural excellence.

2.4.1.1 Integrated processes

Several management philosophies concerned with processes have arisen over the past few decades. In addition to PM itself there are now others including total quality management (TQM) (Evans & Dean 2003; Ghobadian & Gallear 2001), knowledge

management (KM) (Tiwana 2000; Quintas *et al.* 1997), concurrent engineering (CE) (Khalfan & Anumba; 2000; El-Bibany 1999) and change management (CM) (Sirkin *et al.* 2005). These disciplines are all concerned with the concepts of processes, integration, and continuous improvement based on past experience and can be seen as different ways of looking at the same underlying concerns of delivering improved business performance.

The PMBOK (PMI 2004) asserts that, though much of the knowledge needed to manage projects is unique or nearly unique to project management - such as work breakdown structures (WBS), critical path method (CPM), earned value analysis (EVA), project management overlaps and benefits from other management specialisms.

Thus integrating the practices of these complementing disciplines with PM practices would be beneficial to the pursuit of excellence in project delivery and it is believed by writers such as Kerzner (2000) that companies that reach excellence are the quickest to recognize the synergy amongst the many management options available (ibid.).

2.4.1.2 Culture

Webster's II New Riverside University Dictionary (1988) defines "culture" as: "the totality of socially transmitted behaviour patterns, arts, beliefs, institutions, and all other products of human work and thought typical of a population or community at a given time." This social behaviour, when extended to corporate culture of organizations, is reflected in their shared values, norms, beliefs, and expectations, in their policies and procedures, in their views of authority and relationships etc. Thus corporate culture serves as a foundation for an organization's management system as well as the set of management practices and behaviours that both exemplify and reinforce these underlying basic social interrelationships (Dension 1990).

Corporate culture is a key factor in attaining and sustaining performance and a competitive advantage. For example, Collins (2001) in his study of transition from 'good-to-great', found out that factors such as unwavering faith and passion, rigorous discipline

and focus, clearly communicated and practiced core values and timeless principles, modest leadership, strong work ethics and choosing individuals with the right character traits are viewed as [by the good-to-great executives he interviewed] major organizational characteristics and components that are key to attaining and sustaining performance and a competitive advantage. Thus these characteristics which, along others, form what is referred to as a company's culture are very crucial in an organization's performance.

Successful implementation of project management creates an organization and culture that can adapt rapidly to the demands of each project and respond quickly to the demands of a constantly changing dynamic environment. 'Perhaps the most significant characteristics of companies that are excellent in project management is their culture' (Kerzner 2000: 211). Thus creating a corporate culture where company values are congruent to project management and these goals, objectives and values are accepted by all members of the organization is very essential to organizations. Cooperation, teamwork, trust and effective communications are the back-bone of instilling a project management culture in a given organization; 'successful project management can occur within any structure, no matter how bad the structure looks on paper, if the culture within the organization promotes teamwork, cooperation, trust, and effective communication' (Kerzner 2000: 219).

Corporate culture is an organizational property which can't be bought; it needs a long and committed nurturing. Thus to successfully implement PM, it is necessary to pay close attention to their culture and nurture it accordingly.

2.4.1.3 Management Support

Instilling project management culture and practice needs investment in resources and showing strong commitment to change from the conventional way of conducting business to management by project. Shaping culture and changing existing mental models needs a sustained and strong commitment (Senge 1994). Senge (ibid) argues that, the need of visible support from senior management and 'leading by example' with strong

commitment to the cause is very crucial in establishing a learning and transforming organizations. Senior managements are the architects of corporate culture. Thus visible management support is essential to instil the PM culture within the organization and sustain that culture.

2.4.1.4 Training and education

Project management involves numerous complex and interrelated behavioural, organizational and quantitative fields. In the past, projects, especially projects in industries which were previously not known to be project driven were managed by 'accidental' project managers (those without formal training and education in project management principles, techniques and processes, but who find themselves fulfilling that role) (Tarne 2003). Today, companies excelling in project management offer corporate curricula in project management and support PM as a profession (Kerzner 2000). Identifying training of both technical aspects such as planning, scheduling, software areas and behavioural areas such as motivation, team building, leadership, conflict management and creating a curriculum and effectively running the training to the appropriate personnel at the appropriate time is very crucial for effective project management.

2.4.1.5 'Informal' project management

The conventional project delivery system, as practiced by the traditionally project-oriented industries such as construction, involves compilation of piles of polices, procedures, forms etc which are to become part of a written proposal and contractual agreement. This strategy of the conventional project delivery system is meant to minimize risks and changes through thorough descriptions of specifications and contracts. Unfortunately, this strict conventional project management approach, as witnessed by the practice of the construction industry, has led to the evolution of a rigid and adversarial culture that is believed to be an effective barrier to using the skills and knowledge of contractors and suppliers (project participants) in the project delivery (Latham 1994). Moreover the projects and operations that organizations embark on are

becoming increasingly complex and demanding to be accurately stipulated before hand (for contractual agreement), hence, if dealt with the conventional way, leading to greater conflict.

To fully exploit the advantages of PM in successfully delivering such complex projects, parties involved in a project need to be flexible enough and adapt a partnering type 'informal' project management approach rather than solely concentrate on the policies and procedures. The success of partnering depends on both the process and the nature of partnering (Liu & Fellows 2001, Lazar 2000). The process element of partnering provides the mechanistic framework for the operation of the partnering. It deals about how to make the partnering work and hence is about the procedures and methods the partners adopt to effect the partnering - hence includes the contractual aspects too. The nature of partnering is about the behavioural aspect of the partnering which underpin the partnering culture and can be manifested through commitment, trust, conflict resolution, common goal, etc (Liu & Fellows 2001). For effective partnering, labelled by Kerzner (2000) in his model as 'informal' PM, the parties must be committed to the basic PM cultures of trust, communication, cooperation and teamwork. Thus, organizations need to cultivate these traits and empower their staff to enable them acquire a proper mix of skills, knowledge and authority to deliver outputs and conduct 'situational management' as conditions demand. This can be achieved by formal training, as discussed in section 2.3.1.

2.4.1.6 Behavioural excellence

Today projects are increasing both in size and complexity. Moreover shifting way of conducting business from conventional to management by project requires change of processes and culture. For example, the traditional line management approach may have to be replaced by matrix organization where resources are shared among different departments/projects. This, if the organization's culture is not well cultivated and departmental managers are not bought into enterprise wide optimization of resources, might lead to conflict as managers may appreciate efforts only in their department

(Verma 1995). Such 'I am my position' thinking are seen as major disabilities for learning and transforming (Senge 1994).

O'Brien on Senge (1994) argues that the traditional organization systems are designed to provide for the first three levels of Maslow's hierarchy of human needs of food, shelter and *belonging*ness. However, these motivating factors are becoming increasingly less effective in providing significant unique opportunity to command the loyalty and commitment of employees as they are becoming widely available (at least for the industrialized society). Hence organizations have to focus on addressing Maslow's higher human needs of self-respect and self-actualizations (Maslow 1970).

For this, it is necessary for organizations to empower their staff and achieve a behavioural excellence level where staff strive to acquire a higher level of personal mastery. Senge (1994) in his book *The Fifth Discipline* and Flood (1999) in *Rethinking The Fifth Discipline* argue that one of the basic characteristics of learning and transforming organizations is their ability to create the environment and culture for people to reflect on their knowledge and experience as a means of shaping the future actions. They argue that improving the personal mastery of employees is crucial in having a shared vision that all employees will be committed to. Thus, it is necessary for organizations to invest on their employees to improve the organization's behavioural excellence level to where employees have a high level of personal mastery whereby they can clearly see the shared vision and be committed to it.

Finally it has to be noted that the above 'other' initiatives are clearly not comprehensive and are only some initiative that enhance the achievement of excellence in PM. To excel in overall business performance, organizations need to improve on more diverse areas than just these. For example sales & marketing, financial management, research and development are just few examples of areas that organizations need to improve their performance so as to be successful in today's very demanding business.

2.5 Conclusion

The purpose of this chapter was to provide an overview of the project management competence and maturity concepts. The chapter provided a thorough discussion of the concepts and highlighted possible ways of improving the constructs. The chapter has also presented some initiatives that need to be enhanced and cultivated to achieve excellence in project management and mature in PM practice and culture. The following chapter discusses the Project Management Office concept as a strategy of achieving a higher level of project management competency and maturity.

CHAPTER THREE: THE PROJECT MANAGEMENT OFFICE

3.1 Introduction

This chapter provides an overview of the project management office concept and practice. The chapter explains how the concept and practice evolved, discusses in detail the different levels of maturity of the PMO as an organizational entity together with the practices to be found at each level in an attempt to develop a framework for analysing the concept as applied by organizations. The chapter further describes the typical PMO organization structure within an organization's hierarchy and presents its responsibilities. It also discusses the costs and benefits of establishing and running the entity. The chapter concludes by providing a guideline for implementing the PMO and a discussion of possible challenges expected in implementing and operating the entity and potential ways of combating them.

3.1.1 Background

As briefly discussed in chapter one, 'management by projects' is receiving wide acceptance as an appropriate means of conducting business in volatile business environments. However, adopting this project-based approach brings with it its own challenges of which the main one stems from the one-time nature of projects. Organizations may not often derive benefit from previous project successes and failures due to a lack of effective knowledge transfer between projects (Jessen 1992).

To overcome this problem and maximise the benefits of applying PM, companies have given growing attention to knowledge management (KM) practice in project environments and improve their PM competency and maturity. They have come to realize that being agile and being able to adapt to fast changing business environments by leveraging knowledge gained on projects and continuously learning and transforming accordingly is an important factor for an organization's performance.

Embracing a holistic approach to PM, and integrating it with other management processes and practices such as total quality management (TQM), knowledge management (KM) concurrent engineering (CE) change management (CM), is considered as a strategic competency for organizations and, as such, can significantly improve an organization's future competitiveness and adaptability to the ever changing business environment (Kendall & Rollins 2003; Kerzner 1998).

As a result many companies have sought to re-invent themselves as learning and transforming organizations (Flood, 1999; Senge *et al.* 1999) and started to envisage strategies that help achieve excellence in project management (PM) and help formally "manage" the intellectual property they acquire on projects (Kerzner 2003).

One of the strategies that many companies are adopting for the structured collection, distribution, and updating of this intellectual property gained on projects and facilitate their maturity in PM practices is the 'project management office' (PMO) (PMI standards committee, 2004; Dai & Wells 2004; Santosus 2003; Bates 1998; Rad & Levin 2002) alternatively known as '[Strategic] project office' (PO) (Kerzner 2003; Englund et al. 2003; Turbit 2003), PM centre of excellence (COE) (Kerzner 2001), or project support office (PSO) (Marsh 2001).

3.2 The Project Management office

3.2.1 Evolution of the PMO

The function of the PMO has evolved over time. Prior to the 1990s, one of the drivers behind the adoption of PMO's was customer relationship management (CRM) (Kerzner 2003) where the main objective was to set up an organizational entity dedicated to the customer which would allow an organization to get closer to, and so better understand, specific customers. This was ideally suited to organizations that had relatively few, large customers and so was initially implemented by firms such as large defence and aerospace contractor companies (Kerzner 2003). After the 1990's, following the growing interest in

PM practices, other companies have shown much interest in setting up PMOs (Dai & Wells 2004). During this period, the function of the PMO shifted from servicing a specific customer to servicing the corporate body and it is through this that the PMO attained much of the functions associated with it today.

3.2.2 *Functions* of the PMO

The PMO can provide a range of functions to an organization. These functions can broadly be viewed as project-oriented functions where the service and help will be directed to the temporary project delivery organization and enterprise-oriented functions where the focus is on the long term improvement of the PM capabilities and competencies of the enterprise. Lying in between the project and enterprise oriented functions, some literature (e.g. Rad and Levin 2002) mention a third function of the PMO as division or program level functions. The division/program level PMO centralizes and coordinates all the projects in the program/division level. Related to this, the PMI's PMBOK (2004) defines the PMO as an organizational unit to centralize and coordinate the management of projects under its domain. This definition lies somewhere between the project and enterprise focused definitions, hence as division level PMO. However, as will be discussed in section 3.2.3 below, this third division can be seen as a stage of evolution of the PMO from the lower project-oriented one to a higher enterprise-oriented entity.

3.2.2.1 Project-oriented functions

In delivering project-oriented functions, the PMO focuses on short term activities mainly related to successful delivery of specific projects or series of programmes. Here the PMO's main objective is to help the temporary project organization successfully deliver the project. 'The project focused functions are intended to have immediate impact on the performance of the project, and they are usually for remedial purpose' (Rad and Levin 2002: 131). As project-oriented functions, the PMO would provide:

- Augmentation; whereby the PMO provides resources to specific projects for the performance of certain tasks-hence fill gap in project team;
- Mentoring; here the PMO gives personnel to work with project personnel to ensure proper execution of tasks- work side by side with novice team members;
- Consultation: the PMO may provide occasional problem solving ideas to projects

Whether as augmentation, mentoring and/or consultation - drawn from its pool of knowledge base and expertise, the PMO can provide a variety of project focused services. These may include establishing standards for managing projects, standardizing report forms, selecting, operating and supporting project management software, defining and implementing proposal development methodology, drafting proposals, providing project start up assistances, preparing project charters and scope statements, facilitating project kickoff meetings, conducting project risk assessment, maintaining project visibility room, providing human resources/staffing assistance for projects, tracking and recording changes made to project requirements, maintaining project work book or library, improving accuracy and timeliness of time sheets, administering assistance, standardizing project reviews, promoting issue resolution, supporting project close out, etc. In short, if the project organization lacks any expertise and competencies, and they are available within the PMO, the PMO does the activities on behalf of the project organization or helps the project organization acquire the competency in an effort to successfully deliver the project.

3.2.2.2 Enterprise-oriented practices

The enterprise PMO is the focal point of an organization's project management improvement and enhancement endeavors and hence has to provide and establish best practices and training on all PM knowledge areas. This is in contrast to the previous practices which are concerned with short term remedial project focused activities. These practices allow the enterprise PMO to concentrate on long term enterprise wide activities. Once a PMO has evolved into the enterprise project management office level, it becomes the back bone of enterprise's organizational project management endeavor. Thus this

level of PMO is considered as the focal point of project and PM related practices (Dai & Wells 2004; Kerzner 2003; Santosus 2003; Rad & Levin 2002) and is recognized as the place where a company's PM activities and KM endeavors intersect (Crawford 2002).

As a means of discharging its enterprise focused functions, the PMO may conduct training and education to the enterprise staff about contemporary aspects of PM. It practices and develops methodologies and procedures that facilitate the enterprise's maturity in PM, archives lessons learned and knowledge gained both from within the organization or those benchmarked from outside - such as from professional associations, competitors or other industries. It also promotes PM cultures and norms which are based on trust and mutual understanding. The following activities, among others, are assumed to be effected by such PMO as part of its mission of helping the organization achieve a higher level of PM competency and maturity (Dai & Wells 2004; Kerzner 2003; Rad & Levin 2002):

- Documenting lessons learned on projects;
- Dissemination of information;
- Development of methodologies, standards and templates for PM;
- PM benchmarking;
- Planning for and effecting continuous improvement strategies;
- PM training and education;
- Planning and coordinating effective utilization of resources
- Central communication management across projects
- Acting as a home for project managers;
- Formalizing project selection through project portfolio management;
- Customer relationship management;
- Support in corporate strategic planning, etc.

Figure 3:1 next page shows the major activities that the PMO deals with as part of delivering its project and enterprise oriented functions.

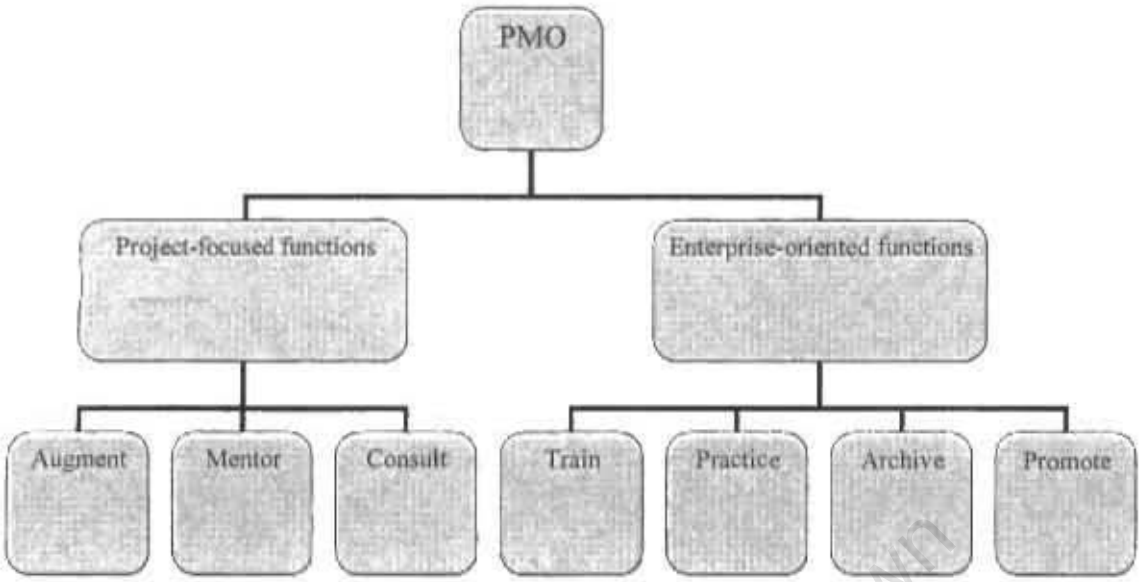

Figure 3: 1 Project Vs Enterprise-oriented functions of a PMO (adapted from Rad & Levin 2002)

All these activities, both project-oriented and enterprise-oriented, are assumed to be made more effective through the existence of this organizational entity. Depending on the level of maturity of the PMO within a given organization, this organizational entity can be set to function some or all of the above activities ranging from support to single project to enterprise-wide strategic alignment of the organization (Hill 2004; Rad and Levin 2002). Hence a PMO may mean different things for different organization/people (PMBOK 2000a) with all considering it as a roadmap to maturity in the application of project management practice (Casey & Peck 2001).

It is believed that not having such a focal point for PM related activities may render the organization to inefficiencies. Block and Frame (1998), for example, suggest that an *ad hoc* approach to PM practices leads to inefficiencies and can even be dangerous, while establishment of a PMO can foster consistency and nurture PM professionalism. Similarly Rad & Levin (2002) claim that one of the main functions of the PMO, both at the project and enterprise level is in knowledge management with instilling a PM culture and professionalism at the heart of its charter, 'by far, the most exciting functions of the PMO are to instil a project management culture and to facilitate the organizational recognition of the project management profession'(ibid, : 2). Implementation of PMOs is

thus considered part of a larger effort by an organization to bring it to a higher level of project management capability and competency (Bates 1998) and hence the PMO's principal charter is to 'help manage the future; not just recalculate the past' (Murphy 1997). As such, the PMO is about managing the project management endeavour of a given organization.

Notwithstanding the claimed PMO benefits, little research has been done to quantify these benefits of the PMO to the organization they are established in. Kwak and Dai (2000) observed that research concerning the contribution of a PMO to overall effectiveness of PM is limited and anecdotal. Even the very few which exist have generally focused on the IT sector (e.g. Gardner Group 2000). However, those few research outputs claim that PMO has been a success in helping the organization deliver projects. For example, the Gardner Group (ibid:21) found that '[information systems] organizations that establish enterprise standards for project management, including a project office [PMO] with suitable governance, will experience half the major project cost overruns, delays and cancellations of those that fail to do so (0.7 probability)'. This output, although it doesn't show how consistently organizations with PMO perform better than those without-consistency comes with maturity in PM, it, however, clearly indicates that the organizations with PMO are having a marked competitive advantage over those who don't have when it comes to successful delivery of projects.

The PMO's development from a project-oriented entity to enterprise wide service provider is part of the continuums of evolutions and maturities by the entity within an organization. As the PMO gets more mature and, in parallel with this, as the organization's project management competency improves, the PMO is expected to slowly withdraw from involvement in project oriented activities. This is because as the enterprise gets more mature in PM capability, it will have a capability of setting up a temporary project organization that can deliver projects successfully on a consistent basis without direct involvement of the PMO. This in turn will allow the PMO to concentrate on long term strategic issues. In short, the more mature the PMO is within a given

organization, the less it gets involved in project-oriented functions and the more it dwells on long term strategic enterprise wide activities.

3.2.3 PMO: A continuum of practices to improve PM competency

As highlighted in the above section, the PMO's transition from serving project-oriented functions to those enterprise-oriented ones is associated with a continuum of maturity and evolution by the entity. Even when initially established, not all project management offices are created equally. 'Although almost any form of PMO will jumpstart incremental process improvement in organizations that have nothing in place, PMO's are incepted at different levels and with difference capabilities' (Crawford 2002: 67).

Thus Crawford (ibid.) argues that there are different levels of PMO reflecting different practices and activities performed by them. The level of PMO that is appropriate for a given organization will be determined by factors such as the size and complexity of the company, the interdependence of projects among business units and functions and the availability of resources.

One way of conceptualising this is to consider the PMO in the same way as the organizational project management maturity model (OPM3) (PMI 2004). In this way the PMO can be described as a series of levels. As put by Rad & Levin (2002: 125), 'level-one PMO might support a single project, a level-two PMO would support several projects under the same programme, a level-three PMO would support a division or departments of an organization with all its projects, level-four PMO would support the organization within its projects and a level-five PMO would be placed strategically at an executive level and would support business strategy and resource allocation at the enterprise level.' The highest level of the PMO, the 'strategic project office', is seen as providing the best chance of delivering the organization's aspiration of acquiring excellence in PM. This 'highest level group, the strategic project office, is the one that has the best chance for directing real organizational change' (Englund *et al.* 2003:11).

Hill (2004) most clearly illustrates this idea in his model of the different levels of the PMO and identifies some of the competencies achieved at each level (see figure 3:2 below). Each level is described below in more detail.

Level 1: The Project Office

This is an office that helps in handling typically large, complex single projects. The project office performs a variety of essential project management activities, including (Rad & Levin 2002; Hill 2004):

- Applying principles and techniques of modern project management, through the skill and knowledge of the project manager, to ensure that successful project performance is achieved. The project office assists the project manager in such activities as planning, paper work, etc. so that the project manager concentrates on running the day-to-day activities of the project. The project office concentrates on deliverables associated with project objectives of delivering projects on schedule, within budget, to the quality set out and to the satisfaction of the customer, and manages the vital signs of each project effort; cost, schedule, and resource utilization.
- Applying organizational guidance in the form of policies, standards, executive decisions, etc. to each project effort. The project office also acts as the first point of contact between business processes in the project management environment and the alignment and integration of these.
- Serving as the first level of project oversight and, frequently, the highest level of technical oversight. Whereas higher-level PMOs may mandate and introduce technical methods and procedures, it is the project office that is responsible for implementing them in the project management environment. At this level of maturity, there is likely to be minimal emphasis on business issues.

At this level, the project office's role is that of implementer. It carries the policies, practices, and guidance prescribed by higher authority into the project management environment for implementation by the project team. Yet the project office does not have to achieve advanced levels of functionality beyond what is needed to discharge

responsibilities for project and project team performance of the projects it supports. In short, the project office acts as the first line of supervision for implementing and integrating standard PM practices in the project management environment.

Level 2: Basic PMO

This level of PMO deals with the oversight and control of multiple projects. It furnishes the capability to provide aggregate oversight and control of portfolios of projects. This level of PMO is sometimes known as the "program office" (Marsh 2000) and is the domain of the program manager. It is possible that there could be more than one PMO in an organization, where there may be several program managers each controlling and overseeing a portfolio of projects through their own PMO's. But the basic PMO is presumed to be the highest centralized entity of project management that pursues its mission under the leadership and guidance of one designated program manager. With an emphasis on establishing control in the project management environment, the basic PMO performs a variety of centralized project management activities, including:

- Establishing a standard approach to how project management is conducted in the relevant organization. This includes the introduction of common tools, repeatable processes, and preferred practices, ideally represented by implementation of a comprehensive project management methodology.
- Compiling aggregate results and analyses of various projects' status and progress as a way of identifying and responding to project variations, evaluating project and project manager performance, and monitoring the achievement of project objectives.
- Introducing project management as a professional discipline in the permanent organization through the prescription of applicable standards, designation of qualified project managers, training and empowerment of project teams, and specification of roles and responsibilities of stakeholders in the project management environment. The basic PMO thus has a responsibility for establishing a viable project management environment within the permanent organization. This involves building capability across all PMO functions.

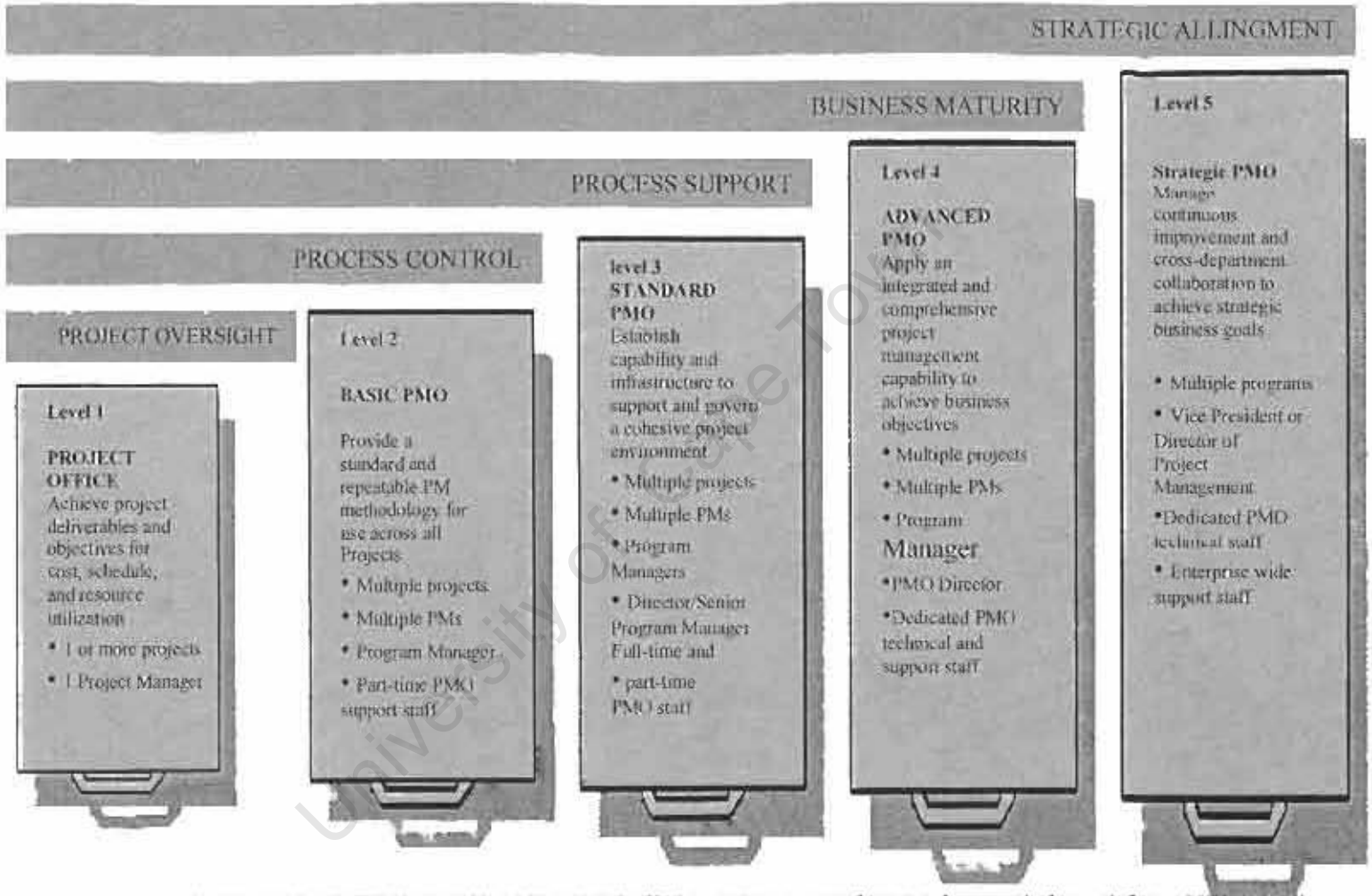

Figure 3: 2 Overview of the PMO capabilities across maturity continuum (adapted from Hill (2001)

A level 2 PMO will most likely be treading new ground within the enterprise; advances in functional capability may initially be minimal until business units are accustomed to the PMO's presence, and accept the transition of certain responsibilities to the PMO. This will improve as the business units evolve a greater reliance on the PMO management capability of project oversight and control. Conversely, the new basic PMO will need to demonstrate its alignment within the relevant organization and establish its reputation for professionalism in the practice of project management in order to gain legitimacy within the broader organization. This often requires the PMO to be proactive in planning its functionality and for it to be prepared to defend its business position.

Level 3: Standard PMO

Although it continues to address project management oversight and control, the level 3 PMO introduces a new focus on support that optimises individual and project performance in the project management environment. Its purview ranges from managing multiple projects and multiple project managers and may even include overseeing or otherwise aligning with one or more program managers. The 'standard' PMO may evolve from earlier efforts to establish a 'basic' level 2 PMO but may also be designed and implemented "from scratch", although allowing the PMO to develop through the various stages of maturity is believed to reduce organizational resistance (Hoffman 2005), to introduce a centralized oversight, control, and support in project management environments. If a new PMO at the standard PMO level is to be pursued from the outset, the designers and developers must ensure that functionality prescribed for the basic level 2 PMO is incorporated into their PMO implementation plans.

Level 3 PMO functionality is a solution for organizations/departments that are either seeking to make project management a core business competency, or are seeking to improve the capability and sophistication of project management. At this level, the standard PMO performs complete centralized project management oversight and control activities, with an added emphasis on introducing process and practice support into the project management environment. Thus its activities would include (Hill 2004; Kandall & Rollins 2003; Englund et al. 2003; Rad & Levin 2002)

- Serving as the centerpiece of project management support in the relevant organization: effectively acting as a project management resource for business units, a professional practice facilitator for project managers and project team members, and acting as a coordinator and collaborator for project stakeholders' activity and involvement.
- Functioning as the interface between the business environment and the project management environment. The standard PMO translates, as appropriate, policy and executive guidance for project performance and implements actions and activities associated with business interests and objectives in the project management environment.
- Acting as the facilitator of project management environment process design and as a catalyst for project management excellence. This extends from attending to project management methodology and practices used to ensure project success; to introducing project reporting tools and collaboration techniques; to providing executive support processes regarding matters of project governance, project portfolio management, and business performance.
- Serving as the representative of the project management environment to the senior executive of the relevant organization, and participating in, or possibly convening and leading, associated control boards comprising executives and senior managers. As such, the standard PMO can be the relevant organization's project management representative to business and industry affiliates, partners, and professional institutions.
- Operating as the recognized organizational entity that directly or indirectly influences resource participation on projects, to include addressing such matters as qualification, training, assignment, and evaluation.

Thus the standard PMO found at level 3 has responsibility for implementing a complete project management capability across all the designated PMO functions.

Level 4: The Advanced PMO

The level 4 PMO represents a shift in focus away from project management skills to integrating the permanent organization's business interests and objectives into the project management environment and implies a convergence between both project management processes and business processes. The advanced PMO thus is trying to create a "projectized" business environment. Assigned PMO resources may be aligned with a few key functional units within the PMO that provide the means to integrate business and project management practices. The advanced PMO performs comprehensive, centralized project management oversight, control, and support activities, but with an expanded functionality that represents a mature and business-oriented project management approach within the permanent organization. Thus at this level, the PMO is characterised by:

- Appearing more and more like a separate business unit and development and implementation of advanced project management practices and business integration activities.
- Collaboration with business units within the relevant organization and participating in the development or adaptation of practices and processes common to both the business environment and the project management environment.
- Provision of distinct expertise in state-of-the-art project management practices and procedures. Senior staff members are assigned full time and represent highly skilled and knowledgeable professionals who apply business acumen and advanced business and project management concepts to solutions implemented in the project management environment. These individuals help implement such functionality as mentoring services, project audits, and project recovery services.

Because it has a focus on integrating business interests, the advanced PMO also ensures that all PMO functions are integrated for efficient and effective operations.

Level 5: The Centre of Excellence

The 'centre of excellence' is a separate business unit within the permanent organization that has responsibility for enterprise wide project management operations. The PMO

functionality prescribed for the centre of excellence has a focus on strategic business interests across the relevant organization. Although lower-stage PMOs may also be assigned such tasks, it is most distinct at this highest PMO level. Lower-stage PMOs may also have a business alignment or reporting affiliation with the centre of excellence. Normally, an executive would be appointed in charge of the centre of excellence, and that individual would either report to or have direct access to the chief executive officer or other top executives in the relevant organization.

Although it appears at the top of the PMO competency continuum, the centre of excellence is a unique project management entity that can be established in one of two distinct ways. Firstly, it could be created as a result of the growth and expansion of a lower-stage PMO, which would normally be the case in a small- to- medium-sized organization. Secondly, it could be established independently of any existing PMOs, with the objective of providing strategic business guidance and direction to those subordinate PMOs. The latter is typical in a large global organization where the centre of excellence provides some aspect of oversight, control, and support to PMOs serving regional business interests (Hill 2004). Consequently, the centre of excellence assumes a strategic alignment role in the relevant organization and guides the project management environment in its continuous-improvement efforts. These efforts would typically include (Kandall & Rollins 2003; Englund et al. 2003),

- Providing direction and influence for enterprise project management operations. It may also oversee subordinate PMO functionality where the relevant organization has constructed other PMO operations relative to its international, national, or other expanded geographical business focus.
- Building both project management environment and project stakeholder awareness and representation across business units, customer relationships, as well as vendor and partner relationships.
- Sponsoring and conducting studies and evaluations of project management functionality and business effectiveness, which may include affiliated PMOs.
- Representing the business interests of the relevant organization in the project management environment, and vice versa.

The level 5 centre of excellence PMO reassesses the PMO functions for strategic business implications, together with how they can be adapted, adjusted, or redesigned for optimal use, including application by other subordinate PMOs within the relevant organization.

3.3 *The* PMO and other organizational entities

It is important to distinguish the PMO's responsibility and authority in perspective to other organizational entities. An organization may have other entities set out to function some of the activities of the PMO. For example, an organization may have a separate entity mandated to manage knowledge. Thus to avoid duplication of efforts and/or friction among entities, the PMO's area of influence should be made clear. Sections 3.3.1 and 3.3.2 below discusses the duties of the PMO and project managers, and PMO and KM practices as two of the major overlaps (Kandall & Rollins 2003).

3.3.1 PMOs and Project Managers

Project managers and PMOs pursue different objectives and, as such, are driven by different requirements. The PMI's PBMOK guide (2004) differentiates between PMO's and project managers describing the differences as follows:

- A project manager is responsible for delivering specific project objectives within the constraints of the project, while a PMO is an organizational structure with specific mandates that can take an enterprise wide perspective.
- The project manager focuses on specific project objectives, while the PMO manages major program scope changes and can view them as potential opportunities to better achieve business objectives.
- The project manager manages the scope, cost, and quality of the products of the work packages, while the PMO manages overall risk, overall opportunity, and the interdependencies among projects.
- The project manager reports on project progress and other project specific information while the PMO provides consolidated reporting and an enterprise view of projects under its purview (PMI 2004).

Thus, while the project manager's mandate is to successfully deliver the project he/she is managing, the PMO's major focus is to help achieve both the temporary project delivering organization and the enterprise a higher level of PM maturity. In short, even if the PMO performs some of the activities traditionally carried out by the project manager- as in the case of augmenting discussed in section 3.2.2.1 above - its major objective, even when serving the project oriented activities, is to help the project delivery team achieve the expertise and competency needed to successfully deliver the project, not to duplicate the project manager's activities. As an enterprise-oriented function, the PMO focuses on long term strategic activities which are usually outside of the domain of the project manager.

3.3.2 The PMO and KM

Knowledge management has received wide attention both in academia and business (Carrillo et al. 2004; Tiwana 2000; Quintas et al. 1997). However, despite the recent attention, the management of knowledge has long been an integral element of a good project management practice (Crawford 2002). Though not formalized, projects have been capturing lessons learned on other projects, which is, in essence, part of a knowledge management process. The influx in knowledge management has helped companies to realize more the benefits of continuous learning and learning from self experience and others', which has become very crucial in today's fast changing business environment (Senge 1994) and formalize their KM practices (Carrilo 2004). Egbu *et al* (2004) advise companies to have a centralized knowledge management practice with a designated knowledge manager.

The project management office can act as a knowledge management centre of a given organization. Kerzner (2003) claims that the PMO acts as a corporate centre for control of project management intellectual property and claims that it should be the hub of a corporate project management information system that comprises performance failure information system, earned value information system, risk management information systems and lessons learned information systems. The PMO's mission of being the focal

point of project and PM related activities makes it the centre of information and knowledge flow. Crawford (2002) says that the PMO is the ideal place to integrate a company's PM and KM practices as it is at this point that the two disciplines intersect (ibid.). In the same vein, Rad & Levin (2002) claim that, PMO need to focus on KM practices to effectively deliver its goal and sustain it. 'The PMO's main goal is to promote continuous improvement in the organization's project management practice. This can only be done by a focus on knowledge management, and by using this knowledge as the basis for decisions and actions on projects.' (Rad & Levin 2002:188).

Thus even if an organization has already set out a KM practice before launching a PMO, it would be advantageous to the organization to put the KM practice under the custody of the PMO as the PMO, being centre of all the PM related activities, greatly improves the already existing KM practices of the enterprise.

3.4 PMO responsibility and location within the Organization Hierarchy

The position of the PMO within the organizational hierarchy depends on the maturity level of the PMO itself, resistance to change of the organization, politics within the organization, etc. Generally project level PMOs are set low in the corporate division while the strategic project office is believed to function more effectively if it is put at higher level within the organization hierarchy. This higher level of the PMO is believed to interact frequently with different divisions to facilitate project works and promote PM culture within the organization. 'The primary responsibility of senior management is strategic planning and deployment, and worrying about the future of the organization. The prime responsibility of mid-level and lower-level managers is to worry about operational issues. The responsibility of the PMO is to act as bridge between all levels and make is easier for all levels to accomplish their goals and objectives' (Kerzner 2003:23). The following organizational structure chart gives the three positions of a PMO with in the corporate hierarchy; project level, division level and enterprise level.

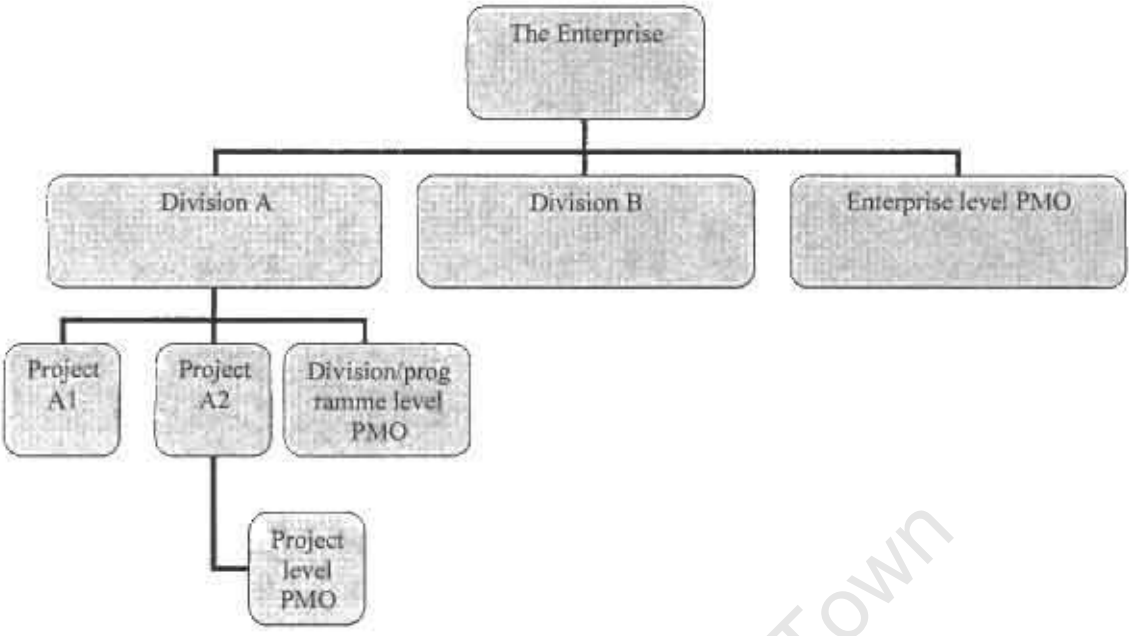

Figure 3: 3 PMO reporting structures (adapted from Rad & Levin 2002)

3.5 Establishing a PMO

The cost and effort needed to establish a PMO is highly dependent on the given organization's maturity level in project management competencies. If the projects of an organization all perform satisfactorily and the performance continually gets better, then the organization is probably at maturity level five (PMI 2004) and it is entirely possible that the capabilities described here as those of a PMO currently do exist in such organization, either separately or in aggregate. It may be that they are just not grouped under, and named, a PMO. In such organizations, only a small investment in resources would be required to establish PMO as it would broadly entail moving existing resources around an organization, rather providing any new resources. On the other hand, if an organization has never continuously attended to the needs of projects, such an organization would probably lie at maturity level one.

In such cases, the organization needs to establish the basic elements of a PMO which would be a sizeable allocation of resources. Here, investments in tools and processes are required to establish and roll out the PMO across the organization. However, there is an

implicit cost in having a large number of failed projects. It is believed (Rad & Levin 2002) that this implicit cost is significantly higher than the explicit cost of establishing a PMO for the purpose of improving project performance and achieving excellence in project management activities.

Figure 3:4 below shows a hypothetical model of trend of such costs along with the PMO maturity continuum. To move from one maturity level to another, the PMO needs to acquire resources and competency needed for that level. Thus there will be a higher explicit cost needed for the PMO to deliver its now new higher level activities. However, as the PMO's maturity goes up, the implicit cost of project failures goes down and finally the organization will arrive at the PM competency level that will enable it successfully deliver projects on a consistent basis. At this highest PM competency level, the net cost of the organization will be the cost needed to maintain the PMO and continuously improve on its activities.

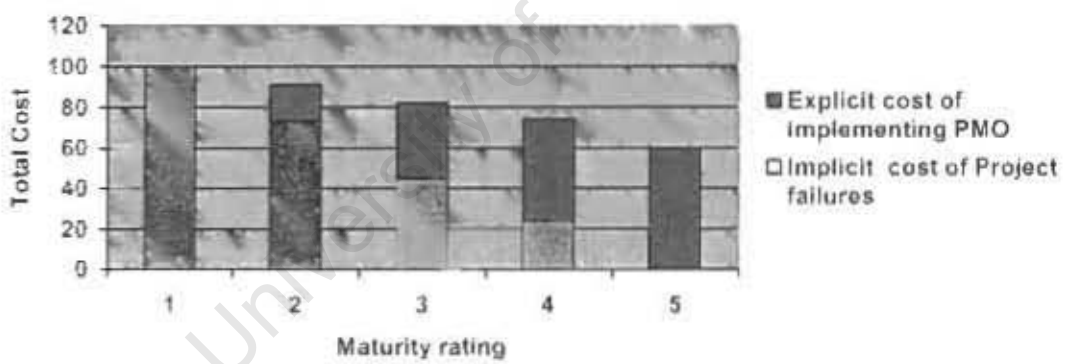

Figure 3: 4 A hypothetical model of cost of implementing and sustaining a PMO in relation to cost of continuous project failure (adapted from Rad & Levin 2002)

The reasons of setting up a PMO vary in urgency and sophistication. They can range from simply to finish a given project successfully according to the factors of cost, time, quality and customer satisfaction, to setting industry standards and instilling a project management culture into the organization. Thus, before planning the implementation, it is necessary to determine organizational objectives that are to be pursued as part of the PMO, and functions to be performed by the PMO. The amount of resources to be

committed and the level of corporate commitment are closely linked to these objectives. To determine these objectives, one needs to asses and ascertain the realistic picture of the organization's current project management practice. Rad & Lavin (2002) identify some basic questions that organizations need to address to help them assess their status of PM practice and help them set up appropriate PMO level.

The sophistication of the PMO structure varies depending on whether the overall goals are to improve project-by-project performance, divisional project performance, or organizational project management maturity as discussed on level of maturity of PMO.

3.5.1 Procedures for implementing a PMO

The implementation of PMO should be planned and executed just like any other project. For organizations which don't have much of the capabilities of a PMO, literature recommends a stage implementation plan, starting first with a PMO supporting a project or series of projects, and then cross functional projects and finally supporting all projects within the organization with a full range of functions. The following five steps are suggested by Rad & Levin (2002) as a guide of implementing (and operating) a PMO:

- Establish the vision and strategy. The PMO can be added to the existing method of PM in the organization or it can be incepted from scratch. Therefore the vision for the PMO should be flexible and tailored enough to match the needs of the organization concerning PM.
- Prepare a plan for the PMO implementation project. As in any other project, implementing a PMO should be properly planned. The plan should be good enough to be able to guide the PMO implementation. It should include some transition plans during which some changes in responsibility, power and culture are required, eliminate or reduce uncertainties in role and responsibility, interface barriers between organizations that need to be eliminated to facilitate KM.
- Plan and establish priorities. Depending on organizational needs the PMO may have different priorities, such as focusing on single project delivery or organization wide change. This need to be properly planned and continuously

traced to align the long term PMO's function in implementing and sustaining PM culture through out the organization.

- Facilitate collaborative work. One of the main goals of a PMO is to continuously track and improve PM processes and practices. To effectively do this, staff from all stakeholders' organizations should actively be involved and buy in PMO implementation which facilitates greater involvement, increased sharing of lessons learned, etc.
- Assist and facilitate the organization's projects. One of the criteria that a PMO's success can be measured is by the number of successfully delivered projects by the organization. Thus sooner the organization starts to successfully deliver projects the easier the implementation of the PMO and its upgrading to higher level.
- Operate and maintain the PMO. A PMO's efficiency is measured in the light of the continuous improvement it brings to the organization's PM practice. Hence it should be improving continuously.

However, it is necessary to bear in mind that these are only guidelines. Though most PMO implementation projects can follow the above guide lines, the actual detailed implementation of the entity can greatly vary from organization to organization depending on a number of factors such as the challenges expected, the culture, norm and structure of the organization, the level of the PMO to be implemented.

3.5.2 Obstacles/challenges in implementing the PMO

Implementing a PMO and effectively operating it is not without problems. Setting and running of the PMO is believed to have a variety of challenges. Some of the highlighted obstacles include senior management and project manager acceptance, appropriate funding, formal definition of the PMO scope and role, applicability of the PMO to all projects, demonstration of the success of the PMO, ensuring consistent application of defined processes, unreasonable workloads, lack of PMO authority to carry out objectives, conflicts over project management ownership, cost increase, adding

bureaucracy to the already existing organizational structure (Kerzner 2003; Darwin's exclusive survey 2003; Interthink Consulting Incorporated 2002; Bernstein 2000).

Bernstein (2000) claims that cost increases and adding bureaucracy to the already existing organizational structure are the most cited problems in PMO implementation. Kandall and Rollins (2003) also share the same view stating that executives usually fear any suggestion that involve an increase in corporate overheads as they fear, reflecting from their experience, that the cost side of any proposition always materialises while the benefits often do not. 'At a time when operating 'lean' is part of every executive's strategy to keep cost under control, the idea of a PMO is not easy to sell' (ibid:8)

Based on different factors such as the authority given to the PMO, the norm and culture of the organization, senior management's buy-in for the concept of the PMO, these challenges may exist in aggregate or separately and, if experienced, can easily be overcome or may severely test the implementation of the entity.

Related to the seriousness of the challenges and their root cause, the remedies to overcome them also vary. Generally, it is suggested that implementing the entity step-by-step starting from the lowest level of maturity will reduce the organizational resistance (Hoffman 2004) while having a firm buy in and commitment to the cause from top management will ease the financial issues (Kandall & Rollins 2003). It is also suggested that PMOs ability to deliver success, both in qualitative terms as in less conflict, high moral among working peer and quantitative such as within budget and on schedule delivery of projects , as fast as possible will enable the organization realize the benefits of the entity and help embrace it (Kandall & Rollins 2003; Kerzner 2003).

3.6 Conclusion

In conclusion, this chapter provided some background to the concept of the project management office and thoroughly described the different maturity levels of this entity highlighting the different activities and responsibilities at each level. A possible place for

this entity in the organizational hierarch for strategic impact in the organization's project management culture and practice was highlighted. The success factors that need to be in place for effective adoption as well as some of the challenges that can be faced in implementing and running of this entity, along with possible ways of combating them, were also highlighted. The following chapter provides the characteristics and practices of the construction industry in general and the German AEC sector in particular.

CHAPTER FOUR: PMO AND THE CONSTRUCTION INDUSTRY

4.1 Introduction

This chapter is structured in three sections. Section one describes the general characteristics and peculiarities, along with their effects, of the construction industry. It discusses *some* of the particular cultures and practices of the industry and highlights the limitations of construction, as an industry, compared to other industries. Section two provides a background to the German AEC sector and its traditions and culture in terms of some selected factors with an emphasis on similarities and differences of the industry with other mature construction sectors. Section three discusses the practice and application of the concept of PMO within construction and puts it in perspective.

4.2 Background

The construction industry is an enormously important sector of any economy. Economic growth depends on the physical infrastructure that is delivered by the construction industry and its key participants. It is by far the most important way in which societies create new value (Winch 2002) and has the responsibility of creating, defining and maintaining the built environment within which most other social and economic activities take place (Cain 2003; Morton 2002). The construction industry provides society with delivery mechanisms for many aspects of its needs such as economic, social, political, environmental and public sector reform. The industry's products are essential to our physical and social day-to day-existence.

The industry also provides significant amounts of fixed investment, contributes considerably to the national output and is a major source of employment, directly and indirectly by its multiplier effect (Walker and Flanagan 1991). Studies show that in most countries construction constitutes more than half of capital investment, contributes up to 10% of GDP and employs more than one hundred million people globally which accounts for almost 28% of all industrial employment (CSIR 2003; Winch 2002).

Therefore, any changes and improvements in the output and processes of the construction industry affect the size of the national product both directly and indirectly.

4.2.1 Characteristics of the Construction Industry

Generally the construction industry is labelled as a 'conservative industry' which adopts new technologies and practices at a slower rate as compared to other industries such as IT, manufacturing and automotive sectors and invests very little in capital, research & development and training (Egan 1998).

As it is, construction lacks a full utilization of the construction team, bringing the skills of all the participants to bear on deliverable value to the client through integrated project process. The efficiency of the conventional project delivery system currently practiced is constrained by the largely separate and sequential processes through which projects are planned, designed and constructed which in turn indicates the fragmented nature of the industry.

The strategy of the conventional processes of sequential project delivery system is meant to minimize risks and changes through thorough descriptions of specifications and contracts. However, this sequential, separate system of project delivery is blamed of creating barrier to exploit the skills and knowledge of the parties participating in the project. For example this project delivery system is accused for being not suitable to use contractors' and suppliers' know how of construction and material properties in design and planning phase of projects (Latham 1994).

The conventional procurement system, which assumes that clients benefit from choosing a new project team competitively for every project they engage on, is also believed to be a major obstacle for the advancement of the industry. This aggressive separate procurement system inhibits learning, innovation and development of skills. It prevents parties from developing a synergy on past relationships and also leads to the adversarial and confrontational supply chain relationship that the industry is known for as the fierce

competition on price forces parties to lower their quotation to win projects with a belies that they will recoup through change requests-hence destabilizing the industry (Egan 1998).

Other industries, such as manufacturing and the service industries have curbed these problems quite effectively. They have changed the culture and the way they conduct business to a total quality management (TQM) way of conducting business by adopting and fully implementing integrated process approach and partnering form of supply chain management (mutual beneficial supply chain relationship) in parallel with focusing on their customers, improving their leadership style, etc and continuously assessing and improving their approach (Evans & Dean 2003).

Though not at a satisfactory rate, construction is also adopting these principles. For example, the Japanese construction companies have started to benefit from these principles by adopting them from the manufacturing industry despite all the cynicism that construction is a one time creative process and TQM can only be adopted to a mass production processes like in manufacturing (Arditi & Gunaydin 1997).

4.2.2 'Unique' characteristics of construction and their effects in the industry

The construction industry is espoused to have a number of characteristics which sets it as 'unique' from most other industries. These characteristics embrace a number of political, social and economic aspects and are believed to have a telling effect in the way the industry is functioning, including the problems mentioned above (Cartilidge 2002; Ganesan 2000).

4.2.2.1 Nature of production

In most cases the place of production of construction has to be necessarily the place where the product is going to be used. Thus the working place is changing regularly with workers constantly moving from one site to another, cooperating with different partners

and in different chains. Moreover, because the site of production is the site of product which has to be built yet, work in the construction industry is mostly exposed to weather, and, therefore, to seasonal cycles and disruption.

This creates insecurity of employment and earnings. Due to the instability of the production process, its exposure to weather, and the variable working environment, the *incidence of* accidents is significantly higher than in most other industries. Unhealthy working conditions result in industrial injury and trade-specific occupational diseases. Because the character of work is of temporary duration, labour contracts are very often of a fixed term nature. Hence, insecurity of employment and earnings is significantly higher than in other industries (Cooke 1996).

For these reasons of peculiarity regarding the sector's production process including work organisation (and others) there are some peculiarities in the construction industry's labour relations. These peculiarities include lower wages, particular vocational training systems, social funds to compensate disadvantages caused by health and safety risks, disruption of earnings, and fluctuation with negative effects on earnings, vacation, and pensions (Morton 2002; Ganesan 2000).

4.2.2.2 Demand for the industry's products

Unlike most consumer products that are readily produced in bulk, the demand for the product of the construction industry is generally only produced upon the initiation of, and to the requirements of the clients. With the exception of the sometimes speculative building, clients must first define their requirements in terms of what product that they want and only then can the construction industry build it.

Secondly, the level and type of demand cannot be controlled, manipulated or easily created by the industry itself. Hence unlike most industries where a considerable proportion of effective demand for their products is created and managed by the producers themselves through extensive marketing and application of new technologies

(Morton 2002), demand for construction products is mainly secondary or derived. Hence the demand is determined by the demand and output of other goods and services such as investment goods (Morton 2002; Ganesan 2000; Briscoe 1989). The implication of this is that it is much more difficult for the construction industry to create or manipulate demand for its products since such factors are not under the control of the industry (Morton 2002). However, the inability of the industry to manipulate demand could also be partly attributed to the overall structure of the industry, as will be discussed below.

4.2.2.3 Nature of the product

The outputs of construction are generally large, heavy, durable, expensive, heterogeneous, and immobile in addition to being required over a wide geographical area (Ganesan 2000). Due to the identity of location of production and location of products, with products that immobile, the construction market is mostly restricted to local markets. Thus the construction market is dominated by small enterprises which perfectly meet the low-size scale of most sites or the specialisation of trade respectively and the geographic market.

4.2.2.4 The structure of the industry

The product and production characteristics stated above largely determine the structure of the industry including the proliferation of many small firms, each forming temporary alliances on a project basis for the duration of the project (Cartlidge 2002). Further, the construction industry is highly fragmented with the planning, design and procurement of a building being separated from its construction process (Cartlidge 2002; Flanagan *et al.* 1998).

The industry is characterized by high levels of uncertainty. The demand is so variable and the environment so competitive for work that, it creates low levels of profitability (Cartlidge 2002). Flanagan *et al.* (1998) argue that profits in construction will remain

low for as long as construction is seen as a low-technology industry and while many firms are prepared to win work with low-profit margins.

The physical nature of the product and the characteristics of demand, coupled with the structure of the industry it encourages also mean that each contract often represents a large proportion of the work of a contractor in a year, resulting in work disruptions for *most firms* (Briscoe 1989). Since there is no standard product for the industry as each building is unique to some extent, the methods of price determination are not uniform, but rather a discrete process for each project and for each piece of work sub-contracted (Cartlidge 2002). Owing to this, general economic theory fails to deal adequately with this type of price determination. The construction industry is also known for its adversarial procurement system. The supply chain relationships in construction are believed to be one of the worst characterized by confrontations and mistrust (Latham 1994).

Because of all the above reasons and 'peculiarities', it is claimed that it is difficult for the construction industry to adopt manufacturing industry-style supply chain management and delivery of projects (Cartlidge 2002). On the other hand, the construction industry which is typically associated with late delivery, over budget, low profitability, poor returns and slow up take of new technology and management philosophies is challenged to discontinue disguising its inefficiency behind the idea of the industry being so different from others (Flanagan *et al.* 1998; Egan 1998). It is suggested that as the construction industry evolves, it can and will start to learn and benchmark ideas from outside industries, such as manufacturing and IT (Egan 1998).

4.2.3 Impacts of Construction

The construction industry has a significant multiplier effect on a given economy. There is a relationship between output, employment, income and demand. Certain actions, particularly government ones, such as an increase in the interest rate or decrease in supply of credit affects not only the demand on construction industry but also firms in the

industry. Similarly, any change in the level of construction output will also affect employment and hence incomes, demand and ultimately outputs of other sectors of the economy (Winch 2000).

Under conventional "Keynesian" economic theory, when the economy is in a recession, as output and employment falls, the government would increase spending to stimulate *economic* activity, and when there is a boom, government would reduce its spending (Morton 2002). Similarly, low income, low investment and low levels of productive employment feed into one another (Ganesan 2000). Thus, targets for construction output and employment should be integrated within macro-economic planning.

Governmental influence coupled with the investment nature of the construction industry's product means that demand tends to fluctuate particularly according to the state of the economy and the social, economic policies of the government, with consequent effects on the industry. Flanagan *et al.* (1998) for example argue that change in the construction industry is constant and is influenced by many factors including interest rates, business uncertainty, government policy, world events, training and changing expectations of clients. Typically, variations in construction output have little physical short-term effects particularly because of the durability of most construction products (Ball 1998). Time lags in the construction process tend to be long and variable and there are large fluctuations in the demand for construction over time. This implies that the amount spent on construction can as a result vary quite sharply from year to year without significantly affecting the state of the built environment.

However, save for the negative impacts on efficiency that these sudden stops and starts in its workload have, the construction industry is often used as a regulator of the general economy (Ball 1998). The construction industry 'has proved a good instrument for transmitting short-term deflation through the economy without creating widespread political upheaval, economic disruption or closure of productivity capacity' (Ball 1998: 112). It is therefore, for both economic and administrative reasons, that the reductions

and increases in government spending are often concentrated on construction projections (Morton 2002).

4.3 The German Construction Industry

4.3.2 General Background

Germany, with an estimated GDP of approximately $2.454 trillion in 2005, is Europe's largest economy. Its $29,800 per capita income is slightly above the average of the per capita income of the EU member states (with the new member countries from Eastern Europe excluded) (CIA report 2005). The total population of the country was estimated at 82.5 million in 2002 (destatis, n.d.)

For about 45 years after the Second World War (WWII), the German (West) economy performed very well and rebuilt country's fixed infrastructure after the destruction and devastation of the war. In the last decade, however, the overall economy has performed poorly. The overall economy's growth in real GDP terms reduced to 1.3% per annum over the 1992-2003 period (KfW research 2004). This is significantly lower than the annual growth that the Federal Republic states (West Germany states) used to enjoy. The then West Germany states grew at 3.2% per annum on average for the whole 1960-1990 period.

Three major reasons are cited for the recession in the German economy:

1. Reunification: After reunification, Germany had to contend with many handicaps and backlogs that the communist era left in the former Democratic Republic, the now "Neue Bundesländer" states. The then East Germany states were characterized by a virtually autarkic economy not subjected to the rules of market where prices didn't reflect economic reality, an extremely rigid labour market, a production system notable for the low level of value added, run-down and highly indebted firms, major ecological problems, etc (Estiot 2000).

2. The slow transition from industrial economy to service based economy. Because of restrictive legislations such as on opening hours, the high share of taxes and employers' social insurance contribution in labour cost (taxes account 52.3% of the cost of labour in Germany compared to about 30% in US and UK, and employers' social insurance account 17.4% in Germany while it is only 7.1% in US) (Estiot 2000), the service sector has expanded less rapidly than elsewhere. With the service sector's main input being manpower, the more restrictive the labour legislation, the more slowly the sector grows thereby creating a major negative impact on the overall growth of the economy.
3. Construction: On the wake of reunification, stimulated by the need to address the infrastructure backlog in the New States, construction hit a growth rate of 4.4% of real gross capital formation between 1992-1995 (the corresponding figure in the New Länder States was at unprecedented 22.4%)(KfW Research 2004). The recession in the industry began after 1995 and growth has slumped to an average value of -2.6% per annum in real gross capital formation terms between the years of 1996-2003. The major reason why construction has done so badly during recent years is the structural crisis that resulted after the euphoria of the unprecedented growth experienced in early 1990s. Production capacity had been put in place in order to meet what had been an extremely dynamic demand. However, when this demand started to subside the capacity became surplus to requirement, forcing construction companies to offload their workforce. The sector also suffered from the same problem as consumer goods, as households reduced confidence due to the recession in the general economy and the high rate of unemployment causing them to prefer saving.

High labour costs, which mainly stems from German construction industry's traditional reliance on qualified workers compared to other countries (Syben 1998) and the high wages of the general labour market as compared to the Eastern European countries (of which Germany is Western Europe's gateway to the East) imposes further competition on German construction companies at home. This further added to the problems of the industry. On the international market level, however, Germany's construction companies

have an excellent reputation. In response to the crisis at home, the big companies are looking abroad to take advantage of large and complex projects elsewhere such as in Australia, USA and South East Asia. 'The German building industry in Australia is responsible for a fourth of all sales' (Schreiber 2005; 1). The quality of work and their technical know how has given most German construction companies a competitive advantage on big and complex projects advertised at international level.

4.3.3 Construction's contribution to the economy

The German construction industry contributes significantly to the country's total economy. However, in the last decade or so, as discussed earlier, the under achievement of the construction industry is blamed as one of the main factors which resulted in recession of the overall economy (Estiot 2000)

Table 4: 1 Gross Value Added (GVA) and construction's contribution (Source data: the German Federal Statistics Office)

Year	*GVA*	*GVA in Construction*	*Contribution of construction to GVA*
1990	8.85	12.21	0.66
1991	18.04	26.15	1.46
1992	7.4	18.75	1.12
1993	2.4	4.54	0.3
1994	4.55	8.84	0.59
1995	3.96	0.32	0.02
1996	1.87	-4.46	-0.3
1997	2.21	-3.98	-0.25
1998	2.85	-3.68	-0.22
1999	1.82	0.16	0.01
2000	2.29	-3.44	-0.18
2001	2.09	-4.82	-0.25
2002	1.85	-4.12	-0.2
2003	0.94	-5.64	-0.26
2004	2.64	-3.14	-0.13

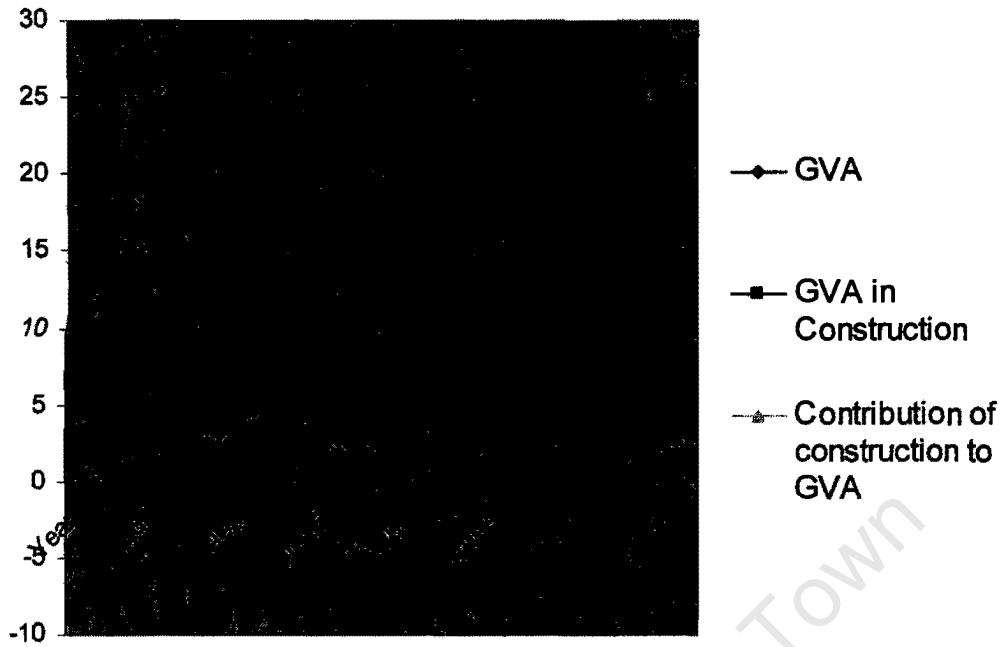

Figure 4: 1 Trends of the general Gross Value Added (GVA) Vs GVA in construction (data source www.destatis.de, own calculations)

As can be seen from Table 4:1 and Figure 4:1 above, starting from 1995 the construction sector has generally been a burden to the general economy. Its contribution to the gross value added (GVA) of the overall economy was negative for the whole period but 1999. Moreover, except 2004, the GVA in construction was consistently decreasing since the turn of the new millennium - hence having a more and more negative impact on the overall economy's performance.

4.3.4 Some common practices of the industry

Generally, as it is the case with most other construction industries, as discussed in section 4.2 above, the German construction industry is characterised by a disjointed sequential project delivery system, a rigid and adversary supplier relationship, slow adoption of new technologies and management philosophies, less investment in research and development etc. The section below discusses some of the major common practices within the industry and highlights the similarities and differences with other developed construction industry practices.

1. Main Participants

The construction industry in Germany includes all trades from the preparation of the site to the finished building. The official German term for this industry is *Baugewerbe.* Firms performing structural steel works alone do not form part of the *Baugewerbe*, nor do firms specialized in services trades like heating, ventilating or electrical. The definition of the *Baugewerbe* and its internal structures are the frame of reference for administrative regulation, for business or professional organizations, for training and education, for the regulation of the labour market and for all statistical data. Like in most other construction industries, the core players in the German construction industry are the client, the architect/engineer and the contractor.

2. *Common forms of contract*

As, shown in Figure 4:2 below about four forms of project organisation styles are witnessed in German construction industry:

- The traditional trades contracting: In this form of organization, the client sits at the top of the hierarchy and defines the need, provides the land and the finance for the project. The architect/engineer, who will have a direct contract with the client, will develop the design and planning work starting from concept development and may go on in supervising the project during implementation. The distinctive characteristic of this form of contracting is that contracts are awarded on lots.
- Generalunternehmer. Most of the responsibilities and duties of the client and the Architect/Engineer are the same to the above case. One main noticeable different is, in the genereluntemehmer arrangement, the client enters a contractual agreement with *only* one contractor for the whole construction work.
- Generalübernehmer. This is fundamentally a design-and-build form of contractual agreement.
- Projektentwickler (project developer). The developer takes all the responsibility for the project work.

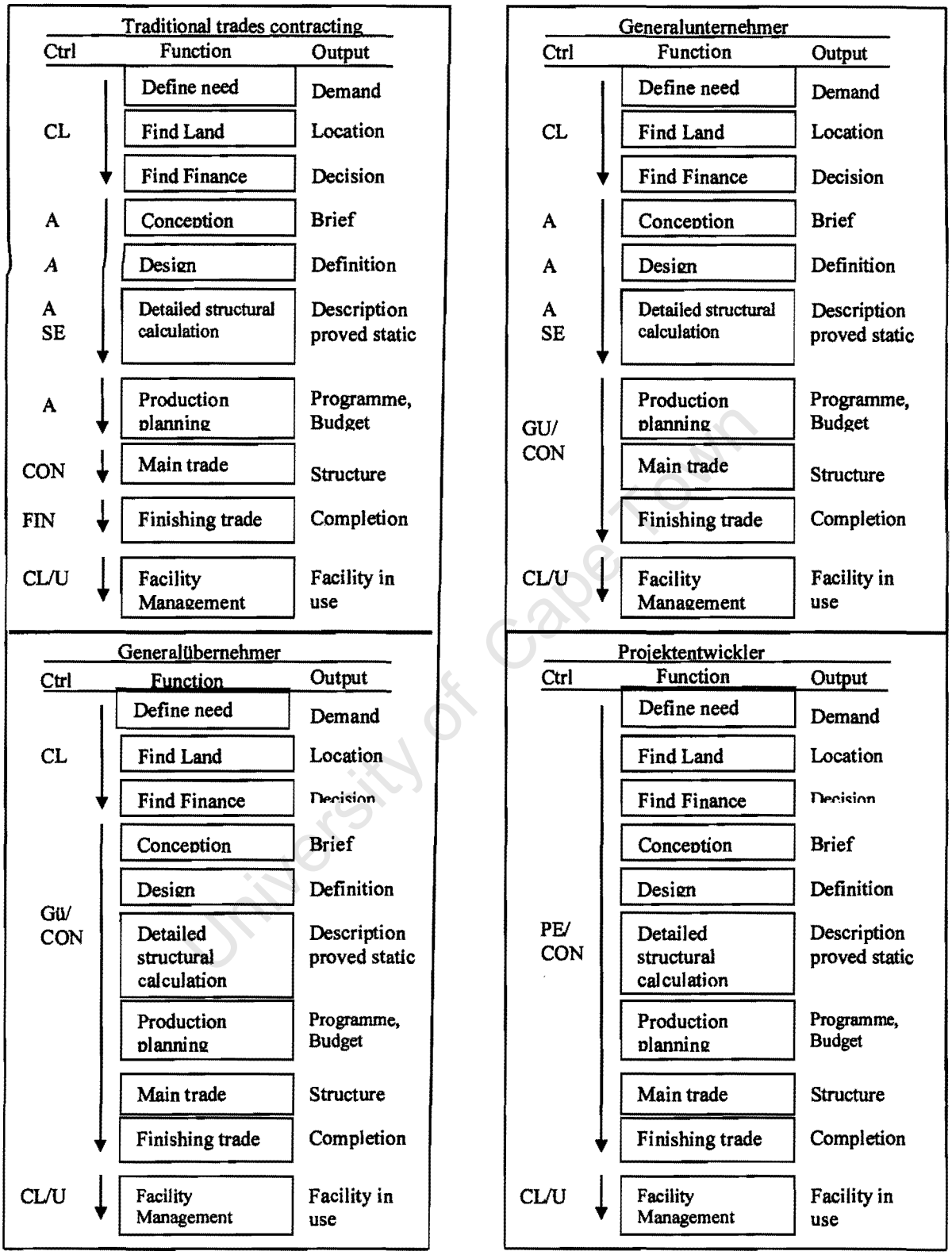

Figure 4: 2 Common forms of project organization styles (adapted from Estiot (2000))

Keys to Figure 4.2 on the previous page

A- Architect CL- Client CON- Contractor SE- Structural Engineer	PE- Projectenwickler GU- Generalunternehmer Gü- Generalübernehmer Ctrl- Control U- User

3. Common forms of tendering

There are different forms of procurement in common use such open (competitive) tender, directly placed orders or negotiated tender; selective or limited tender; etc

- Open (competitive) tender. This form of tendering, which requires the announcement of request for tender in private and public media and then selecting the most responsible bidder, is the most common form of tendering in public projects.
- Selective tendering. Private clients and commercial investors (industrial or commercial companies, banks, insurance companies, building societies, etc.) often use some form of selective tender, inviting only contractors well known for efficiency and to whom they have good, long-term relations. Public clients are allowed to place orders directly or use selective tender only if the work is very small or if it is very complicated and requires very highly specialized skills that only a few firms can offer. Normally they have to use the open tender form.
- Direct (Negotiated) tendering. This is a form of tendering where the client enters a direct negotiation with a contractor without going through any bidding or selective processes. It is usually applied in the private sector only.

Other forms of procurement systems such as the public private partnership (PPP) are gaining wider attraction from public agencies as a means to provide long term relief for public budgets, leading to lasting improvement of government services and the public infrastructure and utilize the management skills of the private sector (Oerter 2004).

4. The Contract documents

The basic documents for the tender process especially in the case of a public client are the *Verdingungsordnung für Bauleistungen* (VOB), *Verdingungsordnung für Leistungen(VOL) and Verdingungsordnung für Frieberufliche Leistungen(VOF).*

The VOB

The VOB is a central document that has ruled the construction tender processes in Germany for over 70 years. It consists of three sections: Section A (VOB/A) regulates tender procedures; Section B (VOB/B) regulates contract conditions and Section C (VOB/C) consists of detailed technical norms of work packages and quality of materials to use and it mainly refers to the German standard 'Deutsches Institute für Normung'(DIN).

VOB/A is binding only for the public client and for construction firms tendering for public construction orders. The VOB itself is not a law, but all public clients (governments, local authorities or public enterprises) are obliged by order of the government (which has a legal quality) to tender using VOB/A (and of course parts B and C as well) which means to use open tender procedures and to obey the rules, prescribed by VOB/A. Private clients, whose construction projects are funded by public authorities to an extent of 50% or more are subject to the same rule (Syben 2000). The private sector commonly bases its contract document on VOB/B, with some adjustments to suite its specific needs but do not have to follow the playing ground set out by the VOB/A

The spirit of the VOB/A is influenced by the empirical evidence of a correlation of cheap bids and bad quality and the experience that the public interest was not met purely by giving construction orders to the firm that offers the lowest price (Daub 1976). Therefore it prescribes to give small and medium enterprises a fair chance that bigger construction works, if ever possible, should be divided and tendered in lots (*losweise* or *gewerkeweise Vergabe*) (art.4, 2), which must be separated and tendered by trades (art. 4, 3).

Therefore, the VOB can be seen as an instrument of a particular industrial policy. Firstly, in the VOB, very strong emphasis is placed on quality, solidity and cost-benefit-analysis rather than pure cost saving. Secondly, the requirement of tender by lots small enough to be performed by the smaller firms also gives small and medium sized firms a real chance to win a contract. The requirement of tender by trades means that one lot, whether a small or a big one, must not include works from different trades.

However, although the VOB/A prescribes the tender by trade as the general form, tenders can ask for a *Generalunternehmer*.

The BOL and/or VOF

While the VOB is the main contracting document in the construction process, the VOL is the standard official contracting form for services and requirements for the attribution of services contracts, excluding professional services, in which case is replaced by the VOF. The *VOF* stipulates requirements for the attribution of service contracts for professionals (including project consultants). It is therefore the transposition of the services directive for intellectual project consultant services.

The concern is to be able to differentiate between the provision of services by certain professionals from the provision of other services. The choice of the applicable *VOF* or *VOL* regulation depends on the contents of the contract. If the nature of the service to be provided is such that contract specifications can be clearly and exhaustively drawn up and are therefore "describable", the applicable regulation is the *VOL*. If, however, the nature of the service is such that the contract specifications are not "describable" in detail, the *VOF* framework is used (European Ministry of Culture and Communication, 2002). In short, if project consultant services are included in a works contract, they depend on the works directive transposed into the *VOB*; if the services correspond to works supervision or '*Ausführung*" (phases 6 to 9 of the *HOAI*), they can depend on the *VOL*; if the services correspond to design phases or "*Planung*" (1 to 5 of the *HOAI*) they depend on the *VOF*, etc. Table 4:2 below gives some considerations concerning choices of contracting documents in the industry.

Nature of Project Consultant contract	*Applicable regulation*	*Open procedure*	*Restricted procedure*	*Negotiated procedure*	*Design contest*	*Status of Project consultant*
Project consultant Contract included in a works contract	VOB	Yes	Yes	Yes, exceptional and substantiated		Architect or engineer, Subcontractor or Contractor employee
Global project consultant contract : design and works supervision	VOF			Yes, Obligatory	Yes	Self-employed, architect chosen by the client or a service provider
Partial project consultancy excluding design' works supervision, project control	VOL or VOF	Yes	Yes	Yes exceptional and substantiated		Self-employed, architects and engineers
Partial project consultancy: design (Max. 1 to 5 HOAI)	VOF			Yes, Obligatory	Yes	Self-employed, architect chosen by the client
Project consultant : Specialised engineering	VOL or VOF	Yes	Yes	Yes exceptional And substantiated		Self-employed structures, fluids, etc.

Table4: 2 Regulations and procedures applicable in Germany according to the types of contracts (adopted from EMCC in Degy (2002))

5. *Amount of fees for professional service*

Within the framework of public and private contracts, all services provided by architects, engineers, quantity surveyors, project managers etc. and their remuneration in the form of fees are based on a statutory federal regulation: The *Honorarordnung für Architekten und Ingenieur(HOAI)* for architects and engineers and its equivalent for project managers and project planners; *AHO-Fachkomission Projektsteuerung/Projectmanagement* stipulate the duties and responsibilities of these professionals together with the ranges of fees they may charge for the service they provide. The fees are in some proportion of the cost of the overall project and are proportionately divided for different services in a given project (see Table 4:3 below).

Table 4: 3 Evaluation of fee percentages in accordance with design and construction phases (adapted from VOB/HOAI (2002))

Phases/ basic mission	*Buildings*	*External areas*	*Interior Fitting out*
1.*Grundlagenermittlung* / Definition of contract bases and design sketch	3	3	3
2.*Vorplanung* / outline proposals with cost estimate	7	10	7
3.*Entwurfsplanung* / scheme design with cost estimate	11	15	14
4. *Genehmigungsplanung* / project study for submission of building permit	6	6	2
5.*Ausführungsplanung* / construction design	25	24	30
6.*Vorbereitung der Vergabe* / preparation of written documents for the signing of works contracts	10	7	7
7.*Mitwirkung bei der Vergabe* / assistance for the signing of works contracts, with cost control	4	3	3
8.*Objektüberwachung und Bauoberleitung* / supervision of works and their compliance with all written documents and drawings	31	29	31
9.*Objektbetreuung und Dokumentation* / checking the compliance of completed works prior to the expiry of guarantees, as-built documents and drawings.	3	3	3

For specific services, fees are calculated according to an hourly rate determined according to an evaluation of the mission and the qualifications (and experience) of the persons necessary to carry it out. The number of hours necessary to carry out these services is established by the contractual parties (for example: surveys, certain town planning studies, complements to the basic missions cited in the table above, etc.).

Hence with most services codified in terms of content and remuneration in the *HOAI* and the *AHO (the green book)*, the price of the service as a criterion for selection of professionals is not of big importance for clients. Besides the amount of fees is not subject to negotiation unless the amounts fall out of the limited thresholds (50,000 DM (Apprx. €25, 000) to 50 million DM (apprx. €25million) for building projects) or if they don't concern additional services or certain specific services (example: surveys, certain town planning studies, etc.) (HOAI 2002). Thus, in most cases in Germany, it is only performance competition that is applied for professional works (Diederichs 2005).

4.3.4.3 The German construction industry as compared to other construction industries

As can be seen from the common characteristics discussed above, generally the German construction industry exhibits similar characteristics to other construction industries such as the UK, Australia and South Africa. The major participants in the industry, the common types of procurement and organizational arrangement in use, the existence of well stipulated contracting documents for use by project participants etc are also common characteristics of other construction industries. Perhaps the one major difference that the German construction industry exhibits is the statutory federal regulation of the contents and the associated fees and remuneration of most professional services, as discussed above.

Moreover, as will be discussed in section 4.4 below, despite being one of the few industries which nurtured the development PM, construction is blamed for being reluctant to adopt a holistic project management approach and instilling PM culture, for which the German construction industry won't be an exception. To this end, construction is advised

to concentrate on holistic PM practices that improve the sector companies' PM competency and maturity to reap maximum benefits that PM promises (Morris 1994). Thus the adoption of the PMO concept as a strategy for project management improvement and maturity can help the industry instil and foster a holistic PM culture. Section 4.4 below discusses some of PMO practices in construction.

4.4 The PMO and Construction industry

4.4.2 Organizational project management and construction

Though construction projects have been 'managed' since ancient times, it is not until the second half of the twentieth century that the construction industry started to use 'some' modern PM practices (Burke 2003). Even in recent times, despite being one of the few industries that nurtured the development of modern 'disciplined' project management, construction is criticised for concentrating on few techniques and tools - such as the critical method - rather than dwelling on a holistic approach to improve PM maturity for repeated successful construction project delivery (Morris 1994). Morris (1994) argues that PM is about the total process of a strategic approach to 'management of projects'.

As discussed in chapter two, embracing a holistic approach to project management and integrating it with other management philosophies and processes such as TQM, concurrent engineering, change management is seen the most convenient management philosophy to survive and excel with the fierce competition among companies and comply with the ever increasing quality requirements of customers as today's market is characterized (Burke 2003). Moreover, in case of construction (as discussed in section 4.2 above) low profit margins, repeated failures in project delivery (in terms of time, budget, scope/quality), failure to satisfy both internal (the workforce) and external customers etc are rendering the conventional way of conducting business incompetent.

The effective adoption of a project based approach and the associated PM practices are seen as having the potential to improve overall organizational performance by both

enhancing the prospects for project performance and minimizing the likelihood of failure (Munns & Bjeirmi 1996). Construction has always been a project based industry. However, despite being core contributors for modern PM, construction has remained reluctant to embrace a holistic approach to PM. Block and Frame (1998) suggest that an *ad hoc* approach to PM practices and not embracing a holistic approach to organizational PM to improve the organization's culture and practices leads to inefficiencies and deprives of companies from the benefits that PM is believed to deliver. Thus companies within construction need to improve their organizational project management approach. As discussed in chapter three, one of the strategies many companies of different industries are adopting to improve their organizational PM competency is embracing the PMO concept.

4.4.3 PMO practices in construction

The delivery of construction projects is a dynamic process that involves different stages that require the formation of virtual, temporary multi-disciplinary organizations that consist of the client and a diverse supply chain. On completion of the project, this virtual team is reported to frequently disband without post-project reviews and without capturing or disseminating the lessons learned during the project (Carrillo *et al.* 2004). There is a concern among practitioners that this conventional transient, sequential and fragmented nature of construction project delivery system has led to a chronic loss of knowledge when compared to other industries (Barlow & Jashapara 1998; Egan 1998).

To curb this chronic loss of knowledge and improve the often discrete practices of PM, companies in the industry are starting to assign a centralized responsible body for delivering objectives of the KM strategy and improve practices of PM (Carrillo *et al.* 2004; Dai & Wells 2004).

The idea of knowledge management such as the capturing of tacit knowledge in Expert Systems and Knowledge-Based Systems has been around in the construction industry

since the 1980s (Allwood 1989) nevertheless, the idea of capturing personal experience on IT systems has not been very successful (Carrillo *et al.* 2004).

Similarly, Rad and Levin (2002), claim that much of the capabilities currently described as those of PMO exist either separately or in aggregate in the project-driven organizations (Kerzner 2000) of the construction, aerospace and defense industries. In the same vein, Michel Bryne of the University of Alberta claims that the concept of PMO was born in the engineering and construction sector as chartering organizations responsible for receiving, reviewing and approving of project requests (Bryne 1997)

Thus, the ideas behind the concept of PMO are not new to the construction industry. What is new is the terminology used and the increased awareness that knowledge should be managed in a more structured manner (Carrillo 2004) and project management practices should be dealt in more formalized and structure way. However, there are some indications that PMOs, as a centralized organizational units dedicated to improve the practice and results of project management, have been adopted more rapidly in the newer technological areas, (e.g. the IT industry) than in the older, more mature industries such as the construction industry (Dai & Wells 2004).

Therefore, it can be argued that whilst they may not be labelled as PMOs or as any of the other terms assigned to it today, PMO practices are applied within the construction industry but that this may be done discretely without having either virtual or real, responsible champions.

Nevertheless, despite the claims that PMO capabilities do exist within construction either as a real or virtual entities (Dai & Wells 2004; Kerzner 2003; Rad & Levin 2002) and the claim that PMO being seen as the best strategy in helping organization's achieve competency and maturity in organizational project management practice (Kandall & Rollins 2003; Kerzner 2003), there is not any research known to the researcher addressing the adoption of the concept specifically in construction industry and assessing its value to the sector companies.

4.5 Conclusion

This chapter presented some characteristics of construction industry in general and briefly discussed its peculiar characteristics and their effect how the industry is performing. The chapter also presented some broad impacts of construction on economy and its effects on policy making. The chapter then provided background of the German construction industry and some of the major common practices in the industry with a view to highlight the industry's general similarity with other construction industries. Finally the chapter briefly presented the state of PMO practices within construction. The following chapter discusses the methodology used for the study and critically argues why the specific methodology was chosen.

CHAPTER FIVE: METHODOLOGY

5.1 Introduction.

This chapter describes how this research was conducted. The first part of the chapter categorises and discusses research methodologies according to philosophical constructs and on the qualitative/quantitative continuum. Then it stereotypes the specific research methodology adopted for this study and justifies why it was chosen. This is followed by discussions of data collection methods, the sampling methods used and how the field work was conducted.

5.2 Philosophical orientations

Before going on to discuss research methodologies, it is necessary to understand the underlying philosophical thinking as it will help clarify research designs and dictate what kind of evidence is required and how it is to be gathered and interpreted.

5.2.1 Definition of terms

Ontology is the assumption that we make about reality. For example, this study makes an assumption that there are PMO practices within construction sector companies and with a carefully constructed research design the construct can be identified and be studied. This, in essence, is an ontological assumption.

Epistemology is a general set of assumptions about the best ways of inquiring into the nature of the world. For example, the ontological assumption that there is the concept of PMO in practice in construction sector companies can be studied by focusing on hard facts or opinions expressed by practitioners. Thus the assumption that the best way of studying it is by focusing on hard facts or opinions is an epistemological assumption.

Methodology is a combination of techniques used to enquire into a specific situation. For example, a research may envisage a quantitative research methodology which can use different ways of collecting data and analysing it.

A Method is an individual technique for data collection, analysis, etc. For example, an internet survey is a specific technique of collecting data (Marvasti 2004); Easterby-Smith et al. (2002).

5.2.2 Schools of thoughts

Easterby-Smith *et al.* (2002) identify three philosophical schools of thought in dealing with social reality, namely, the positivistic, relativistic and constructionist schools of thought.

The positivistic paradigm deals with the social world on the ontological assumption that reality is external and objective. It tries to enquire into this reality on the epistemological assumption that physical sciences are the basics to understand the social world and hence the rationale for carrying out studies is to unravel universal laws that govern causal relationships through empirical studies that are not value-laden.

The constructionist approach (also known as social construction or phenomological paradigm) assumes that reality is socially constructed and therefore our understanding of it is subjective, varied across situations and cultures and is conscious ideological (Easterby-Smith *et al.* 2002 Marvasti 2004).

Contained in this continuum lies a relativistic paradigm which, like the positivistic paradigm, makes the ontological assumption of the existence of a reality independent of the observer but, due to difficulty in getting access to reality, it envisages multiple perspectives of 'estimating' reality hence concedes that it is a matter of probability that the collected views provide accurate indication of the underlying situation (Easterby-Smith et al. 2002).

Easterby-Smith *et al.* (2002) and Marsden and Littler (1996) give the basic characteristics of the two extreme schools of thought, positivist and social constructionist, as shown in Table 5.1 below:

Table *5: 1* Characteristics of positivist and social constructionist paradigms (adapted from Easterby-Smith et al. (2002))

Characteristics	*Positivism*	*Social Constructionism*
The Observer	must be independent	is part of what is being observed
Human interests	should be irrelevant	are the main drivers of science
Explanations	explaining: must demonstrate causality	understanding: aim to increase the general understanding of the situation
Research progresses through	deductive: hypothesis and deductions	inductive: gathering rich from which ideas are induced.
Concepts	need to be operationalized so that they can be measured	Should incorporate stakeholders perspective
Unit of analysis	reductionistic: should be reduced to simplest terms	holistic: may include the complexity of 'whole' situations
Generalization through	statistical probability	theoretical abstraction
Sampling requires	large number selected randomly	small number of cases chosen for specific reasons

5.2.3 Methodological implications of the different epistemologies

The acceptance of a certain epistemology usually leads a researcher to adopt methods that are characteristic of that position or, conversely, when a given range of methods is employed in a particular study it is possible to infer that the researcher holds, perhaps implicitly, a corresponding epistemology (Easterby-Smith *et al.* 2002).

As discussed above, both the positivist and relativist paradigms assume the existence of a reality which is independent of the researcher; hence the job of the researcher is merely to identify this pre-existing reality. From the positivistic perspective, this is most readily achieved through the design of experiments in which the key factors are measured precisely in order to test predetermined hypothesis. From the relativist position, the assumed difficulty to gaining direct access to reality means that multiple perspectives will normally be adopted, both through 'triangulations' of methods and through surveying viewpoints and experiences of large samples of individuals to arrive at some probability of reflecting the underlying situation.

On the constructionist perspective, which starts from a viewpoint that doesn't assume any pre-existing reality, however, the aims of the researcher are to understand how people invent structures to help them make sense of what is going on around them. Consequently, much attention is given to conversation between people as they create their own meaning.

Table 5.2 below depicts the methodological implications of the different epistemologies in social science as put together by Easterby-Smith at al. (2002) from the works of different scientists.

Table 5: 2 Methodological implications of the different epistemologies (adopted from Esterby-Smith *et al.* 2002)

	Social Science Epistemologies		
Elements of Methods	*Positivisim*	*Relativisim*	*Social Constructionism*
Aims	Discovery	Exposure	Invention
Starting point	Hypothesis	Supposition	Meanings
Designs	Experiment	Triangulation	Reflexivity
Techniques	Measurement	Survey	Conversation
Analysis/ interpretation	Verification/ Falsification	Probability	Sense-making
Outcomes	Causality	Correlation	Understanding

5.2.4 Strengths and weaknesses of the different epistemologies.

Table 5: 3 Strength and Weaknesses of the Epistemologies (adopted from Easterby-Smith et al. (2002))

	Strength	*Weakness*
Positivist	Can provide wide coverage of situations. Can be fast and economical. May be of good relevance to policy decisions (especially if statistics are aggregated from large samples)	Tends to be rather inflexible and artificial Not effective in understanding processes or the significances that people attach to action Not very helpful in generating theories Difficult to infer what changes and actions should take place in the future (as they focus on what is, or what has been recently)
Relativist	Accepts the value of using multiple sources of data and perspective. Enables generalization to be made beyond the boundaries of the situation under study Can be conducted efficiently.	Large samples are required if results are to be credible, and this can be costly May not be able to deal effectively with cultural and institutional differences May be hard to reconcile discrepant sources of data which point to different conclusions
Social constructionist	Enables to look at how change processes over time Enables to understand people's meanings Can be adjusted to new issues and ideas as they emerge Can contribute to the evolution of new theories Provides a 'natural' way of gathering data	Data collection can take up a lot of time and resource Analysis and interpretation of data may be difficult and is dependent on the intimate tacit knowledge of the researcher Can be hard to control the pace, progress and end point of the study Could experience low credibility challenge due to the apparently 'subjective' opinions.

The different epistemological paradigms have their own strengths and short comings. Understanding and bearing in mind these strengths and weaknesses of each position will help a researcher to choose which methods and aspects are most likely to be of help in a given situation. Easterby-Smith et al. (2002) give and explain the relative strengths of the three social science epistemologies as shown in Table 5.3 above:

Although the distinction between the different philosophical paradigms may be clear, when it comes to choice of methods to the issue of research designs, this distinction breaks down (Bulmer 1988). Also, writers argue that one should attempt to mix methods to some extent as it provides more perspective on the phenomenon being investigated (Bouchard 1978; Fielding and Fielding 1986).

5.3 Deductive theory testing and inductive theory building

Mainly stemming from the scientific paradigms they are built on, the deductive theory testing and inductive theory building methodologies are two major theory building approaches that are in common use (Parkhe 1993).

Stemming from the principles and methods of natural science, the deductive approach represents the positivistic paradigm (Easterby-Smith *et al.* 2002). In this approach, a research is characterized to be: experimental - the testing is made in a 'repeatable' controlled atmosphere; reductionistic - problems are reduced into the simplest possible element and curbed from 'external' influences; explaining - the testing is mainly to explain a causal relationship; objective, where by the researcher takes an objective stand; quantitative- the casual relationship is expressed in terms of statistical probabilities (Marsden & Litter 1996). Thus the deductive theory testing is mainly a quantitative approach where the main objective is to prove or disprove an existing theory or a hypothesis.

The inductive approach, on the other hand, represents the social construction paradigm which is mainly of holistic, descriptive, understanding, subjective and qualitative form of

knowledge building (Marsden & Litter 1996). In its approach to research, the inductive theory building is mainly a qualitative approach where the main objective is exploring the research question and further understanding it.

5.4 Quantitative Vs qualitative research methodologies.

The quantitative and the qualitative methodologies, as discussed earlier, are two distinct traditions in the literature on social science research methodologies which is often associated with the two extreme epistemological paradigms of positivists and social constructionists respectively.

A quantitative research methodology involves making careful observations of a specific situation, reducing these observations (unaltered) into some form of a data and then using this data for statistical extrapolation of trends and theories. A qualitative approach, on the other hand, records observations and experiences as a basis for extrapolating theories and trends to demonstrate new developments within the population under scrutiny.

Contained on the continuum from quantitative to qualitative approach is a hybrid approach whereby both qualitative and quantitative data is collected to deal with the problem at hand. Such an approach, termed 'triangulation' (Leedy 1993; Easterby-Smith *et al.* 2002), is defined by Denzin (1978) as the combination of methodologies in the study of the same phenomenon and is believed to counter balance the weaknesses of each methodology. For example, Bouchard (1978) argues that, by employing triangulation researchers can improve the accuracy of their judgement by collecting different kinds of data bearing on the same phenomenon.

5.5 Justification of the methodology used

One major requirement in selecting appropriate forms of research methodology and method is to ensure that the characteristics reflected on the research are that of the trait and not a methodological artefact (Jick 1979). A variety of factors such as the problem to

be solved, the type of data needed and the researcher's ontological and epistemological assumptions on the research problem dictate the research method to be employed (Leedy 1993; Easterby-Smith *et al.* 2002).

The problem statement in this research, as highlighted in chapter one, is that little is known of the existence of the capabilities described under PMO, as a real or virtual entity, within companies of the construction industry and, associated with this, little is explored about the benefits and challenges of setting up this entity. This problem suggests a broad research into several companies to arrive at a conclusion. Furthermore, as the identified population has not been surveyed for this concept it would be advantageous to first determine a profile of the industry from which subsequent researches can be undertaken.

Taking cognizance of these facts then, a quantitative research methodology was proposed. The reason that a quantitative approach, rather than a qualitative one, was proposed was that it was necessary to cover as many survey participants as quickly as possible in order to obtain a record of the phenomenon at a particular point in time. A qualitative methodology would have required the researcher to immerse themselves in the survey participant's work situations for a period of time so as to determine first hand what the current practices are.

5.5.1 Survey research approach

Leedy (1997) reveals that within the quantitative research realm, there are a number of research designs:

Descriptive survey – measures characteristics of a phenomenon at a point of time

Longitudinal survey - measures characteristics of a phenomenon over a period of time

Correlational survey – builds on descriptive survey to explore relationships.

Ex post facto survey – measures things that happened in the past.

As stated earlier, this work tries to capture a 'snapshot' of the current practice of the PMO concept within the construction industry. Hence, a descriptive survey was taken as the most appropriate approach. As put by Leedy (1997), the basic structure of descriptive survey requires that the population under scrutiny must be carefully chosen and suitably delimited so that generalization doesn't occur and the issue of bias should properly be dealt with.

5.5.2 Design of the research instrument

Several instruments are available to conduct a research. Within a descriptive survey research context, postal (mail), telephone, fax, PC disk-to-mail, and internet surveys are some of the most frequently used instruments (Faught & Whitten 2004). Each of these survey approaches has their own merits and demerits. Klasson and Jacobs (2001) indicate, as a major down side of an internet survey to the others, that web response rates can be expected to be approximately half of that of other data collection methods, such as mail. As a main advantage of an internet survey over others, they identify high data item completion rates and an increased likelihood that best practice users will respond via the web. Other benefits that the internet approach is believed to have over the others include: lower cost, broader distribution, improved accuracy of data entry, faster survey turn around times, greater user friendliness, richer variety and more interesting formats for questions, direct access to managers and key informants (Gofton 1999; Kuhnert and McCauley 1996; Bailey 1994)

This research work aimed to capture as much practices of the concept as possible by soliciting responses from practitioners, broadly distributing the questionnaire, getting access to the most informed person (in the organization),etc. To this end, an internet survey was chosen as the most appropriate approach. It also had the additional advantage of being more cost effective than the others.

5.5.3 The internet survey

With the general acceptance and increasing adoption of personal computers, electronic mail, and the internet, researchers across many disciplines are beginning to take advantage of this alternative technology to conduct surveys (Fallows 2002; Faught & Whitten 2004). Besides the advantages of a web survey over other survey methods mentioned in the previous section, the communication capability of the internet, especially electronic mail, is viewed as another major benefit. However, while e-mail is an important medium of communication, it also has substantial downsides.

Communicating via e-mails can create a deluge of e-mails in a person's mailbox, which presents a potentially negative effect for survey research: A potential respondent, working to minimize wasted time, may become more sophisticated and discriminating about the use of emails. First, such persons, especially if they are "power e-mailers" who typically receive more than 30 emails a day (Fallows 2002), may utilize filters and file e-mails into various folders (e.g. "junk e-mails" or "spam") as one way to manage the volume of emails. Second, they may become more aggressive with the use of their 'delete' key- rather than reviewing the entire message, they may simply note the 'Sent From' name and the title of the message from the 'Subject' line. Those messages coming from unknown or low priority senders and/or that have a title that seems irrelevant my simply be deleted without any consideration.

These problems seem to be more serious for researchers targeting managers in large corporations. Fallows (2002) found out that managers are often power e-mailers, large corporations are settings where more power e-mailers worked and power e-mailers are more sophisticated in their use of filtering and filing e-mails.

Faught and Whitten (2004) suggest that one way of reducing the 'delete problem' is the careful timing of the sending of emails. They argue that due to the instantaneous nature of emails, timing when to send them will affect their probability of being read and subsequently of being replied to. After empirical studies, they identify Wednesday

mornings as the 'best time' of sending emails to get the optimum response. However, their work doesn't discuss the reason why a Wednesday morning is the 'best time' and doesn't distinguish between populations, as 'best timing' for power e-mailers such as managers could well be different to that of normal email users. Moreover, timing doesn't solve the 'filter problem' as filters, once enabled, are always active and timing wouldn't help.

This study targeted managers who, in Fallows (2002) groups of e-mailers, are classified as power e-mailers, as a potential source of data or as a channel through which communication to other sources can be effected. Though nothing can be done if the managers have activated their 'filters', the questionnaire was sent out on a Wednesday morning to maximize the response rate. Besides, in viewing research as being 'art of the possible' (Buchanan et al. 1988:55), the research tried to solicit more responses through the strong industry contacts of one of the researcher's supervisors by mentioning his name on the cover letter of the survey questionnaire.

5.6 Unit of Analysis

The construction industry has stakeholders that range from suppliers of raw materials and machinery through the main trades to the end users of the products of the industry. This could include other industries that supply machineries, steel and other construction materials, the different stakeholders that could be involved in the actual construction of the physical deliverable product, such as developers, project managers, designers, constructors and different agencies and authorities that again may range from the main trades that build the major structure (specially in the case of building) and the finishing trades through to the end users of the final product.

This study however intended to take a snapshot of the adoption of the PMO concept only within the main trade sectors. Even within the main trade sector, the study focused only on developers, project managers, and contractors as it was believed that these sectors are more likely to poses PMO capabilities. This belief is based on the assumption that these

sectors have a higher level of PM expertise. The study aimed at tracking the adoption of the PMO concept within the sector companies; hence it adopted a company level unit of analysis. Thus, the population under scrutiny for this study were developers, contracting companies and project management companies who were active in the construction sector and are members of national professional associations in their respective sector.

5.7 Sampling procedure

Leedy (1997) states that one of the basic structures of a descriptive survey is to carefully choose the population for the study, clearly define it and specifically delimit it in order to set precise parameters for ensuring discreteness to the population. Leedy (ibid) asserts that population parameters and sampling procedures are of paramount importance in the success of the study.

5.7.1 Sampling frame and sampling method

Leedy (1997) and Bryan and Cramer (1990) give the following procedures of sampling:
Simple random sampling: Is a sampling procedure where the sample is derived by simple randomization process from a homogenous or homogenous conglomerate texture population.

Stratified random sampling: This sampling procedure instead of using a homogenous population uses an essentially equally stratified population.

Proportional stratified sampling: Is basically one form of stratified sampling where by the strata of population instead of being equal in size is, this time it can be markedly different.

Cluster or area sampling: This is essentially sampling into groups of a large population which is spread over a large area.

Systematic sampling: This form of sampling, as the name implies, is a systematic selection of certain items according to a predetermined criterion.

This study mainly, as can be seen in the sampling procedure adopted below, uses a systematic sampling technique to arrive at the sample frame.

The sampling frame is the list of respondents from which the samples were drawn. It provides a complete listing of the population (Bryan and Cramer 1990). As discussed in the unit of analysis section above, this study drew its sample from national professional association membership lists of construction companies, developers and project management companies of the German construction industry. It is believed that the professional associations selected, being the biggest national associations in their respective sectors, will most likely cover the majority of the targeted populations namely; companies who are actively operating and practicing in the respective areas.

The target group for contracting companies and developers was drawn from a proprietary data bank *www.firmendatenbank.de* while the source for project management companies came from the database of the association of German Construction and Real Estate Project Managers (Deutscher Verband Der Projektmanager in der Bau- und Immoblienwirtschaft e. v. DVP).

Contractors: The population for contracting companies is drawn from the two big national associations of Zentralverband Deutsches Bauwerbe (ZDB) (Central Association of German Building Trade) and/or the Hauptverband der Deutschen Bauindustrie (Main Association of the German Building Industry). These associations are the head associations of the different regional associations from which the population is taken. The samples were taken from the proprietary data bank www.firmendatenbank.de. The following activities were done to extract the samples from the database: On the 'branche' option, Baugewerbe 'construction industry' (Option 'F') 45211 and then 'Hoch- und Tiefbau, ohne ausgeorägten Schwerpunkt' and 45212 'Hochbau (Ohne Fertigteilbau)' are selected to limit the search to main trade contractors. On the 'Beschäftigte' option 'B4'

and above is selected to put companies with 250 or more number of employees. Then all companies with membership of the above professional associations and their daughter associations were selected. The list of the 100 sampling frame construction companies is given in appendix IA

Developers: The population source for the developer is the Federal Association of German Residential and Real Estate Companies (GdW Bundesverband deutscher Wohnungs- und Immobilienunternehmen) drawn from the same databank as the contractors with the 'branche' option changed now to'Grundstücks- und Wohnungswesen, Vermietung beweglicher Sachen, Erbingun von wirtschaftlichen Dienstleistungen,anderweitig nicht gennant'(Option 'K') and then Grundstücks- und Wohnungswesen 'property and housing' (70) followed by options 70112 'Bauträger für Nichtwohngebäude' Builders for none residential buildings and 70113 'Bauträger für Wohngebäude' Builders for residential buildings. On the 'Beschäftigte' option 'B4' and above is chosen to limit it to companies with 100 and above employees. Then companies that are members of the above associations were selected from the search engine results. The list of 123 members in this sample frame is given in appendix IB

Project managing companies: The population frame of this study was the complete member list of the DVP. The DVP, besides company members, also has individual members. Hence it was necessary to sort out the company members from the individuals as this study only focused on companies. This was done in consultation with the administrative assistance of the association. The list of the 121 members in this sampling frame is attached in appendix IC

5.8 Validity, Reliability and Generalizability

One of the key claims of a research is that it is more believable than common everyday observations due to the rigour that it employs in the collection and analysis of data. To ascertain this claim then, researches are usually examined in terms of validity, reliability and generalizability. The meanings of these technical terms and the procedures needed to

be followed to ascertain them differ with the different epistemological viewpoints. The following table (Table 5:4) gives a summary of the terms according to the epistemological views.

Though, as discussed earlier, no research can claim to exactly fit to one of these epistemologies, this study most closely fits the relativistic paradigm. Thus the above terms were dealt with accordingly:

Table5: 4 Validity, reliability and generalizability as seen from the different epistemological perspective (adopted from Easterby-Smith *et al.* (2002))

	Epistemological viewpoint		
	Positivist	Relativist	Constructionist
Validity	Do the measures correspond closely to reality?	Have sufficient number of perspectives been included?	Does the study clearly gain access to the experiences of those doing the research setting?
Reliability	Will the measures yield the same result on other occasions?	Will similar observations be reached by other observers?	Is there transparency how sense was made from the raw data?
Generalizability	To what extent does the study confirm or contradict existing findings in the same field?	What is the probability that patters observed in the sample will be repeated in the general populations?	Do the concepts and constructs derived from this study have any relevance to other setting?

Validity: A test is valid if it does in fact measure what it claims to measure (Tredoux & Durrheim 2002). This study matched the purpose of the survey as mentioned in the cover letter with what the survey questions asked so as to attain face validity.

Reliability: From the relativist point of view, reliability refers to the extent to which the results of a study are consistent and repeatable overtime and across researchers and methods (Bauer and Gaskell 2000). Though it can't be argued that exactly the same result can be solicited, it is hoped that the consultation of the supervisors and other experts along with the pilot study conducted would facilitate inter-coder reliability. In this way, Marvasti (2004) argues that, if the same procedure of sampling and data collection techniques are followed, a similar observation are expected, hence 'equivalent reliability'.

Generalizability: Extrapolating patterns observed in the sample to the population can be tested statistically. The checks conducted (in section 6.2.3 of the data analysis chapter) to ascertain if the study has solicited enough data size for the study to be credible shows whether the sample findings can be extrapolated to the population.

5.9 Questionnaire design

A research design should ensure that the evidences collected address the research questions asked (Yin 1994) and is essential to ensure coherence and rigour (Manson 1996). This is necessary because it is the questionnaire that will provide the data to test the validity of the problem statement and in order to acquire the relevant data the appropriate questions must be asked. It is therefore, necessary to revisit the problem statement and research proposal. The main objective of this research report, as highlighted in chapter one, is to snapshot the adoption of the PMO concept within the industry as the nexus of PM and KM activities of an organisation and analyse possible challenges and success factors in its implementation with a view of coming up with possible ways of alleviating these challenges. With this as the main guideline the questionnaire was prepared. The questionnaire structure is:

Organizational and respondent's profile – indicates the organization profile so that industry differentiation can be made between the respondents. It also gives the position of the respondents in their organizations, so as to allow for a possible bias.

PMO capability and implementation process experience – helps the assessment of the PMO capabilities of the respondent companies and experiences in its implementation. It also gives the major reasons why the companies adopted the entity.

Functions of the PMO and associated experience – explores what functions the PMO plays in the organisations, what were the challenges and success factors experienced along with the measures the companies taken to alleviate these challenges.

PMO maturity and reporting structure - gives where the PMO is situated in the organization hierarchy to try to emulate the best position of the PMO for its effective functioning.

Views on the impact of the PMO - indicates the views the respondents have in PMO's contribution to a successful implementation of projects, instilling PM culture and professionalism and enabling it a knowledge driven company. Using the above as separate headers, a questionnaire was developed giving consideration to the following: (The questionnaire is attached in appendix II)

Table 5: 5 Targeted main point of questionnaire

Question	Required consideration
Organization profile	
Who in the organisation answered the questions	The status of the person answering the questions needs to be known so that the possibility of bias can be established.
Organisation's involvement in the sector • Contractors • Developers • Project management consultants	There is a need to be able to differentiate between members of the industry.
Size of the organization (by number of employees)	The adoption rate and the practice may differ between differently sized companies.
PMO capability	

What does the PMO capability of the organization look like	It is necessary to establish how the organizations perceive their PMO capability
Name of PMO	It is essential to establish what the companies call their capabilities as it doesn't seem from literatures that there exist a single universal name
Age of the PMO	Will give some insight concerning when the sector companies started to adopt the concept
Activities undertaken to create the PMO	Will help to establish factors needed to be in place for its implementation
Reasons for PMO inception	Will give insight in the most common business cases and reasons why organizations are adopting PMO
PMO experience:	
PMO roles	Will help understand what roles a PMO plays in the organisations
Success factors in PMO implementation and running	Will help to explore the factors that are necessary for successful implementation and running of the entity
Obstacles and ways of alleviating them	Helps to record the most frequent obstacles faced by the companies and how they deal with them.
PMO maturity and reporting structure	
PMO reporting structure	Gives insight into where the PMO should be placed in the organization structure to effectively deliver its mandate
PMO maturity level	Will help understand where in the PMO maturity continuum lies the sector companies' PMO maturity
Project and project managers reporting structure	Helps to establish PMO's involvement in project reporting and how much it is accepted as home of the project manager
Views on the contribution of the PMO	
• To successful delivery of projects • To instil PM culture and practice • To the organization's KM endeavour	Will help establish how the organizations rate their PMO in terms of its core functions

5.9.1 Physical characteristics of the questionnaire

Dillman *et al.* (2000) have emphasised the need to create internet surveys that are visually stimulating, easy to use and fit properly on recipients' computers. Thus the questionnaire was made to look professional as well as being clear and concise. It was also tested on two of the most frequently used internet browsers, Internet Explorer and Netscape, so as to ensure compatibility.

5.9.2 Form of response to questions

Mainly, the questionnaire used fixed questions with as many alternatives given as had been compiled from the literature on the concept. The fixed response type of questions have the following advantages: they are easy to administer; easy to analyse; easy to tabulate; reduce the difficulty level in responding as the frame of reference may become clearer when the alternatives are available; the 'click' options may improve response rate; the responses have a greater chance of being repeatable should the respondents be asked the same questions again.

Fixed alternative questions do, however, have some disadvantages. One of these disadvantages is when the required response is not available or when a respondent has more information to offer than what is given as an alternative. This disadvantage has been minimized by including alternatives such as 'other' and providing space for what respondents may add.

5.10 Administration of data collection

5.10.1 Covering letter

For presentation and enlightenment purpose, a covering letter was used to introduce the survey and the concept of PMO to the survey population. It was thought that the PMO concept is a relatively new topic; the questions asked might cause confusion and result in

reluctance to answer. Therefore it was important to introduce the concept concisely in the covering letter. The covering letter has been attached in appendix IIIA

5.10.2 Email note

A covering e-mail, with the link to the questionnaire site was sent to the general managers of the sampled companies with a request to the general managers to forward the link to their PMO managers-responsible champion (if any) or fill it by themselves (if there is no PMO responsible body). The covering e-mail is attached in appendix IIIB

5.10.3 Reminder

Two weeks after the first email, another email was sent to the target companies that have not already responded as a reminder, again with the link to the questionnaire, and specifying another fortnight for the deadline. The reminder e-mail is attached in appendix IIIC

5.10.4 Codification of 'Form Fields'

For MS FrontPage codification purpose, each question and the associated choices were given a single 'form field number' that represents specific choices of each question. The field numbers were allocated in the following manner:

- The last numeric digit in the code (sometimes the last two digits where the options were more than ten) represents the 'option' or 'choice' number assigned to that specific choice,
- The second digit represents the question number,
- The third digit stands for the page number that specific question appears in the questionnaire,
- The 'C' -check box field, is a field type used by MS FrontPage where multiple choices are allowed in that specific question (i. e. respondents can give multiple answers for that question) 'T'- text field, is a field left for respondents to give

their experience in their own words while 'R' -option field, is used for fields where only one choice is allowed for that question.

For example, "C315" represents the field number allocated for the 'fifth' option of the 'first' question of the 'third' page on the questionnaire, where the C stands for the fact that that field is a 'check box' and hence multiple choices are possible in that question.

5.11 Pilot survey

As a further measure to ensure the correct presentation, a pilot survey was conducted to review the acceptability of the survey by an objective third party. Two companies, one project management company and one double registered as contractor and developer were chosen to review the covering letter and the survey instrument. The pilot survey participant companies were contacted personally and informed of the research being undertaken and the need to survey a population, hence the necessity to verify the survey instrument. After an opportunity to review the covering letter and the survey instrument, the participants were contacted again and asked for their candid comments. The comments received have been summarised below:

Reviewer 1: Project management company representative

Covering letter: The covering letter was well presented and introduced the topic adequately. Possibly a time deadline should be stated with regard to a return date. This comment was not accepted and was not included in the cover letter as it was intended not to mention a deadline (which could prompt procrastination of the response initially and finally leave it as a whole). A deadline was stated in the covering email of the reminder.

Survey instrument: The reviewer commented on rearrangement of some questions to keep the flow and rephrase them for better adaptation to the German condition rather than take the direct translation of the English.

The comments were included in the final draft of the questionnaire.

Reviewer 2. Constructor and developer company representative

Covering letter: No comments.

Survey instrument: Original questionnaire asked respondents to fill in their email address without mentioning the purpose (though it was stated in the cover letter that a summarized copy of the finding is to be sent to them), the reviewer recommended to clearly specify for what purpose the email address is needed as this may be needed for confidentiality. The comment was qualified and a clear statement why the e-mail address was needed was put in the final draft.

5.12 Limitations

Due to the fact that the concept of PMO is a relatively new concept and appears to be even newer in the construction industry, the understanding of the topic by the survey populations might cause unwillingness to reply or place bias on the replies tendered.

Another shortcoming of the study could be in the reconciliation of the original (English) version of the survey questionnaire to the translated German version. Terms may not be directly translated to the German version as they may need adaptation to the German construction technical languages. To limit this difficulty, the questionnaire was translated by a professional who is very experienced in the industry. The German version of the questionnaire was also translated by a different professional in the industry back to English version to check reconciliation to the original version.

5.13 Summary

Starting from the problem statement that little is known about the use of the PMO concept as a means of instilling PM culture and practice within construction sector, this

research adopted a mostly relativistic paradigm approach of quantitative data collection methodologies to explore the concept as a strategy to improve PM competence and maturity in construction sector companies. To this end, a descriptive survey approach was chosen as the most appropriate research methodology to survey the defined population. In addition an internet survey was adopted as the most appropriate means of data collection methods while a questionnaire was adopted as the most appropriate survey instrument.

From the results of the pilot survey it was felt that the survey questionnaire was a robust instrument that would be interpreted correctly by the survey population.

The next chapter, chapter six, presents and analyses the data obtained by executing the research instrument developed in this chapter.

CHAPTER SIX: ANALYSIS

6.1 Introduction

The purpose of this chapter is to present and analyse the data collected by the research instrument described in the previous chapter. The survey instrument developed in Chapter 5 was designed to test current industry practices of the PMO concept in the particular sectors of the industry under review and using this data to analyze the current practice in the industry.

In order to thoroughly test the problem statement and research proposal, the data gathered from the survey was structured in a manner that allows maximum flexibility in testing. A spread sheet package was used as a platform to capture and analyse the data, as well as test the sensitivity of the data to various scenarios.

Beyond the introduction and summary, this chapter comprises of four sections: The first section presents the profiles of the respondents, section two presents the PMO practices and experiences of the responding companies, section three deals with PMO maturity and reporting structure and section four gives the respondents' view on the PMO's contribution to some selected functions.

The analysis is presented question by question. In the second, third and fourth section, the analysis starts with the question asked and explains why it was necessary to pose the question. It then goes on to analyze the overall findings (the findings with all the three sectors combined). Though, as indicated in section 6.2.3, the response rates in the individual sectors is insufficient to draw a statistically conclusive outcome about the differences and similarities of the practices within the individual sectors, the responses to each question were analysed for the specific sectors. Hence some insights about the differences and similarities in practices are made, even if these remain inconclusive. Moreover, in a view to explore the overall picture of the practice, chi-square tests have

been made between some of the questions to check out if there are some interrelationships among them.

Statistical tests about the validity of the findings and interrelationships of the findings among different sectors and questions are also carried out when the data is found tenable for such tests.

6.2 Sampling frame and response rate

6.2.1 Sampling frame

The study anticipated to gain a 'snap shot' in time of the adoption of the PMO concept by main contractors, developers and project management consultants active within the German AEC sector. A company level unit of analysis was adopted. A total of 346 companies who were members of federal professional associations in their respective sectors were sampled. As stated in chapter five, the database of the association of German Construction and Real Estate Project Managers (DVP. e.v.) was the source of project management companies (PMC) while the proprietary databank www.firmendatenbank.de was used for contracting companies and developers. The contracting companies selected for the study were companies with 250 or more employees and were members of either of the two major federal professional associations: Zentralverband Deutsches Bauwerbe (ZDB)(Central Association of German Building Trade) or the Hauptverband der Deutschen Bauindustrie (Main Association of the German Building Industry), while the developers' sampling frame consisted of companies with 100 or more employees who were members of the Federal Association of German Residential and Real Estate Companies (GdW Bundesverband deutscher Wohnungs- und Immobilienunternehmen)

6.2.2 Sampling size

Of the sampling frame selected for the study, 74 were disregarded as they either failed to provide an email address as part of their contact details in the databases or because the

questionnaire was undeliverable electronically due to a 'bad address', or because the companies didn't want to participate in the survey for a variety of reasons. This reduced the effective sampling size to **267** companies.

Table 6: 1 below shows the break down of the sample frame and sample size.

Table 6: 1 Breakdown of sample frame

Sector	*Total number of sample frame*	*Number disregarded*	*Sample size*
Developers	123	18 'bad address' 12 'not participate'	93
Project management companies	121	14 'bad address' 7 'not participate'	100
Contractors	102	21'no email address ' 5 'bad address' 2 'not participate'	74
Total	346	79	**267**

6.2.3 Response rate

6.2.3.1 How large a response is needed?

The data (response) size of a given study is directly related to the generalisability-extrapolability of patterns observed in the sample to the population of that study (Tredoux & Durrheim 2002). If the study is to properly estimate the behaviour of the population from the sample response, besides the sample being a representative of the population under scrutiny, the size should be above a certain statistical threshold. The minimum sample size for a credible study differs from discipline to discipline and research topic to research topic (ibid). As a general starting point, Beam (2005) gives a good rule of thumb for the minimum data size required and states that anything less than

thirty (30) responses falls in the realm of anecdotal evidence and is probably not suitable for much statistical analysis.

Unlike Beam (2005) who suggests 30 responses as the minimum required, independent of the accuracy of prediction required of the study, Easterby-Smith *et al.* (2002) give a rule of thumb formula, which takes into account the accuracy of prediction needed, to calculate the minimum data size.

The formula below is dependent on the error to be allowed in the study and is applicable for a questionnaire containing many questions.

$n \cong \frac{2500}{E^2}$, Where n is the minimum response required and E is the maximum (standard) error allowed (%)

A standard error serves as an estimate of the degree to which a sample accurately estimates the population mean and statistically is taken as an estimate of the average degree to which sample means in the sampling distribution are expected to differ from each other. Hence, statistically, the standard deviation of a given data set is taken as the standard error.

There is no general rule in how much standard error can be tolerated. Researchers use various standard errors in their studies depending on the sensitivity and stability of the study and the importance of the outcome of the study and its implications (Dai & Wells 2004; Faught & Whitten 2004). A standard error of 10% is taken as acceptable for this study where the concept of PMO is believed to be new and hence the views and practices of the respondents may vary widely, i.e., the standard deviation of the responses is expected to be high. Thus in accepting a standard error of 10% as the maximum error that could be allowed to propagate into any of the questions, the minimum response rate needed is 25.

The data size needed for a given test is also related to the statistical power of that test. The statistical power of a test is the probability of correctly rejecting a false null hypothesis (Tredoux & Durrheim 2002).

A null hypothesis is a statement that maintains that there is no difference between groups or conditions. Statistical power is thus intimately related to type II error, failing to reject the null hypothesis when it is false. Type I error is rejecting the null hypothesis when it actually is true. Hence a type I error concerns the event of finding differences that are not there whilst a type II error concerns the event of failing to find differences that there are. The probability of making a type I error in a particular test is the significance level (α) of that test while the probability of making type II error is ß. Since the probability of mistakenly accepting a false null hypothesis is ß, the probability of correctly rejecting a false null hypothesis is 1- ß; the statistical power.

Among other factors such as significance level of the test (hence the probability of making a type I error), the true state of affairs guessed by the alternative hypothesis, and the particular test to be employed, the statistical power of a test is dependant on the data size. Generally, the larger the power required the greater the data size needed, or conversely, the smaller the data size the greater the chance of non significant results accepted, hence the smaller the power of the test.

The statistical power is shown in the respective questions where comparisons among the different groups are made, more specifically at questions where t-tests among the different sub-samples (i.e. contractors, developers and project management companies) is made.

6.2.3.2 Response solicited

A total of 39 (14.6%) responses were received back with most of the construction companies (CON) and developers (DEV) responding as having a dual or triplicate role in the industry. A 15% response rate, although admittedly not a large one, can be taken as

an adequate response rate for an internet survey which is generally known to attract half a response rate as a mail survey would do (Faught & Whitten 2004). Moreover, the construction industry is known to have a generally poor response level to descriptive surveys (Cooke 2003). Hence a total response rate of 14.6% on an internet survey was taken acceptable for the purpose of this study. Moreover, the 39 response rate satisfies the minimum data size stipulated by both Beam (2005) and Easterby-Smith *et al.* (2002) discussed above.

Whilst the overall response rate can be taken as acceptable, the sectoral response was highly skewed towards PMCs. As can be seen from Table 6.2 below, the response rate for contractors and developers is only 9% which is barely satisfactory for the study. This high skewness of the response rate can be attributed to the following major reasons: first, the email address used for the PMC was that of the contact person while a generic address, with a request to forward it to the contact person, was used for contractors and developers. Hence, while there is a high probability that the survey instrument reached the targeted people in the case of the PMC, the same can't be said for contractors and developers where the survey could be met with higher apathy. Secondly, one of the supervisors of the researcher, whose name was mentioned in the cover letter of the questionnaire, previously headed the DVP, the professional association from which the PMC sampling population was extracted, for approximately 15 years. Thus his name was likely to raise the PMC enterprises' interest in the survey and give it heightened credibility amongst that sample.

However, the big difference in the level of response can also possibly be attributable to the subject of the study, and more specifically, to a possible high level of PMO practices awareness by the project management companies as compared to contractors or developers, manifested by a generally better quality of response by the PMC as compared to the replying contractors or developers. Table 6.2 below shows the response profile by sector.

Table 6: 2 Respondents profile as per registration

Sector Companies	*Absolute response*	*Percentage response*
Project Management Companies (PMC)	24	24.0%
Contractors (CON)	7	9.5%
Developers(DEV)	8	8.6%
Total	39	14.6%

Thus, even though attempts were made to show the differences and compare the different groups in terms of PMO characteristics, these findings of differences or similarities may not be conclusive as the data size of the different sectors (individually) is hardy satisfactory to have a credible statistical power. The statistical power of the comparative tests is shown at places where comparison is made.

6.2.4 Roles of respondents in the industry

Although all samples were approached as having a single role in the industry (the sector from which their contact was extracted), the respondents replied to have more than the role they were approached for. As Figure 6.1 below depicts, eight companies that were registered as developers replied to have a dual or triplicate involvement in the industry. Another four companies who were registered as contractors replied as having more than one role. Two project management companies also replied to do both developing and contracting, besides project management.

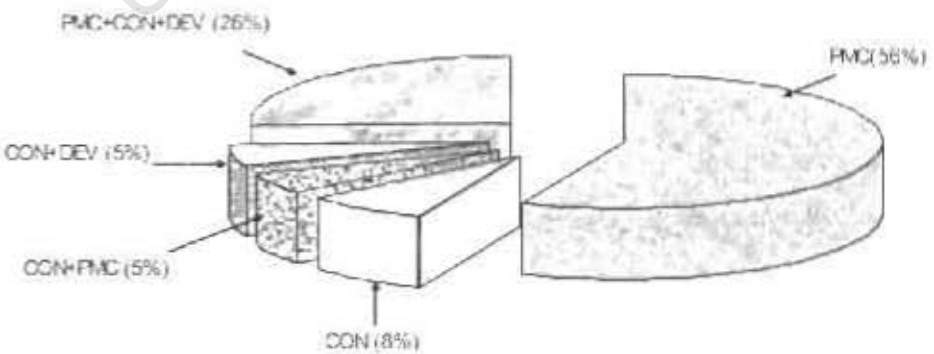

Figure 6: 1 Respondent company profile by sector

6.2.5 Position of respondents

Quite a significant proportion of the respondents (43%) were executive members of their companies (President, Vice-President, Director) whereas 23% of them were functional managers (23%). Whilst quality manager, owner, supervisor, etc formed 28% of the respondents as replied under 'other'. It is interesting to note that only 3% of the respondents were actually PMO managers or PMO staff. This low percentage of actual PMO managers/responsible champions may suggest that most companies operate a virtual PMO where executives keep an eye on its function but with no appointed responsible body. Figure 6.2 below shows the position of the respondents.

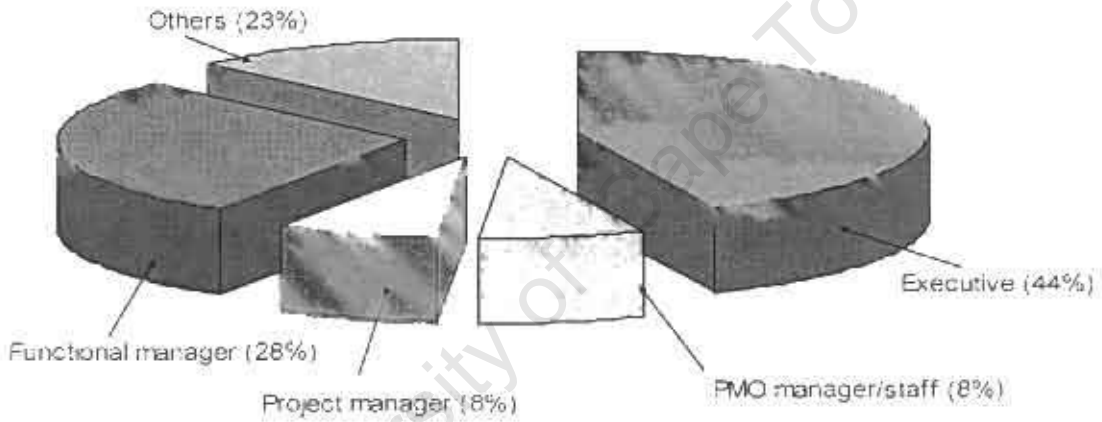

Figure 6: 2 Positions of respondents

When broken down into the position of the respondents in their respective sector, the highest number of respondents from contractors and project management companies were at executive position as 43% and 50% respectively which is followed by 'other' at 29% for contractors and functional manager as 33% for PMC. Developers exhibited a generally even distribution.

Table 6: 3 Positions of respondents by sector

Position of respondent	*CON*	*DEV*	*PMC*
Executive	42.9%	25.0%	50.0%
PMO manager/staff	0.0%	25.0%	4.2%
Project manager	14.3%	0.0%	8.3%
Functional manager	14.3%	25.0%	33.3%
Other	28.6%	25.0%	4.2%

6.3 PMO Capability, Roles, Success factors and Challenges

6.3.1 PMO capability

Question: What does your organisation's PMO capability look like?

Given the spectrum of roles that the PMO is believed to be called upon to play, the scope of the PMO becomes of interest. This question aims to explore the scope of the PMO of the sector companies, which might have a direct effect on the maturity level of the entity.

As shown is Figure 6.3 below, while 87% of respondents indicate that some form of PMO is in place within their organization, for a significant number (46% of overall respondents) the PMO is established on only an informal basis, with 18% of respondents indicating a capability designed to support an individual project or department and 28% of them reflecting a more enterprise wide capability, if still an informal one. For 41% of respondents, a formal PMO capability has been defined. However, only 37% of these (15% of overall respondents) who indicated an organizational wide capability while the rest (26% of respondents) reported a project or department level capability.

With no previous research on compiling PMO capability within companies of the construction industry identified through the literature review, it is impossible to make comparisons with other findings. However, given the relatively recent focus on

organizational project management and the relative novelty of the concept of PMO, the capability manifested within the industry is satisfactory.

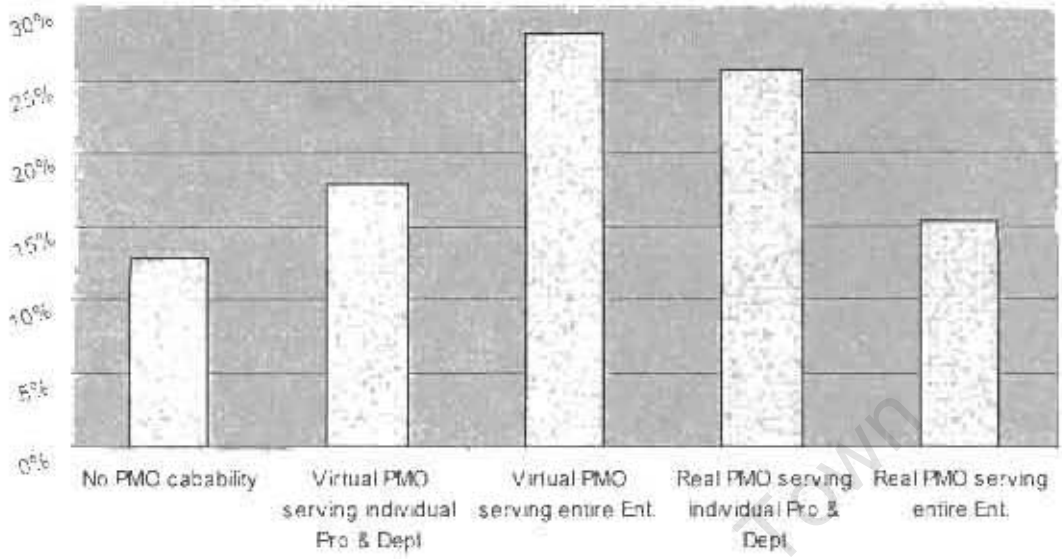

Figure 6: 3 PMO capabilities

In looking into the capability within the different sectors, 58% of the contracting company's respondents replied as having a real PMO, either at project/department level or enterprise wide. But still about one-third (29%) of the contractor respondents replied as not having any sort of PMO capability.

Nearly two-third (63%) of the developers who have replied indicated having only informal PMO, either at department/project level or enterprise wide or not having the capability at all while the rest replied as having some sort of formal PMO albeit at the department/project level.

The project management companies seem to exhibit a normal distribution with 38% of them replying as having a formal PMO with more than one-third of them (13% of the total PMC respondents) replied as having enterprise wide real PMO. Exactly half of the respondents indicated as having an informal PMO, 58% of whom (29% of total PMC respondents) indicating as having an enterprise wide entity, if still virtual. About thirteen percent (13%) of the respondents indicated that they did not possess any PMO capabilities.

Table 6: 4 PMO capabilities by sector

Capability	*CON*	*DEV*	*PMC*
No PMO capability	28.6%	12.5%	12.5%
Virtual PMO serving individual Pro.& Dept	0.0%	25.0%	20.8%
Virtual PMO serving entire Ent.	14.3%	25.0%	29.2%
Real PMO serving individual Pro & Dept	28.6%	37.5%	25.0%
Real PMO serving entire Ent.	28.6%	0.0%	12.5%

Statistically, there isn't a significant difference in PMO capability among the sectors. A student's t-test between the sectors gives the t_{calc} (t calculated) and t_{crit} (t critical) for a double-tailed t-values and statistical significance level α =5%, the probability with which we are willing to reject a null hypothesis while it is correct, shown in table 6:5 below. With $t_{calc} < t_{crit}$ in all cases, the t-test shows that the null hypothesis that there is no significant difference (α =5%) in the PMO capability between the sectors is valid.

Table 6: 5 Summary of t-test results

Relations	t_{calc}	t_{crit}	*Power*
CON-vs-DEV	0.5579	2.1448	<0.17
PMO-vs-CON	0.5670	2.0452	<0.17
PMC-vs-DEV	0.1689	2.0423	<0.17

As tabulated in Table 6:5, however, the small statistical power, the probability of correctly rejecting a correct null hypothesis, indicates that the probability of the validity of the null hypothesis is very small.

6.3.2 PMO names

Question: If your organization possesses PMO capabilities, what do you call your PMO?

The name Project Management Office seem to take a centre stage in nomenclatures given to the capability that is ascribed to the PMO, probably due to the PMI's adoption of this name (*PMBOK* 2004). But organizations continue to use a variety of names to describe their capability. Thus it was necessary to track down which nomenclature is predominant in the case of the construction sector.

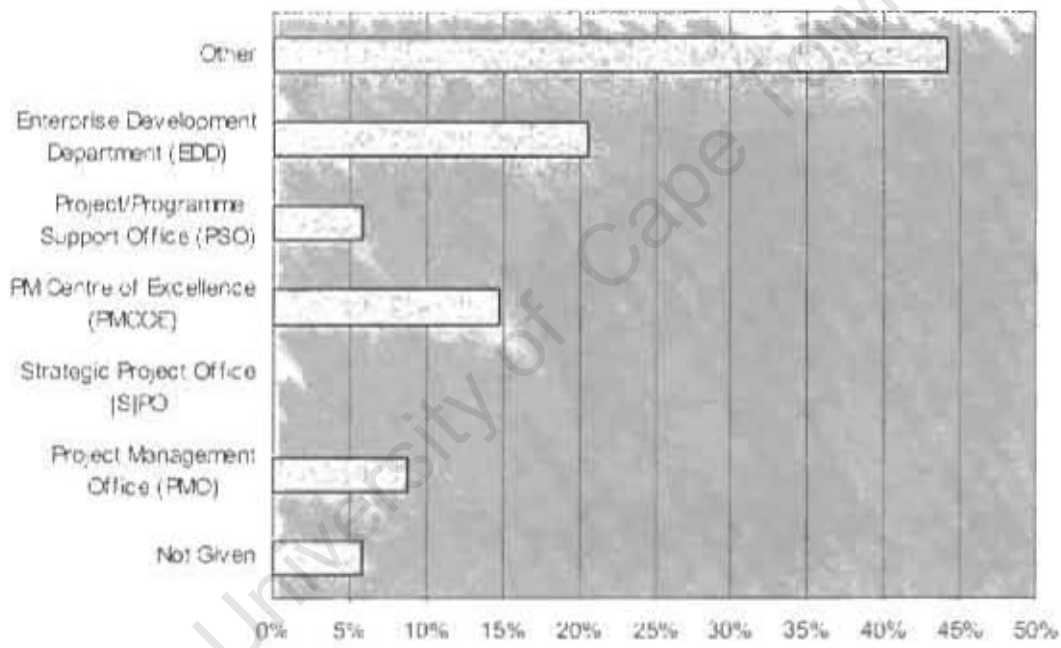

Figure6: 4 PMO nomenclature

As can be seen by the 44% of 'other' response than the most frequently cited names in literature (those indicated in the choices), it is evident that there is no one consistent title for the capability ascribed under the Project Management Office. Moreover, asked to specify what they call their PMO, these 'other' respondents gave a range of names for their PMO with internal (or human resource) PMO, customer service and quality management office being among the frequently cited ones. Of the possible names frequently cited in literature, 'enterprise development' (EDD) received 21% of the

responses while project management centre of excellence (PMCOE) came next at 15 %. It is interesting to point out, however, that it is only about 9% of the respondents who actually named their capability as PMO which may imply that the concept of the PMO is not yet standardized within the construction sector.

Except for developers where more than a quarter of them (28.6%) call their capability the Project Management Office, the name 'project management office' doesn't seem prevalent for contractors and project management companies for the capability that this study has ascribed to it. While all the three sectors gave a wide range of names for their capability under the choice 'other', contractors attached their capability to their enterprise development department. Developers also responded as giving that name equal to the name they gave their capability a PMO. More than a quarter of (27.3%) project management companies call their capability 'project management centre of excellence'.

Table 6: 6 PMO names by sector

PMO Names	*CON*	*DEV*	*PMC*
Not Given	0.0%	0.0%	9.1%
Project Management Office (PMO)	0.0%	28.6%	4.5%
Strategic Project Office [S]PO	0.0%	0.0%	0.0%
PM Centre of Excellence (PMCOE)	0.0%	0.0%	27.3%
Project/Programme Support Office (PSO)	0.0%	14.3%	0.0%
Enterprise Development Department (EDD)	33.3%	28.6%	13.6%
Other	66.7%	28.6%	45.5%

6.3.3 PMO inception time

Question: How long has it been since your PMO was incepted?

Different industry sectors have accepted the PMO at different rate. As discussed earlier the construction sector seems to adopt the concept at a slower speed than other sectors. Exploring the age of the PMO within the three sectors surveyed may then help to have a

view when the concept started to penetrate into the sectors and help to analyse the relation between the entity's maturity and its age within the sector companies.

In looking at the longevity of PMO capabilities, more than two-thirds of the respondents (67%) said their PMO was less than five years old, reflecting the relatively recent focus that has been placed on establishing organizational project management capabilities. 12% replied as having set up their PMOs five to ten years previously. Given the high percentage of relatively new PMOs, it is perhaps more surprising that nearly one-fifth (18%) of PMOs have been in place for over 10 years.

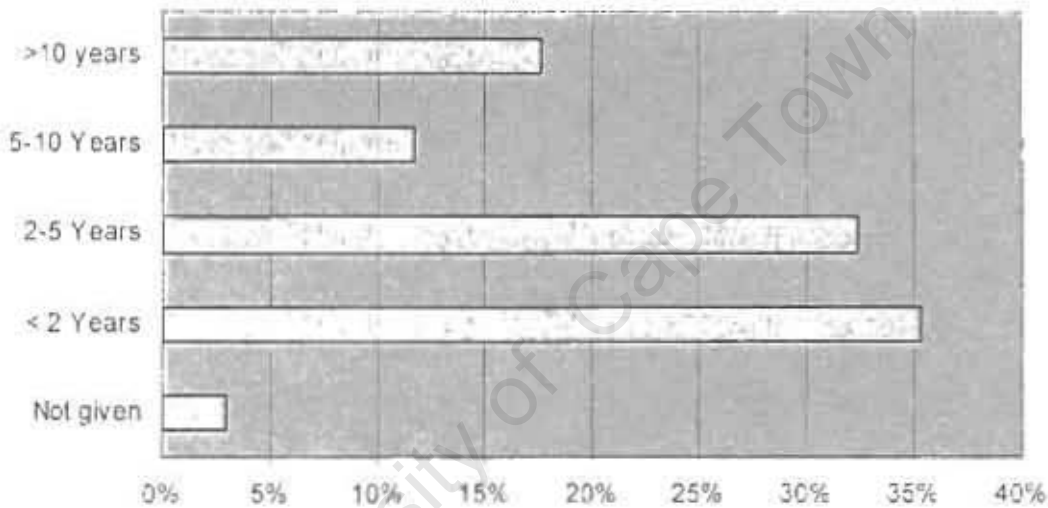

Figure 6: 5 PMO inception time

When looking into the age of this organizational entity in the different sectors, project management organizations seemed to embrace the concept before the others. One-quarter of the project management company respondents indicated that their PMO has been in place for more than a decade while none of the contracting companies or developers indicated to have that old entity. All developers who have indicated the age of their PMO has indicated to establish it within the last five years or less.

However, with the calculated t values t_{cal} = 0.2269, 1.8576, 1.9609 between PMC and CON, PMC and DEV and CON and DEV respectively all less than the respective critical values of t_{crit} = 2.0639, 2.0555, 2.2281, (where the data with no date given not included

and for a double tailed t-test of significance level 5%) the difference in ages of PMO between the sectors is not significant in statistical terms.

With the exception of the difference in ages between project managing companies and contractors where the statistical power is very low at less than 0.17, there is a relatively good chance (at a power of 0.64 and 0.49 respectively between PMC and DEV and CON and DEV) that the different sectors PMO age doesn't vary significantly.

Table 6: 7 PMO inception time

Age of the PMO	*CON*	*DEV*	*PMC*
Not PMO/not given	28.6%	12.5%	8.8%
< 2 Years	14.3%	50.0%	29.2%
2-5 Years	28.6%	37.5%	25.0%
5-10 Years	28.6%	0.0%	8.3%
>10 years	0.0%	0.0%	25.0%

6.3.4 Activities undertaken to create the PMO

Question: What activities did you undertake to create your PMO?

Depending on the values, norms, cultures and needs of the organizations, the activities undertaken to create the PMO differ from organization to organization. This question aimed at exploring and tracking down some the activities within the sector that others might adopt, with appropriate adjustment to their system, in their pursuit of a PMO.

The activities undertaken to create the PMO seemed to focus on high-level organization tasks such as: facilitate collaborative work within the organization (62%), development of structure for the PMO (44%) and established vision and strategy for the PMO (32%). It is interesting to note, however, that there was less emphasis to hiring consultants (24%) which looks a wise move as PMOs are organizational capabilities which need to be nurtured rather than imposed on an organization by external consultants.

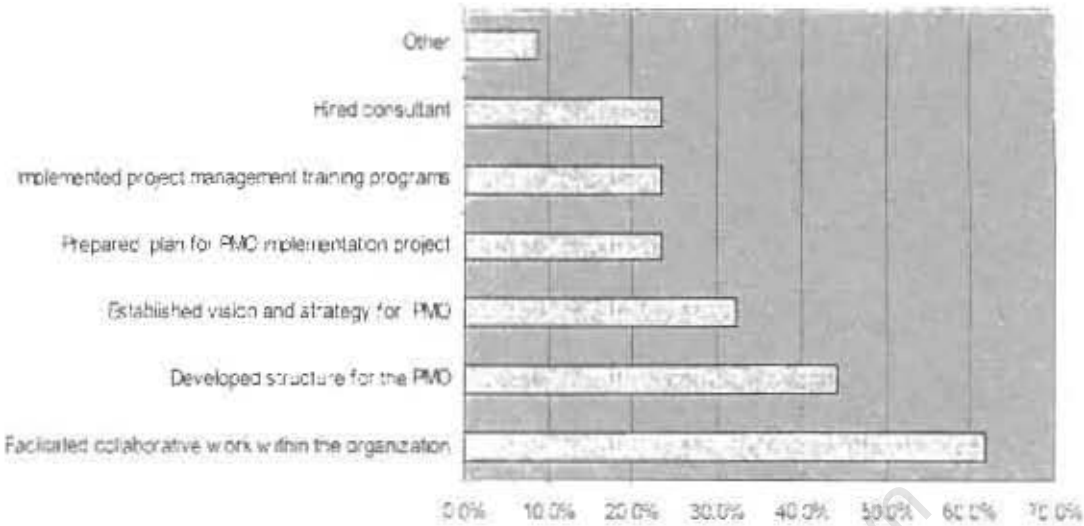

Figure 6: 6 Activities undertaken to create PMO

A more or less similar trend to the overall response is exhibited by the different sectors for the activities undertaken to create PMOs. Facilitating collaborative work within the organization was the main activity in all of the three sectors and is followed by implementing project management training programs and developing structure for the PMO in the case of contractors, establishing vision and strategy for a PMO, developing structure for the PMO hiring consultants for developers while project management companies gave more emphasis on developing structure for the PMO and establishing vision and strategy for the PMO.

Table 6: 8 Activities undertaken to create PMO-sectoral view

Activities	*CON*	*DEV*	*PMC*
Established vision and strategy for PMO	20.0%	57.1%	27.3%
Prepared plan for PMO implementation project	20.0%	28.6%	9.1%
Facilitated collaborative work within the organization	60.0%	85.7%	63.6%
Implemented project management training programs	40.0%	28.6%	13.6%
Developed structure for the PMO	40.0%	57.1%	50.0%
Hired consultant	20.0%	57.1%	4.5%
Other	20.0%	0.0%	9.1%

With t_{class} of 0.6082, 0.0416, 0.5582 between PMC and CON, PMC and DEV, CON and DEV all less than their respective critical values, the differences in activities undertaken by the different sectors aren't statistically significant. However, with yet again all the statistical powers at less than 0.17; the result doesn't show a conclusive image that the different sectors indeed followed similar procedures and practices in implementing their PMO.

6.3.5 Business case for PMO

Question: What was the business case for your PMO?

As in the activities undertaken in creating the PMO, different companies have different major reasons for implementing a PMO in their organizational hierarchy. Documenting these business cases will help identify the major reasons why companies within the construction sector dwell on the PMO implementation project.

There were combinations of factors, ranging from project oriented to strategic ones that have supported the implementation of PMOs within organizations. The most common reason for the PMO, mentioned by 91% of respondents, was to ensure more successful implementation of projects. Increased staff professionalism in PM came next in frequency with 85% of respondents indicating it as the business case for their PMO. Organizational performance improvement (76%), implementing predictable & reusable PM tools, techniques and processes (68%) and formalizing knowledge management practices (56%) were all mentioned by over half of the respondents with help to build PM oriented culture remotely making the top six frequently cited business cases at 29%. Structuring core performances and improving economic return were also mentioned by respondents as reasons to launch a PMO.

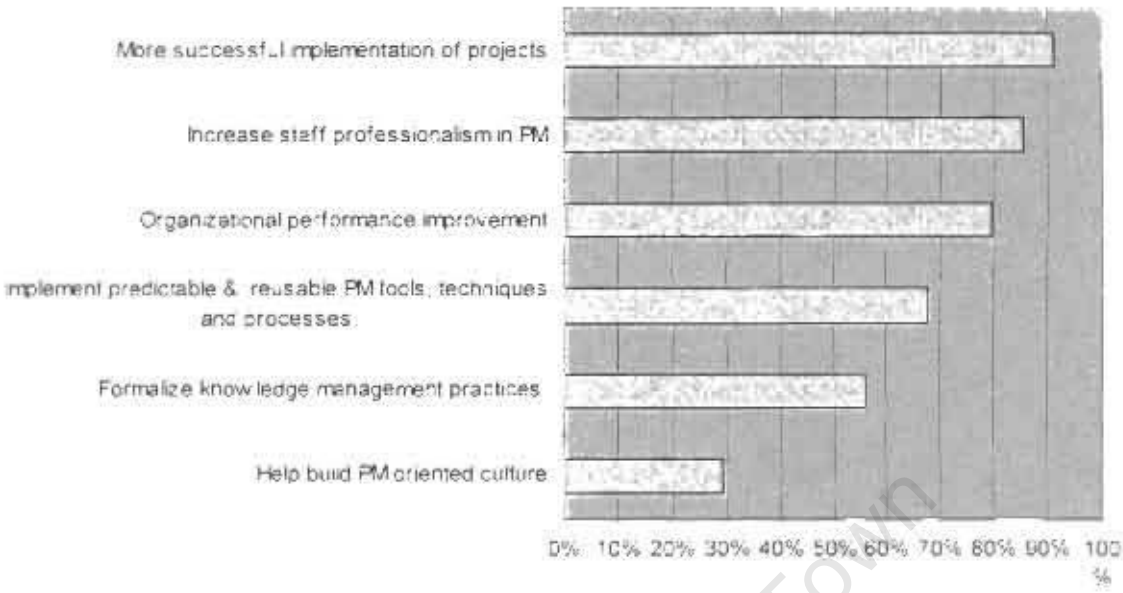

Figure 6: 7 Major business cases for PMO

Increasing staff professionalism in PM, at 100% response, is the most frequently cited mandate that contractors assign to their PMO followed by formalizing knowledge management practices, organizational performance improvement, implementing predictable & reusable PM tools, techniques and processes and more successful implementation of projects all at 80%.

Table 6: 9 Business cases by sector

PMO business cases	*CON*	*DEV*	*PMC*
Formalize knowledge management practices	80.0%	37.5%	50.0%
Organizational performance improvement	80.0%	75.0%	81.8%
Help build PM oriented culture	60.0%	25.0%	22.7%
Increase staff professionalism in PM	100.0%	62.5%	86.4%
Implement predictable & reusable PM tools, techniques and processes	80.0%	75.0%	59.1%
More successful implementation of projects	80.0%	87.5%	90.9%

Though contractors' priority to launch a PMO seemed a bit different, even if not significantly, developers and project management companies seemed to have a broadly similar major incentive in establishing a PMO with both putting more successful implementation of projects at the top of their drive at 87.5% and 90.95 respectively. While increasing staff professionalism in PM came second at 86.4% for the PMC followed by organizational performance improvement at 81.8%, this has swapped in the case of developers who have indicated organizational performance improvement and implementing predictable & reusable PM tools, techniques and processes as their next most frequent business case for establishing PMO, both at 75% followed by increasing staff professionalism in PM at 62.5%. In statistical terms, there again isn't a significant difference to the business cases of the different sectors.

6.3.6 Roles of the PMO

Question: What does your PMO do?

The actual role of the PMO varies considerably from organization to organization and can be linked to the maturity level of the PMO entity. It can be thought as a continuum between project and enterprise oriented. As project-oriented role player, it can do anything from supporting project managers in some activities to taking the actual responsibility to deliver the project itself. Moving towards the opposite end of the spectrum, where the PMO plays a more strategic role than focusing in the day to day activities of projects, the PMO is responsible for coordinating the KM strategy of the company, planning for and effecting continuous improvement strategies, helping senior management in strategic planning, etc. This question aims at tracking the major roles of the PMO in the sector areas of the industry.

As can be seen in Figure 6.8 below, it appears that there is no real inclination in any of the extremities of the continuum with disseminating information (74%) developing methodologies, standards and templates for PM (68%) (which are more of an enterprise oriented activities) only slightly edging the more project oriented monitoring and

controlling project performance at 65%. One the lower end of the responses, the more project oriented role of managing one or more programmes (21%) edged the more or less enterprise oriented functions of formalizing project selection through project portfolio management (18%) and conducting benchmarking in best practices of PM at (15%). This finding of non-inclination to either project or enterprise-oriented roles is in agreement with the more or less normal distribution of the PMO capability and PMO maturity as shown in Figures 6.3 and 6.12 respectively. Theoretically, as the PMO gets more mature, it should tend to concentrate on the enterprise oriented functions.

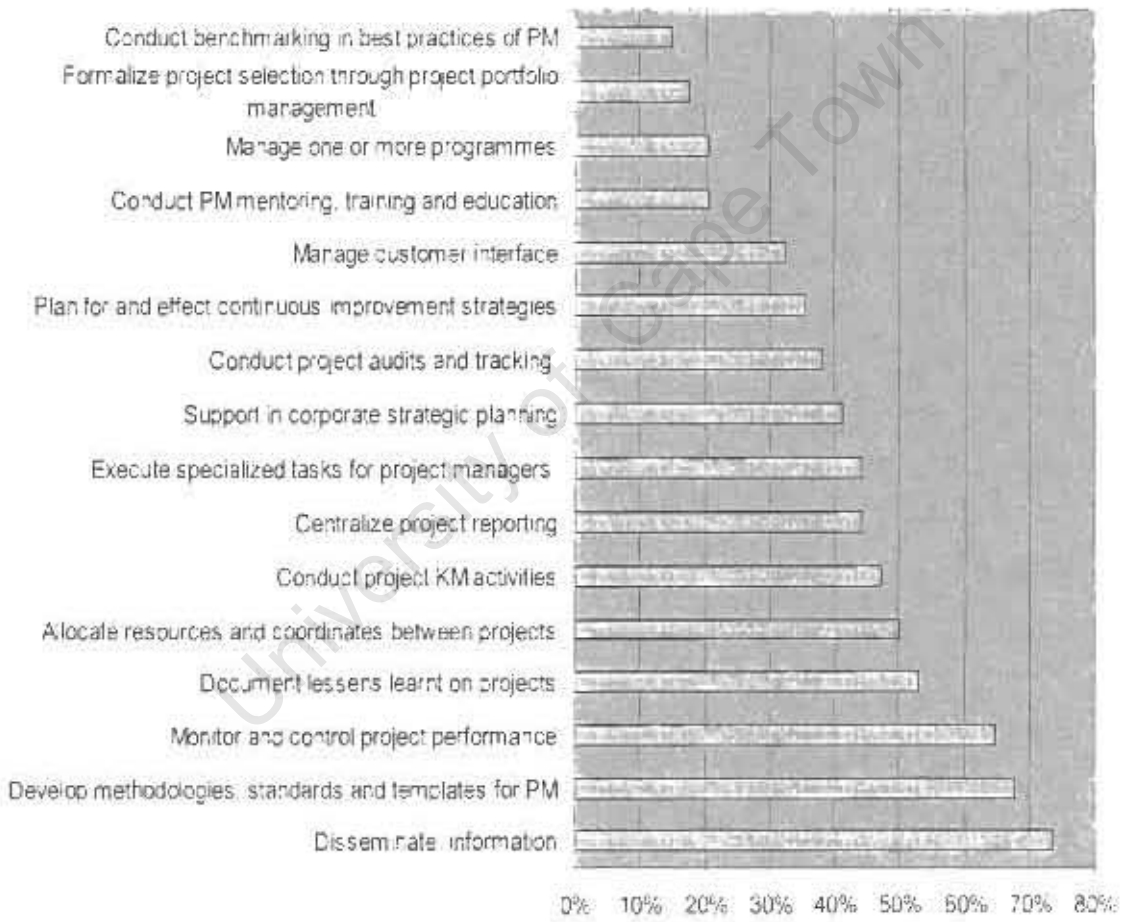

Figure 6 8 PMO roles

Table 6: 10 Major PMO roles in the different sectors

Contractors	
Document lessens learnt on projects	66.7%
Develop methodologies, standards and templates for PM	66.7%
Disseminate information	66.7%
Conduct project audits and tracking	66.7%
Monitor and control project performance	50.0%
Conduct project KM activities	50.0%
Developers	
Allocate resources and coordinates between projects	100.0%
Disseminate information	85.7%
Monitor and control project performance	85.7%
Centralize project reporting	71.4%
Execute specialized tasks for project managers	57.1%
Manage one or more programmes	57.1%
Manage customer interface	57.1%
Project Management Companies	
Develop methodologies, standards and templates for PM	81.8%
Disseminate information	77.3%
Document lessens learnt on projects	59.1%
Monitor and control project performance	59.1%
Conduct project KM activities	54.5%
Support in corporate strategic planning	45.5%
Plan for and effect continuous improvement strategies	45.5%

As can be seen from Table 6.10, though the role of the PMO in the individual sectors doesn't have a significant difference. PMOs role in contactors and developers seemed to mix both those that are project oriented activities and enterprise oriented functions. With the more project oriented activities such as conducting project audits and tracking and monitoring and controlling project performance making the top six activities under the PMO in case of contractors and monitoring and controlling project performance, executing specialized tasks for project managers and managing one or more programmes forming the top seven activities under PMO for developers. PMO's role in project

management companies seemed to focus more on strategic enterprise wide activities. This can be seen from the fact that only monitoring and controlling project performance, project oriented activity, making in to the top seven roles of the PMO in the sector while the extreme enterprise oriented activities such as supporting in corporate strategic planning and planning for and effecting continuous improvement strategies leading the major roles of PMO.

6.3.7 Success factors

Question: What contributed to the success of your PMO?

Organizations have their own set of values, norms and cultures which might have contributed to the success of their PMO. Tracking the major factors that contribute to effective implementation of this entity will help others benchmark these companies and put in place these factors for successful implementation.

As shown in Figure 6:9 below respondents indicated that the key contributors to the success of their PMOs were those items that, when lacking, contributed to failure. Seventy-one percent (71%) of respondents indicated the primary contributor to success was having a clear process in place for managing projects and collecting knowledge gained on projects. Other important contributors to success included: easy access by employees to PMO resources (53%) and having an organizational culture that is supportive of the PMO (47%). Some (3) respondents mentioned dedicated staffing and clear communication of the PMO mandate as additional contributors to success.

Table 6: 11 Success factors by sector

Success factors	*CON*	*DEV*	*PMC*
Organizational culture supportive of PMO	50.0%	42.9%	45.5%
Clear process in place for managing projects and collecting knowledge gained on projects	50.0%	57.1%	77.3%
Easy access by employees to PMO resources	83.3%	28.6%	50.0%

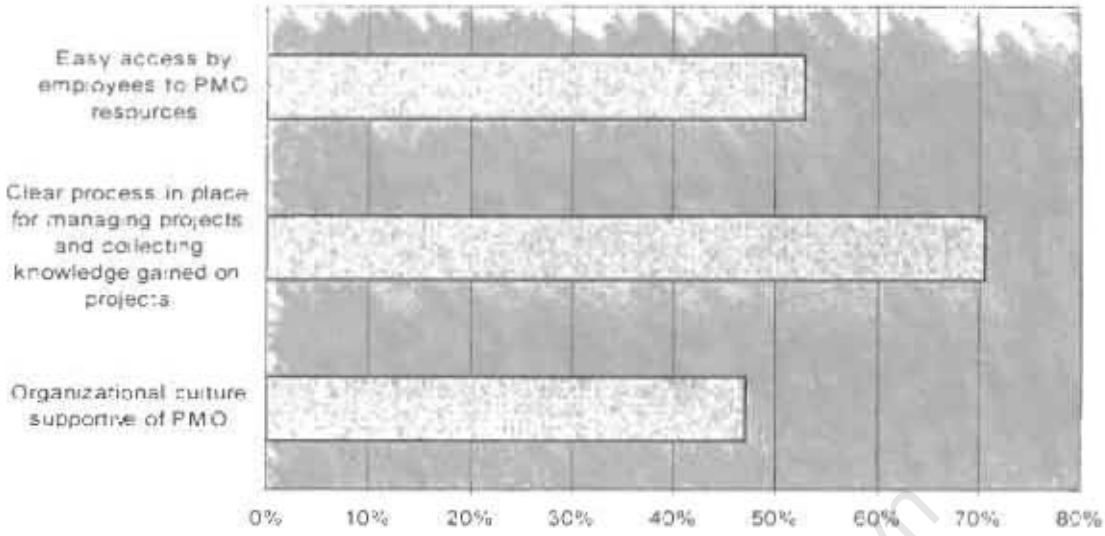

Figure 6: 9 Major success factors for PMO implementation and running

The most important factors that need to be in place for successful implementation of PMOs seem to vary widely among the sectors. While easy access by employees to PMO resources was seen as the most important factor by contractors, it was seen as the least important factor by developers and second important by project management companies, both of which considered existence of clear process for managing projects and collecting knowledge gained on projects as the most important factor. Moreover, it is worth noting that, while contractors and project management companies gave a higher percentage response on the factors, that can't be said for developers.

6.3.8 Major challenges

Question: What obstacles did your PMO experience?

Implementing a PMO structure within a given organizational hierarchy may create different challenges and resistances. As cited in chapter 3, the literature indicates many items that are frequently mentioned as major obstacles in implementing and running a PMO. This question aimed in compiling some of such major challenges within the sectors

under scrutiny, which could help new companies that want to implement a PMO to take a precautionary measure.

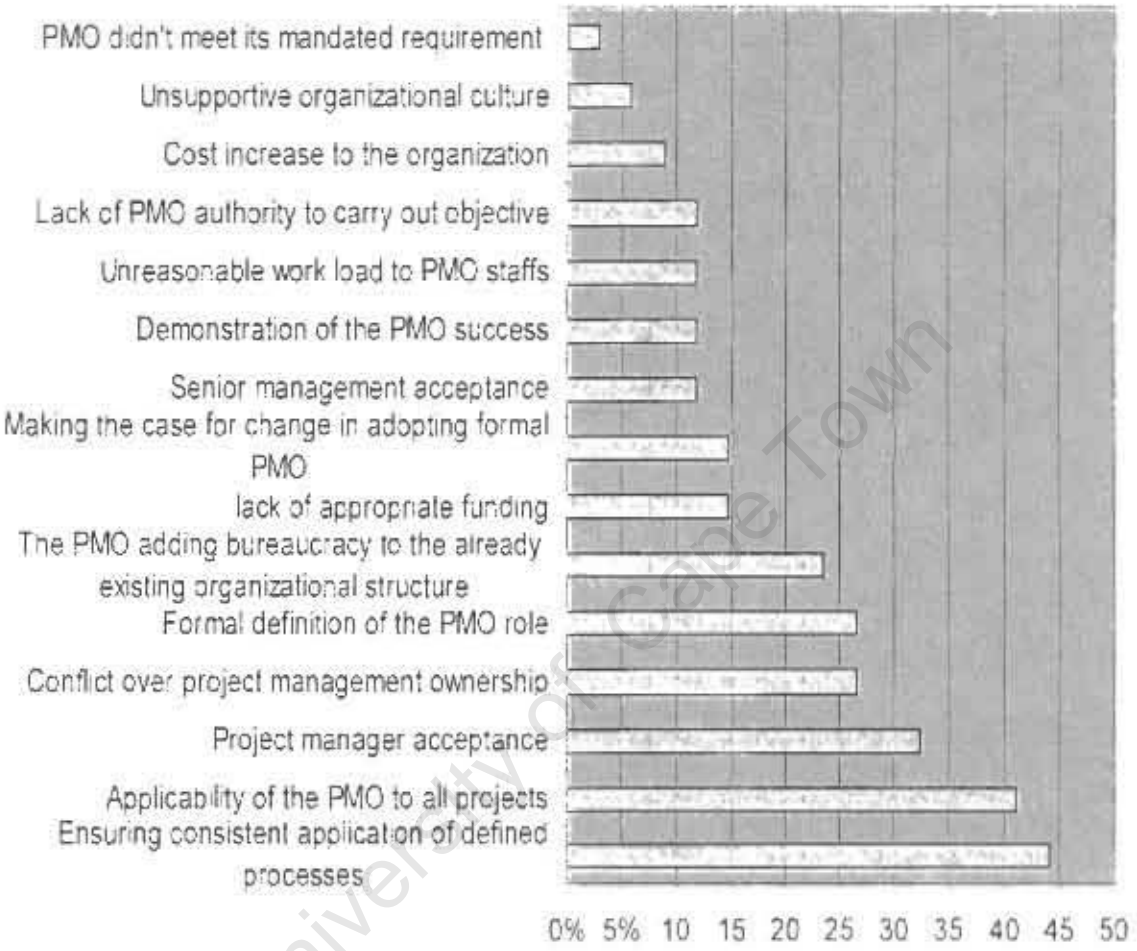

Figure 6: 10 Obstacles in PMO implementation and running

Thus, in looking at the dimensions where the current challenges in establishing and maintaining the PMO capability lie, 44% of the respondents specified consistent application of defined processes as the main challenge with applicability of the PMO to all projects (41%) and project manager acceptance (32%) mentioned as second and third main challenges. On the lower end of the responses, cost increase to the organization (9%) and unsupportive organizational culture (6%) were mentioned among the least obstacles in PMO implementation and running. Perhaps interestingly, PMO's inability to deliver its mandated function was mentioned as the least obstacle at only 3%. This could

reflect the views the organizations hold on PMO - as can be seen in the views the companies have on their PMO's contribution at (see section 6.5 below). Figure 6:10 above shows the major obstacles mentioned.

Table 6: 12 Major challenges by sectors

Top seven challenges: Contractors	
Unreasonable work load to PMO staffs	50.0%
Senior management acceptance	33.3%
Project manager acceptance	33.3%
Demonstration of the PMO success	33.3%
Applicability of the PMO to all projects	33.3%
Conflict over project management ownership	33.3%
Top seven challenges :Developers	
Ensuring consistent application of defined processes	71.4%
Conflict over project management ownership	57.1%
Formal definition of the PMO role	42.9%
Applicability of the PMO to all projects	42.9%
Senior management acceptance	42.9%
Project manager acceptance	28.6%
The PMO adding bureaucracy to the already existing organizational structure	28.6%
Top seven challenges: Project Management Companies	
Ensuring consistent application of defined processes	40.9%
Applicability of the PMO to all projects	40.9%
Project manager acceptance	31.8%
Formal definition of the PMO role	27.3%
The PMO adding bureaucracy to the already existing organizational structure	27.3%
Conflict over project management ownership	18.2%
Making the case for change in adopting formal PMO	13.6%

When looking into the challenges by sector, contractors cited unreasonable work load to PMO staffs as their major challenge while both developers and project management

companies put ensuring consistent application of defined processes as their major obstacle towards PMO. However, major challenges faced by companies in the different sectors don't appear to show a significant difference with more or less the same factors making up the top seven factors in each sector, though with varying degrees and rank.

6.3.9 Ways to overcome challenges

Question: How did you overcome these obstacles?

This question was posed with a view to solicit and document some of the methods that the companies adopted to overcome the challenges they experienced. However as the questions were open ended where respondents were asked to show their own experience, it attracted few responses. Only 19 of the 39 respondents gave answers to this question. Three of those were contracting companies, four developers and the remaining twelve project management companies.

Suited to their own challenges and culture, the respondents gave a wide range of ways of overcoming their challenges. Following the PMO's lead, tackling problems at the department/project level before they escalate, continuous assessment and evaluation of the PMO, putting clear procedures and ensure accountability, implement PMO slowly by going from lower project-oriented ones to higher enterprise-oriented PMOs rather than doing it at once, etc. were some of the methods the respondents mentioned to have used. One- third of the overall respondents said they had not overcome the problem as of the day they replied for the questionnaire.

6.3.10 PMO's current status

Question: Is your PMO still in place?

This question helps to explore if there were PMOs which have failed to overcome the obstacles experienced.

Asked if their PMO is still in place within the organization, all respondents who replied as having the capability gave a positive response.

6.4 Structure of the PMO

6.4.1 PMO reporting structure

Question: 'To whom does your PMO directly report?

One of the struggles that most organizations face in establishing a PMO capability is determining where in the organizational hierarchy it should be placed. The PMO's hierarchical position highly determines its capability in effecting a sustainable change within the organization.

As shown in Figure 6:11 below, though some of the respondents gave a multiple reporting structure, interestingly almost sixty percent of them indicated that their PMO reported to a Vice-President (59%). This, coupled with the fact that 29% of PMOs reported to a director/manager level reflects that PMOs are placed strategically high enough to effect a real change in PM professionalism and culture. But still, more than a quarter (26%) reported as not having a formal reporting structure which could foster an *ad hoc* culture and may deprive the companies of the benefit of PMO.

When looking into the individual sectors, the PMO seemed to be placed at a strategically higher level to effect its mandated functions with all of them indicating Vice President level reporting at 50% response rate or more. Though all of the contractors' and developers' PMO still reported to higher echelons of Vice President level, Board of Directors, CEO/Senior Management team or Manager/Director it is interesting to note that a very high proportion of PMOs of project management companies (45.5%) have no formal reporting structure. This is in contrast to the previous finding that project management companies embraced the concept of PMO before the other sectors and the associated implication that the more the older the PMO the more mature and standardized it will be and hence have a formal reporting structure

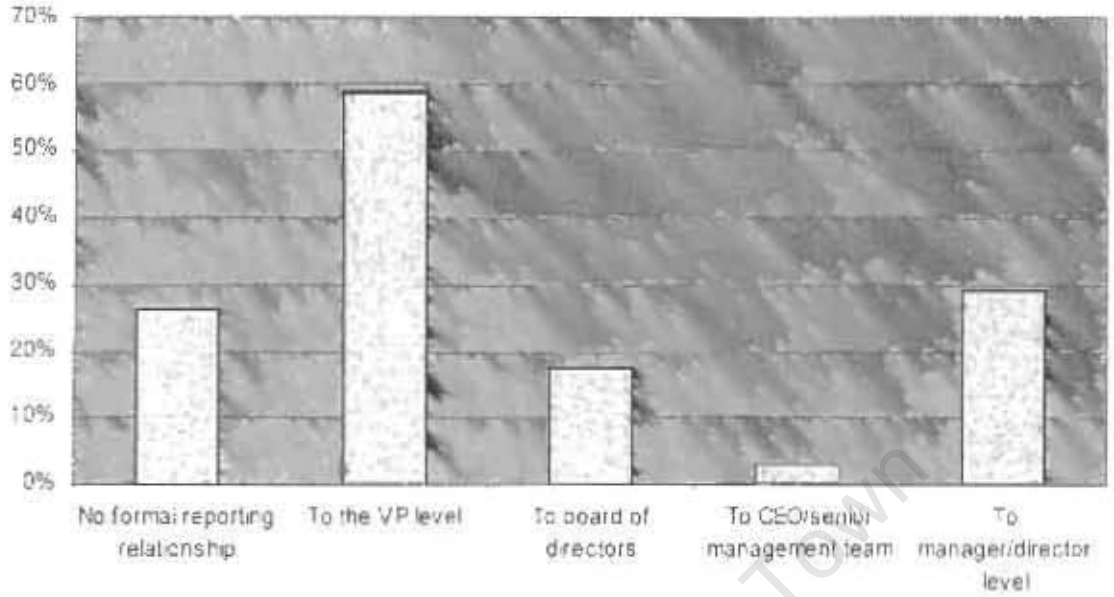

Figure 6: 11 PMO reporting structure

Table 6: 13 PMO reporting structure by sector

PMO reports:	*CON*	*DEV*	*PMC*
No formal reporting relationship	0.0%	0.0%	45.5%
To the VP level	50.0%	71.4%	50.0%
To board of directors	16.7%	28.6%	13.6%
To CEO/senior management team	16.7%	0.0%	0.0%
To manager/director level	33.3%	57.1%	18.2%

Table 6: 14 calculated and critical t values

Relations	t_{calc}	t_{crit}	*Power*
PMC-Vs-CON	0.2823	2.0739	<0.17
PMC-Vs-DEV	0.8732	2.0518	<0.17
CON-Vs-DEV	0.3920	2.1315	<0.17

However, as shown in Table 6:14 above, with all the calculated t-values less than their respective critical values, there isn't a significance difference in PMO reporting among the different sectors. But yet again, the statistical power is very small to conclude so.

6.4.2 PMO maturity level

Question: How do you characterize the maturity level of your PMO?

The PMO's responsibility and scope highly depends on its maturity level. As the PMO gets more mature, it focuses more in the enterprise oriented functions such as instilling effective project management practices and culture which enables the organization successfully deliver project on a consistent basis and adapt to fast changing business environments. Thus investigating the maturity level of this entity in the sector companies will help identify where in the maturity continuum the sector companies lie.

When looking at where to put the maturity level of their PMO and where most support is leveraged, each of the choices 'supports several projects under the same programme', 'supports a division or departments of an organization with all its projects' and 'supports the organization within its projects' were indicated by twenty nine percent (29%) of all respondents. Another 24% of the respondents reported the more advanced maturity level of 'supports business strategy and resource allocation at the enterprise level'. Interestingly, it is only less than one-fifth of the respondents (18%) that reported their PMO to support a single big project (L1). Even though, some respondents gave two or more options - hence the reason for the percentages not adding to hundred - this outcome, along with the previous finding that PMO roles are not inclined in either direction of project or enterprise oriented functions could reflect that most PMOs in the sector are at the middle level of the maturity continuum.

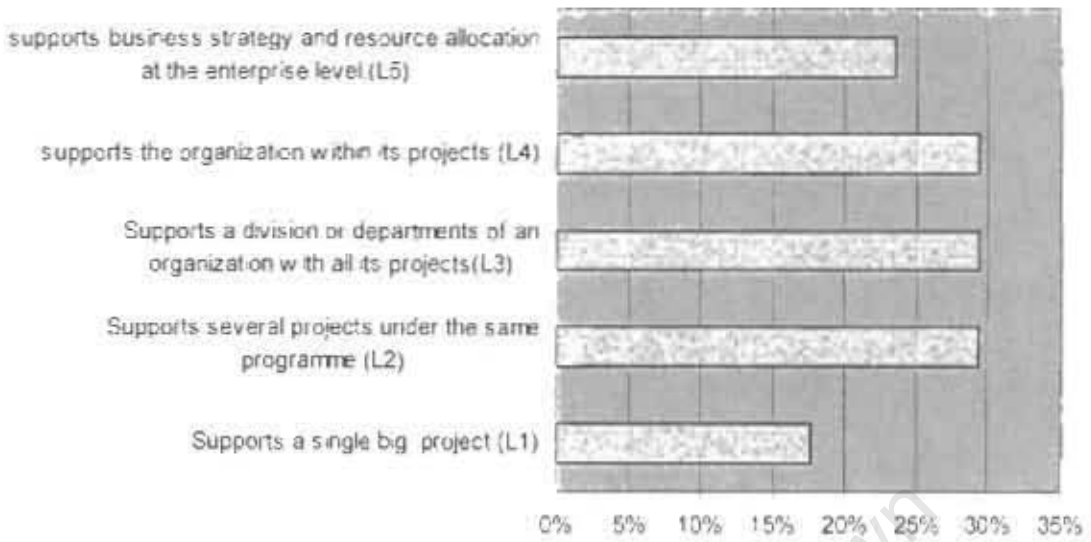

Figure 6: 12 PMO maturity level

The response profile over PMO's maturity level is generally in compliance with the response to PMO capability in the different sectors where contractors have shown more inclination to a more mature enterprise wide capability, developers that of project level maturity and project management companies a normal distribution over the range.

Most contractors responded that their PMO gives support to the entire organization, with about two-third (66.7%) of them indicating that the PMO supports the organization within its projects and another one-six indicating that their PMO helps in business strategy and resource allocation at the enterprise level. Developers frequently cited giving support to a division or departments of an organization with all its projects as their PMO's maturity level at 57.1% followed by supporting several projects under the same programme at 28.6%. Both of these levels are associated with less matured PMO. PMC showed a more even maturity level focusing both on project oriented and enterprise oriented ones with the supporting several projects under the same programme reported most frequently at 36.4% followed by supporting the organization within its projects and business strategy and resource allocation at the enterprise level at 27.7% thus indicating a more or less uniform maturity level over PMO maturity continuum.

However, there isn't a statistically significant difference in PMO maturity among the sectors.

Table 6: 15 Sectoral PMO maturity level

PMO maturity level	*CON*	*DEV*	*PMC*
Supports a single big project (L1)	16.7%	14.3%	18.2%
Supports several projects under the same programme (L2)	0.0%	28.6%	36.4%
Supports a division or departments of an organization with all its projects(L3)	16.7%	57.1%	22.7%
Supports the organization within its projects (L4)	66.7%	14.3%	27.3%
Supports business strategy and resource allocation at the enterprise level.(L5)	16.7%	14.3%	27.3%

6.4.2.1 PMO maturity and age

If common sense is to be applied, the PMO maturity level within a given organization can be assumed to improve as the PMO within the organization structure gets older.

A chi-square test was carried out to test the hypothesis that the two factors are positively related. However, one of the two basic assumptions of a chi-square test is that the expected frequencies in each cell are not 'too small'. A rule of thumb is that the expected frequency shouldn't be less than five in at least 80% of the cells (Tredoux & Durrheim 2002). However, the expected frequencies in this study don't satisfy this rule of thumb. Everitt (1992) argues that this rule of thumb is extremely conservative and in the majority of cases the chi-square test can be used for contingency tables with more than 0.5 expected frequencies in all the cells. Thus conducting a chi-square test was accepted as a means of testing the relationship between the items.

The calculated χ^2 value (χ^2_{calc}=13.6504) is less than the critical value (χ^2_{crit}= 21.0261) for a significance level of 5%. Thus, the directional alternative hypothesis that there is a positive relationship between PMO maturity and age of PMO is invalid, or conversely,

the null hypothesis that there is no relationship between PMO age and its maturity is valid. This is contrary to the belief and the natural trend that maturity comes with age and more practice. However, it can be explained by the fact that the concept of the PMO is new. Since the concept is relatively new within the industry and not yet well adopted and stabilized, there aren't properly tested procedures and best practices of establishing the entity. Thus different companies may launch a PMO at a different maturity stage rather than starting from the lowest one and moving up the continuum.

6.4.3 Project reporting structure

Question: How is your project reporting?

As discussed in chapter three, the PMO is assumed to be the nexus of every project and project management related activities of a given organization. This mission of being the fulcrum of project and project management related activities can be manifested by the PMO's involvement in the organization's project reporting structure. This question aims to explore the sector companies' PMO involvement in project reporting.

More than one-third (42%) of the PMOs perform some form of project reporting function, 21% providing full organizational-level reporting and another 21% providing a departmental or portfolio subset of project information. Though many PMOs perform project reporting, quite a considerable proportion of project reporting (59%) is actually performed only at the project level while still quite a significant of the companies don't even have any formal process in place for project reporting (21%). This finding, where a considerable proportion of the reporting conducted at the project level as indicated in Figure 6:13 below is contrary to the previous findings on PMO maturity and capability where more or less normal distribution were observed. Normally, as the PMO matures and develops higher capability, it takes centre stage in project reporting and compiling.

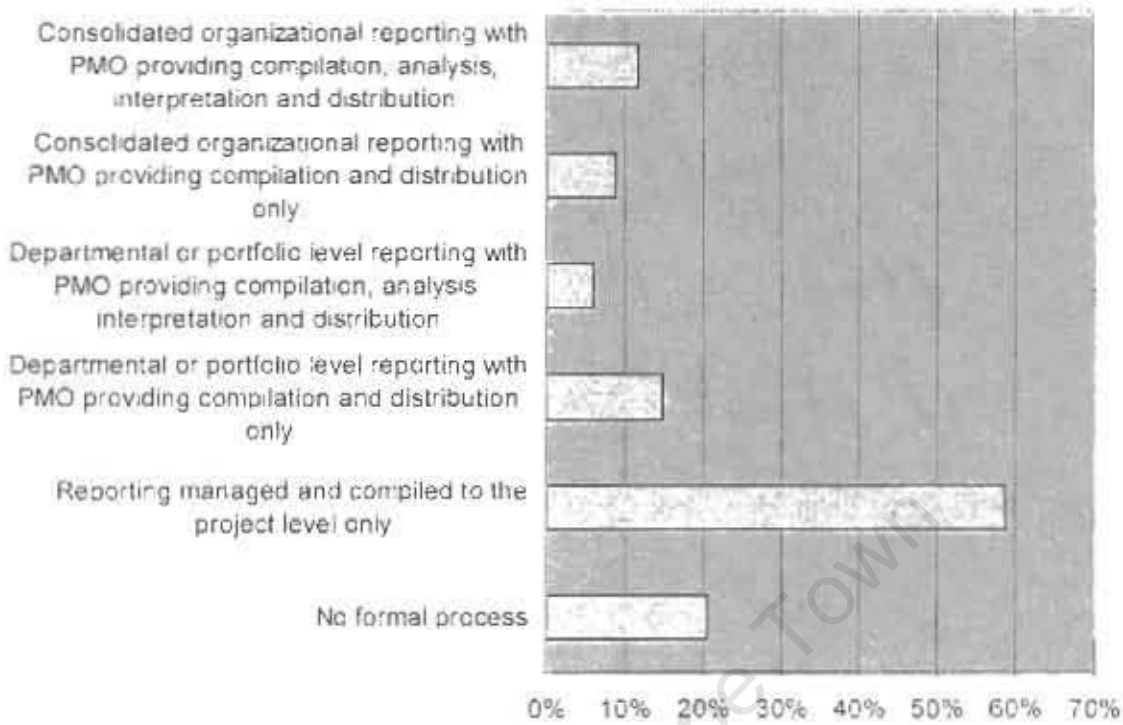

Figure 6: 13 Project reporting structure

When looking into the project reporting profile by sectors, reporting of projects managed and compiled to the project level is the most dominant project reporting structure, attracting half or more response rate in all the three sectors. Only a small proportion of all the three sectors responded as having a consolidated organizational compilation and reporting.

However, this finding is not in compliance with the above PMO maturity level response where quite a large proportion of the respondents reported as having a PMO capability supporting an enterprise-wide endeavour. Theoretically, for a PMO to give an effective enterprise wide strategic support, it should take a centre stage in consolidated project compilation and reporting so that it becomes the organization's centre of information and current practice in PM.

Table 6. 16 Project reporting profile by sector companies

Project reporting:	*CON*	*DEV*	*PMC*
No formal process	16.7%	0.0%	27.3%
Reporting managed and compiled to the project level only	50.0%	71.4%	59.1%
Departmental or portfolio level reporting with PMO providing compilation and distribution only	0.0%	14.3%	18.2%
Departmental or portfolio level reporting with PMO providing compilation, analysis, interpretation and distribution	16.7%	0.0%	4.5%
Consolidated organizational reporting with PMO providing compilation and distribution only.	16.7%	0.0%	9.1%
Consolidated organizational reporting with PMO providing compilation, analysis, interpretation and distribution	16.7%	14.3%	9.1%

6.4.4 Project manager reporting

Question: Your project managers report to?

The PMO is usually taken to be the home of project managers. This question aims to explore if the PMOs of the sector companies are taken as home department for project managers.

In a question where multiple choices were possible, only (32%) of the respondents cited that their project managers report to the PMO. Nearly half (47%) of the respondents said their project managers report to functional departments while 38% said their project manager report to a separate project delivery team.

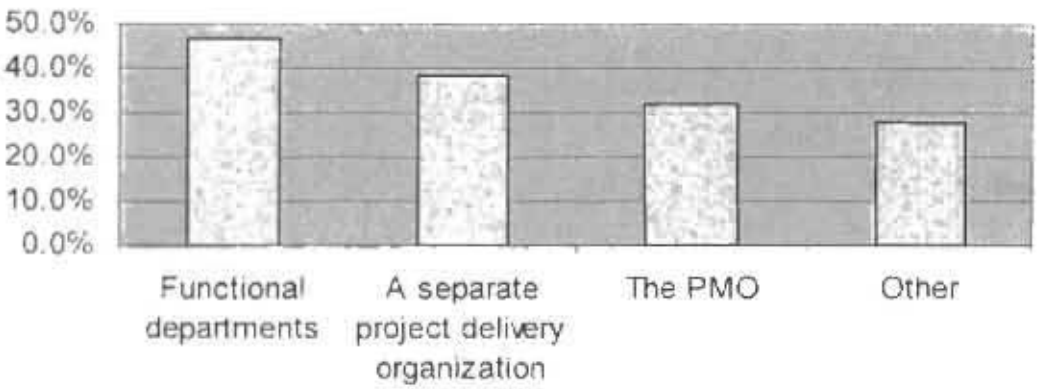

Figure 6: 14 Project manager reporting structure

Only developers had indicated that they had more than half (57.1%) of their project managers reporting to the PMO while the figure for project management companies is slightly more than a quarter (27.3%). Only 16.7% of the contractors had indicated that they had project managers reporting to the PMO. This is in agreement with project reporting structures where most projects were compiled and managed at the project level. Project managers mainly report to functional managers, perhaps indicating that project duties only dealt at a project level and project managers report to their 'home' department.

Table 6: 17 Project manager reporting structure by sector

Project manager reporting structure	CON	DEV	PMC
Functional departments	66.7%	71.4%	31.8%
A separate project delivery organization	50.0%	57.1%	27.3%
The PMO	16.7%	57.1%	27.3%
Other	16.7%	0.0%	36.4%

6.5 View on contribution of the PMO

One of the most significant findings to come out of the study is an assessment of the degree to which the PMO is currently being viewed as a success. The question is rather subjective as it doesn't put any quantifying methods to assess the successes. However, recognizing the subjectivity inherent in the answers, it is still valuable to understand how PMOs are being perceived. Respondents were asked to evaluate how they perceived their PMO in ensuring that the projects they supported were successful, how influential they viewed the PMO in instilling PM culture and practices in their organization, and how they viewed the contribution of their PMO in pursuing their organization's knowledge management endeavour. Responses were ranked on a five-point Likert scale, from no contribution (0) through little contribution (1), some contribution (2), significant contribution (3) to making a considerable contribution (4).

6.5.1 PMO's impact on successful project delivery

Question: How do you rate the PMO's impact in improving the successful delivery of projects?

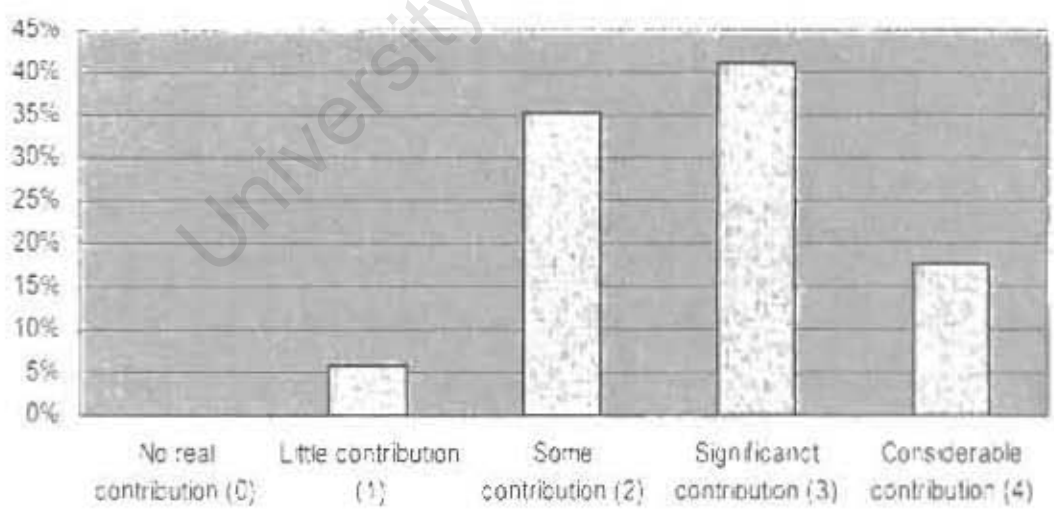

Figure6: 15 View on impact of PMO on successful project delivery

Quite interestingly, ninety-four percent (94%) of the respondents who replied as having some sort of PMO capability indicated that they viewed their PMO as being somewhat

successful and making at least 'some' contribution to successful delivery of project with (59%) of them reporting at least a 'significant' contribution.

There is no major difference in the companies of the different sectors with regard to their views on PMO's contribution to successful project delivery. While all contractors who have responded indicated that they view PMO as contributing at least 'some' for successful project delivery, it is only 14.3% of the responding developers who view PMO as giving only little contribution, the rest believe PMO will give 'some' or 'significant' contributions. Over 95% of project management companies that responded for the survey view PMO as giving at least 'some' contribution to successful project delivery.

Table 6: 18 Sectoral view on PMO's contribution for successful project delivery

PMO impact on success of project delivery	*CON*	*DEV*	*PMC*
No real contribution (0)	0.0%	0.0%	0.0%
Little contribution (1)	0.0%	14.3%	4.5%
Some contribution (2)	16.7%	42.9%	36.4%
Significant contribution (3)	33.3%	42.9%	40.9%
Considerable contribution (4)	33.3%	0.0%	18.2%

6.5.2 PMO's impact in instilling PM culture and practice

Question: How do you rate the PMO's impact in improving the successful delivery of projects?

On the contribution of the PMO in instilling PM culture and practice, nearly all (97%) of those respondents who said to have some form of PMO capability view it as having at least 'some' contribution.

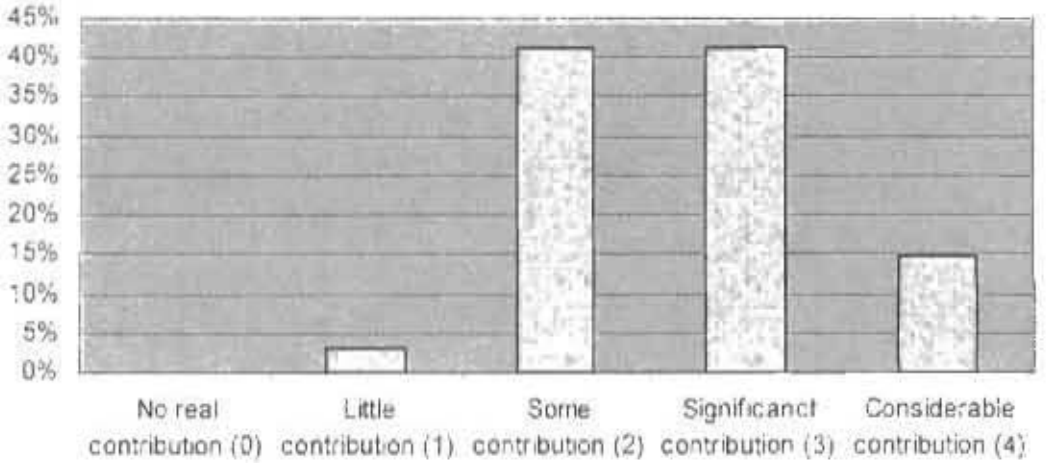

Figure6: 16 View on PMO's contribution on instilling project management culture and practice

Table 6: 19 View by sector on PMO's contribution to instilling project management culture and practice

PMO contribution to instilling PM culture and practice	*CON*	*DEV*	*PMC*
No real contribution (0)	0.0%	0.0%	0.0%
Little contribution (1)	0.0%	0.0%	4.5%
Some contribution (2)	16.7%	71.4%	36.4%
Significant contribution (3)	50.0%	28.6%	40.9%
Considerable contribution (4)	16.7%	0.0%	18.2%

In looking into the companies' views by sector, the respondents don't have a big difference on their views about PMO's contribution in instilling project management culture and practice within their organizations. All of the contractors and developers and over 95% of the project management companies who responded see PMO to make at least 'some' contribution. As can be seen from Tables 6:19 and 6:20 there are no significant differences in the sector companies' view on PMO's contribution to instilling PM culture and practice to that of their view of PMO's contribution to successful delivery of projects.

6.5.3 PMO's contribution to the KM endeavour of the organization

Question: PMO's contribution in enabling your organization use its intellectual property gained on projects and enabling it to become a knowledge driven organization.

Nearly ninety percent of the respondents who reported to have some PMO capabilities (88%) said they view their PMO to had at least 'some' contribution to their organization's KM endeavour with 56% percent of them giving a higher vote for either 'significant' or 'considerable' contribution.

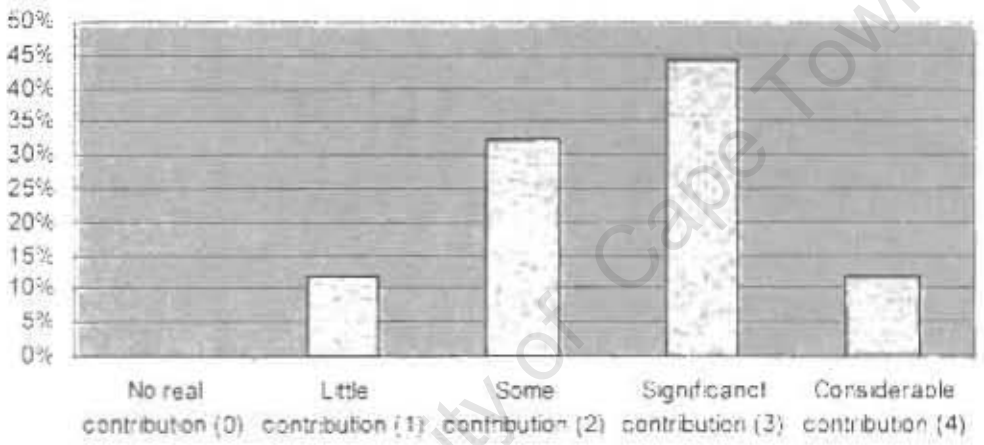

Figure6 17 View on PMO's contribution for organization's KM endeavor

Half of the contractors who responded indicated PMO to have 'some' contribution to their KM endeavour and one third of them indicated 'significant' contribution while the remaining one-six had not replied for that question. As can be manifested by the relatively large proportion of 'little contribution' (42.9%), developers' view of PMO's contribution to KM is less than that of contractors and project management as well as their view of a PMO's contribution to successful delivery of projects and instilling project management culture and practice. Project management companies have a more or less similar view on the PMO's contribution to their organization's KM endeavour to that of its contribution to a successful project delivery and instilling project management culture and practice with yet again more than 95% of them indicating at least 'some'

contribution by the PMO towards their KM activities and helping them be become 'knowledge driven organizations.

Table 6: 20 Sectoral views on PMO's contribution to KM practices

PMO's contribution in KM endeavour	*CON*	*DEV*	*PMC*
No real contribution (0)	0.0%	0.0%	0.0%
Little contribution (1)	0.0%	42.9%	4.5%
Some contribution (2)	50.0%	28.6%	27.3%
Significant contribution (3)	33.3%	28.6%	50.0%
Considerable contribution (4)	0.0%	0.0%	18.2%

6.6 Summary

The chapter begun with a brief description of the sample frame for the different target groups and went on to summarize the sample size that was approached for the study. Then the response rate was presented which was followed by the respondents' company role in the industry sector and positions of the person responding to the questionnaire which helps test for a possible bias and link with the possible weights given to the PMO

The section then documented and put in perspective the PMO capabilities and experiences of the companies in implementing and running of the entity. These findings were put into three major categories as summarised below:

6.6.1 Summary of PMO capabilities, roles, success factors and challenges

Companies within construction possess some PMO capability, if mainly an informal one. The PMO concept within the sector areas, however, is new and is yet to be standardized and uniformly practiced. There is no universally recognized single nomenclature for the entity.

The sector companies' major business case to launch a PMO is to use the entity as a road map to a more matured PM practices, as opposed to a short term remedy to successfully deliver specific projects. The activities that the responding companies undertake to establish their PMO appear to focus on high level strategic organization tasks such as facilitating collaborative work within the organization, developing of structure for the PMO and establishment of vision and strategy for the PMO.

The companies reported that their PMO play various roles ranging from temporary and often remedial project oriented functions such as executing special tasks for project managers and/or conducting project control and managing to the enterprise oriented activities of developing methodologies, standards and templates for PM, conduct project KM practices etc.

The challenges faced in pursuit of implementation and running of this entity are more structural and/or technical than budgetary as mentioned in most literature. Ensuring consistent application of defined processes, applicability of the PMO to all projects and project manager acceptance were the three most frequently cited challenges while cost increase to the organization was only the third least frequently mentioned challenge.

The companies used varying solutions as a means of overcoming these obstacles and challenges with continuous assessment and evaluation of the PMO, putting clear procedures and ensuring accountability; implementing PMO slowly by going from lower levels to higher levels and from division to division rather than doing it at once were among the most frequently mentioned ones. These factors to mitigate challenges are also mentioned as the major factors that needed to be in place for successful PMO implementation and operation.

6.6.2 PMO reporting structure and maturity

Congruent to its mandate of improving the organizations' PM performance and helping to achieve excellence in PM, the PMO is situated at a higher level in the hierarchy to effect a sustainable change within the organization and deliver the strategic mandate.

In terms of maturity, most PMOs are at the middle level of maturity where by they are focusing on both enterprise and project oriented activities. As the PMO becomes more mature within the sector companies, it is expected that it evolves into a higher level and focuses mainly on strategic enterprise-oriented activities.

One of the major activities of the PMO is managing and compiling project reporting; a consolidated organization wide reporting or a departmental/portfolio level reporting, depending on the maturity level. In this case, however, the respondents indicated that most of the project reports are compiled and managed only to the project level and in addition most project managers don't report to the PMO.

6.6.3 Summary of views on PMO's contribution

The respondents view is that PMO can contribute hugely to successful delivery of projects, instilling project management practice and culture as well as in the organizations' KM endeavour. On a five point Likert scale of 'no contribution', 'little contribution', 'some contribution', 'significant contribution', and 'considerable contribution' more than 85% of the respondents view the PMO as contributing at least 'some' in all of the above mentioned factors. These views indicate that the sector companies value the contribution of the PMO highly.

6.6.4 Summary on differences and similarities among the sectors under scrutiny in adopting the concept

As discussed, the data size solicited from contractors and developers was hardly enough to conduct a credible comparison between the sectors. But still some comparison of the similarities and differences among the sectors' practice is made just to show if there are any such similarities and differences, even if they are inconclusive. From this comparison and the statistical tests conducted, it appears that there isn't a statistically significant difference among the sectors for any of the characteristics compared. Reflecting on the number of responses solicited, quality of the responses, and the minor difference among the sectors, it appears that project management companies have embraced/are embracing the concept faster than the other sectors.

CHAPTER SEVEN: CONCLUSION

7.1 Introduction

The aim of this research was to take a snapshot of the application of the Project Management Office concept within the construction sector by taking contractor companies, developers and project management companies of the German construction industry as a case in point. This aim was described in the problem statement as set out in chapter one. For the purpose of clarity and conclusion, the problem statement and the specific objectives that the research anticipated to achieve are revisited here.

7.2 Review of the problem statement

The problem this research has tried to address is centred around construction's inability and reluctance to grasp a holistic approach to project management and work towards achieving maturity and competency in PM. It has been emphasised that, although construction has always been a project-oriented industry and has contributed much to the development of modern PM theory and practice, it has failed to adopt a holistic approach to PM which, in turn, could arguably lead to sub-optimality. The literature has been shown to argue that the PMO concept can be adopted as an entity to centralize project management practices and by doing so, improve an organization's PM competency and maturity.

This research has demonstrated that many of the sector companies under scrutiny are adopting the concept as a means to achieve a higher level of maturity in PM and to improve project performance. The sector companies initiatives to set up a PMO range from short-term project-oriented activities to long-term strategic ones. However, with many of the organizations establishing the entity in the last few years and, related to this, many of the PMOs serving as an informal (virtual) entity, the concept of the PMO appears to be relatively new in construction.

7.3 Review of the research objectives

The primary aim of this study was to explore the adoption of the PMO concept within developing, contracting and project management sector companies of the German construction industry. With this as a major aim, the study was set out to achieve the following specific objectives:

- Investigate the adoption of PMO within German construction industry
- Explore the PMO's profile within companies specific parts of the sector that have high levels of PM expertise: developers, contractors and project management companies.
- Investigate the role of the PMO in adding value to project related KM strategies and delivering its mission as being the focal point of best PM practices;
- Establish the success factors associated with effective implementation of the PMO within the industry;
- Investigate barriers to PMO adoption, and the extent to which these are determined by the industry context; and
- Identify ways that firms can implement the PMO as a roadmap for achieving excellence in PM and tackle with the difficulty in delivering the objectives of KM strategy.

7.3.1 Adoption of PMO within German construction industry

The survey results show that the overwhelming majority of companies within the sector under scrutiny possess some form of PMO capability. Nearly ninety percent (87%) of the companies that have responded for the survey indicated that they posses some kind of PMO capability, either as a real organizational unit where the unit is provided with a separate section within the enterprise and allocated an individual to be responsible for looking after the PMO's progress or as a virtual one where there is no specific individual responsible. However, most of the PMO's within the sector companies function informally, i.e. most PMOs do not have a single assigned individual responsible to look

after the development of the PMO. This indicates that the entity is not yet embedded within companies in the sector. Nevertheless, given the relatively recent focus on organizational project management and the relative novelty of the concept of PMO within the sector, the mainly informal capability manifested within the sub-sectors is satisfactory.

From the statistical analysis of the survey response, it appears that there is no statistically significant difference in PMO capability between the sub-sectors under scrutiny. From the quality and number of responses, however, it appears that the concept is slightly more prevalent in project management companies than in the other two sub-sectors. However, as discussed in the analysis chapter, the response rates for developers and contracting companies were too small to make a statistical inference from this.

7.3.2 PMO's profile within the sub- sectors

As can be seen from section 6.4.2 of the analysis chapter (and from other sections such as the PMO roles in section 6.3.6, PMO reporting structure in section 6.4.1 etc.), the profile of PMOs within the different sub-sectors is normally distributed along the continuum from supporting a single large project at one end to providing strategic enterprise-wide functions at the other. Since the literature and theory argue that for an organization to reap from the full range of benefits that the PMO promises, the construct needs to develop to a more mature entity positioned high in the enterprise's organizational structure that enables it to effect the enterprise wide strategic functions. Thus, many of the sector companies' PMO still have considerable scope to evolve further before the organizations reap the full benefits of the concept.

7.3.3 Role of the PMO in KM strategies and instilling PM practices

The survey found that the PMO is viewed by the respondents as an important entity that plays a central role in an organization's KM strategies and improving PM maturity and competency. It plays a central role in collecting and disseminating knowledge gained in projects, developing methodologies, procedures and standards for PM, conducting

training and education in PM and instilling PM professionalism and plans for continuous improvement in PM.

7.3.4 Success factors associated with effective implementation of the PMO

The factors associated with effective implementation of the PMO are those, which when lacking, could lead to failure. These factors centre around a culture of teamwork, trust, respect and communication. More specifically, as also identified by Rad & Levin (2002), the study found that the existence of clear processes for managing projects and collecting knowledge gained in projects, easy access by employees to PMO resources and having an organizational culture that is supportive of the PMO are the most important factors associated with effective PMO implementation.

7.3.5 Barriers to PMO adoption

From the survey results, the main challenges in PMO adoption appear to lie in management, behavioural and technical issues rather than financial ones. This supports the findings of other writers including Kandall and Rollins (2003), Rad & Leving (2002) and Bernstein (2000). Factors that are mentioned as some of the major challenges faced by organizations in implementing PMO's in the German AEC sector include; the consistent application of defined processes, the applicability of the concept across all projects and divisions of an organization, resistance to the concept by project managers, and the additional bureaucracy that a PMO can add to the existing structure of an organization.

7.3.6 Ways of implementing the PMO and combating challenges

The majority of the respondents expressed the view that focusing on high-level strategic activities is crucial for the effective implementation of a PMO. For example; establishing a clear vision for the PMO, facilitating collaborative works within the organization culture and developing a clear structure and authority line for the PMO, are all considered to be crucial factors that PMO implementation need to be focused on.

The challenges faced by the organizations varied depending on many factors such as organization culture, commitment to the PMO, a PMO's stage of maturity within the organization. Thus, ways to alleviate these challenges expressed by these organizations were also varied reflecting their unique organizational contexts. Continuously assessing the PMO, following the lead of the PMO, establishing the entity progressively from the lower maturity level to the higher one, are seen as some of the actions that can be used in overcoming the challenges the faced in implementing the construct.

7.4 Overall PMO practices within the sectors

Despite the sector companies' rather positive view to the contributions of the entity, the practice of the PMO within the sectors is at an infantry stage. This can be seen from sections 6.3.1 and sections 6.4.2 where in many organizations PMOs only provide a supportive role to projects and departments without. Moreover, as section 6.4.3 and 6.4.4 show, the majority of the project reports are compiled and executed at the project level with few project managers reporting back to the PMO. Given that the PMOs did not take centre stage in PMO reporting, this was not surprising. However, for a PMO to act as a centre of PM practices for an organization, it should take a central stage in consolidating project compilation and reporting within the organization. It is only when the PMO reaches a level of maturity where is takes charge of the project and PM related activities that PMOs are entrusted with the responsibility to improve an organization's PM related practices and processes.

Overall, there are few PMOs within the sub-sectors that are strategically placed to engender PM maturity within the organizations. The majority of the responses indicate that the existing PMOs do not possess those capabilities. Therefore, the practice of PMOs within German AEC has considerable scope for further development before it can deliver the promised improvement in PM capabilities.

7.5 Recommendations

In view of the analysis and conclusions drawn from this research, the following recommendations can be made:

7.5.1 Making the PMO a formal entity

This research has shown that most of the companies own PMO as a virtual entity informally serving departments/projects or organizations. However, as discussed in chapter three, may sources in the literature argue that a formally mandated enterprise-wide PMO has a greater chance of improving an organization's PM competency and maturity. It is believed that such a PMO is an efficient mechanism to instil project management culture and practices within an organization. Thus it is necessary to consider ways in which this informal entity can be upgraded to a formally mandated and authorised entity to improve PM maturity and competency within an organization.

7.5.2 Quantifying a PMO's contribution

Despite the respondents' view that a PMO can contribute much to an organization's chance of consistently delivering successful projects, there is no research quantifying these contributions in the literature, nor has this research sought to do this. Thus, there is a clear need for this to be addressed in future research. Such research will need to, not only quantify the positive impacts of a PMO, but should also attempt to quantify the costs of implementing and operating a PMO, so that organizations would be better informed of the real value that PMOs can bring to an organization and the level of financial and managerial commitment needed for their effective implementation and operation.

7.5.3 Exploring best practices surrounding the PMO

This research focused in exploring the adoption of the PMO within the German AEC sector by sampling organizations within specific sub-sectors where the PMO might, form the literature, be used. In doing so, it also identified a number of practices that are closely

associated with the adoption of a PMO. However, it did not set out to identify or assess 'best practice'. Despite this, exploring and documenting the 'best practices' that surround the concept could assist organizations in benchmarking their own practice in PMOs. This would require attention to be paid to the contexts of individual organizations to better understand the relationship between a business's environment and practice. Thus future research into this topic might well require a more case-based research approach, allowing for more detailed investigation of the PMO phenomena and its role in an organization.

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Zack, H. (1999), Developing a Knowledge Strategy, *California Management Review*,4(3) 125-145

Appendix I

Appendices

Appendix 1A: Contractor companies' contact details

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BauKing Aktiengesellschaft Contact: Karsten Lutte (manager) **Strasse:** Buchholzer Str. 98 **Ort:** 30655 Hannover **Telefon:** (0511) 12 32 06-0 **Fax:** (0511) 12 32 06-55 **E-Mail:** info@bauking.de **Internet:** http://www.bauking.de	**Bau- und Haustechnik Bad Düben GmbH** **Contact: Rudolf Schäfer (MD)** **Strasse:** Torgauer Str. 33 **Ort:** 04849 Bad Duben **Telefon:** (034243) 3 04-0 **Fax:** (034243) 3 04-59 **E-Mail:** info@bht-badduebeen.de **Internet:** http://www. bht-badduebeen.de
Bauschutz GmbH **Contact: Bernhard Hiller (MD)** **Strasse:** Neckarstr. 2 **Ort:** 71679 Asperg **Telefon:** (07141) 2 68-0 **Fax:** (07141) 2 68-159 **E-Mail:** zentrale.asperg@bauschutz.de **Internet:** http://www.bauschutz.de	**Bauunternehmung Glöckle SF-Bau GmbH** **Contact:** **Strasse:** Wirsingstr. 15 **Ort:** 97424 Schweinfurt **Telefon:** (09721) 80 01-0 **Fax:** (09721) 80 01-541 **Internet:** http://www.gloeckle-bau.de
Bauwens GmbH **Contact: Patrick Adenauer (MD)** **Strasse:** Richard-Strauss-Str. 2 **Ort:** 50931 Koln **Telefon:** (0221) 4 00 84-0 **Fax:** (0221) 4 00 84-148 **E-Mail:** info@bauwens.de **Internet:** http://www.bauwens.de	**Berger Bau-GmbH** **Contact: Hans Berger (Managing Director)** **Strasse:** AuBere Spitalhofstr. 19 **Ort:** 94036 Passau **Telefon:** (0851) 8 06-0 **Fax:** (0851) 8 06-104 **E-Mail:** info@bergerbau.de **Internet:** http://www.bergerbau.de
Bickhardt Bau Aktiengesellschaft **Contact: Ralf Schär (Manager)** **Strasse:** Industriestr. 9 **Ort:** 36275 Kirchheim **Telefon:** (06625) 88-0 **Fax:** (06625) 88-111 **E-Mail:** info@bickhardt-bau.de **Internet:** http://www.bickhardt-bau.de	**Bilfinger Berger AG** **Contact:** **Strasse:** Carl-Reiβ-Platz 1-5 **Ort:** 68165 Mannheim **Telefon:** (0621) 4 59-0 **Fax:** (0621) 4 59-2366 **Internet:** http://www.bilfingerberger.de
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BUDIMEX Spolka Akcyjna Zweigniederlassung Köln **Contact:Mark Michaelowski (Manager)** **Strasse:** Pferdmengesstr. 5 **Ort:** 50968 Koln **Telefon:** (0221) 93 70 22-0 **Fax:** (0221) 3 76 17 99 **E-Mail:** info@budimex.de **Internet:** http://www.budimex.de	**Johann Bunte** **Bauunternehmung GmbH & Co. KG** Contact: Manfred Wendt **Strasse:** Hauptkanal links 88 **Ort:** 26871 Papenburg **Telefon:** (04961) 8 95-0 **Fax:** (04961) 20 85 **E-Mail:** schultea@johann-bunte.de **Internet:** http://www.Johann-bunte.de

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Deilmann-Haniel GmbH **Contact: Manfred Hegemann** **Strasse:** Haustenbecke 1 **Ort:** 44319 Dortmund Papenburg **Telefon:** (0231) 28 91-0 **Fax:** (0231) 28 91-362 **E-Mail:** info@deilmann-haniel.de **Internet:** http://www.deilmann-haniel.de	**Depenbrock Bau GmbH & Co. KG** **Contact: Karl-Heinrich Depenbrock (MD)** **Strasse:** Blumenhorst 6 **Ort:** 32351 Stemwede **Telefon:** (05474) 68-0 **Fax:** (04961) 68-175 **E-Mail:** info@depenbrock.de **Internet:** http://www.depenbrock.de
Dieckmann Bauen+Umwelt GmbH & Co. KG **Contact:** **Strasse:** Hannoversche Str. 80 **Ort:** 49084Osnabruck **Telefon:** (0541) 9 07 00 **Fax:** (0541) 90 70 92	**Diringer & Scheidel** **Bauunternehmung GmbH & Co.** **Contact. Karheinz heffner (managing director)** **Strasse:** Wilhelm-Wundt-Str. 19 **Ort:** 68199 Mannheim **Telefon:** (0621) 86 07-0 **Fax:** (0621) 86 07-149 **E-Mail:** info@dus.de **Internet:** http://www.dus.de
Richard Ditting GmbH & Co. KG **Contact:** **Strasse:** Wyker Str. 2-18 **Ort:** 24768 Rendsurg **Telefon:** (04331) 4 51-0 **Fax:** (04331) 4 51-142 **Internet:** http://www.ditting-bau.de	**J. Dobler GmbH & Co Bauunternehmung** **Contact: Peter Dobler (managing Director)** **Strasse:** Gutenbergstr. 8 **Ort:** 87600 Kaufbeuren **Telefon:** (08341) 71-0 **Fax:** (08341) 71-216,(08341) 71 **E-Mail:** walter@dobler.de **Internet:** http://www.dobler.de
Dreßler Bau GmbH **Contact: Karl Dreßler (MD)** **Strasse:** Mullerstr. 26 **Ort:** 63741 Aschaffenburg **Telefon:** (06021) 4 03-0 **Fax:** (06021) 4 03-216 **E-Mail:** a-hv@dressler-bau.de **Internet:** http://www.dressler-bau.de	**Düser, Grambart, v. d. Linde GmbH & Co. KG** **Contact:** **Strasse:** Ammerlander Heerstr. 368 **Ort:** 26129 Oldenburg(Oldb) **Telefon:** (0441) 97 04-0 **Fax:** (0441) 97 04-100 **Internet:** http://www.ludwig-freytag.de
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EUROVIA Beton GmbH **Contact: Bernd Diening (managing director)** **Strasse:** Caputher Chaussee 1a **Ort:** 14552 Michendorf **Telefon:** (033205) 76-201 **Fax:** (033205) 76-209 **E-Mail:** info@eurovia.de **Internet:** http://www.eurovia-beton.de	**A.Frauenrath Bauunternehmen GmbH** **Contact: Erich Gerards (MD)** **Strasse:** Industriestr. 50 **Ort:** 52525 Heinsberg **Telefon:** (02452) 1 89-0 **Fax:** (0221) 1 89-891 **E-Mail:** kontakt@frauenrath.de **Internet:** http://www.frauenrath.de

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Appendix IA: Contractor companies' contact details

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Appendix IB: Developers' contact details

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nps Bauprojektmanagement GmbH Herrn Robert Scholz Lise-Meitner-Straße 15 89081 Ulm Tel. 0731/50995-10 Fax 0731/50995-00 info@nps-ulm.de	Obermeyer Planen + Beraten GmbH Herrn Dipl.- Ing. Gerhart Neuwirth Hansastraße 40 80686 München Tel. 089/5799540 Fax 089/5799910 gerhart.neuwirth@opb.de
OFB Projektentwicklungs GmbH Herrn Dipl.-Ing. Arch. H.-J. Weihrauch Myliusstraße 33 - 37 60323 Frankfurt Tel. 069/91732-02 Fax 069/91732-556 hans_joerg_weihrauch@ofb-gruppe.de	p2m berlin gmbh Herrn Heiko Bohnhorst Fasanenstr. 7-8 10623 Berlin Tel. 030/74735-100 Fax 030/74735-105 heiko.bohnhorst@p2mberlin.de

Appendix IC : Project Management Companies' contact details

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PHI GmbH Herrn Dr.-Ing. Patrick Rüggeberg Völklinger Str. 3a 42285 Wuppertal Tel. 0202/7994138 Fax 0202/2654755 info@phi-gmbh.com	project control Gesellschaft für Projektkoordination mbH Herrn GF W.-R. Bienheim Isartorplatz 5 80331 München Tel. 089/227791 Fax 089/2285800 will.rafael.bienheim@project-control.de
PRÜFER Projektsteuerung + Baucontrolling Herrn Dipl.-Ing. Uwe-Michael Prüfer Unterm Herrschaftswald 5 78078 Niedereschach Tel. 07728/7276 Fax 07728/91044 controlling@pruefer.de	PSG Bau-Projektsteuerungs GmbH Herrn Dr.-Ing. Michael Fretter Schloßstr. 27 12163 Berlin Tel. 030/390794-0 Fax 030/390794-29 service@psg-berlin.de
PZ Peter Zeitler Ingenieurges. mbH Herrn Dipl.-Ing. Peter Zeitler Konrad-Celtis-Str. 81 81369 München Tel. 089/741528-0 Fax 089/741528-22 pz-muenchen@pz-ing.de	QTB Projektsteuerung GmbH Herrn Dipl.-Ing. Dirk Stelter Freundallee 13 30173 Hannover Tel. 0511/2888-111 Fax 0511/2888-193 info@qtb.de
Projektsteuerung Hans Ramcke Herrn Dipl.-Ing. Hans Ramcke Prof.-Döllgast-Str. 2 86633 Neuburg a. d. Donau Tel. 08431/4 74 43 Fax 08431/4 18 43 ib-ramcke@t-online.de	REMONDIS Engineering & Service GmbH Herrn Dr. Jan Hoffmann Dohrweg 20 41066 Mönchengladbach Tel. 02161/609-0 Fax 02161/609-460 jan.hoffmann@remondis.de
Architekten & Generalplaner RKH REFA - Industrial Engineering Herrn Dipl.-Ing. Ralf K. Heimann Europaring 2 64521 Groß-Gerau Tel. 06152/54302 Fax 06152/59971 rkheimann@architekturbuero.com	S-Baumanagement GmbH Sachsen-Anhalt Herrn Dr. Ing. Jürgen Olbrich Lübecker Str. 126 39124 Magdeburg Tel. 0391/25088-01 Fax 0391/25088-02 juergen.olbrich@t-online.de
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Appendix IC : Project Management Companies' contact details

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SMV Bauprojektsteuerung Ingenieurgesellschaft mbH Herm Dr.-Ing. Rainer Schofer Wichmannstr. 5 10787 Berlin Tel. 030/254221-14 Fax 030/254221-91 schofer@smv.com	Dipl.-Ing. B. Spitthöver GmbH Herm Dipl.-Ing. Bernhard Spitthöver Am Uhlenkrug 45 45133 Essen Tel. 0201/84609-0 Fax 0201/84609-25 buero@spitthoever.de
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Thost Projektmanagement für Bauten und Anlagen GmbH Herm Dipl.-Wi.-Ing. Burkhard Thost Villinger Str. 6 75179 Pforzheim Tel. 07231-1560-0 Fax 07231-1560-90 tpm@thost.de	THS Consulting GmbH Herrn Lothar Löchter Stauderstr. 213 45327 Essen Tel. 0201/2017-280 Fax 0201/2017-281 gelsenkirchen@ths-consulting.de
TREUCON Management Immobilien GmbH Herm Thomas Doll Uhlandstr. 7/8 10623 Berlin Tel. 030/884839-0 Fax 030/884839-10 doll@treucon-fonds.de	UNIT Versicherungsmakler GmbH & Co.KG Herm GF Bernd Mikosch Theodor-Althoff-Str. 45 45133 Essen Tel. 0201/87220-0 Fax 0201/87220-20 unit@unita.de
VIB Verhoeven Ingenieurberatung GmbH Herrn Dr.-Ing. Hans-Jörg Gasterich Universitätsstraße 142 44799 Bochum Tel. 0234/97190-86 Fax 0234/97190-88 vib@vib-bochum	Ingenieurbüro Dipl.-Ing. H. Vössing GmbH Herrn Dipl.-Ing. Michael Schmidt Brunnenstr. 29-31 40223 Düsseldorf Tel. 0211/9054-5 Fax 0211/9054-619 michael.schmidt@voessing.de
VR-Bauregie GmbH Herm Dipl.-Ing. Hagen Heinz Hauptstr. 131-137 65760 Eschborn Tel. 06196/9941-11 Fax 06196/4441-98 hagen.heinz@vr-bauregie.de	Wallmeier Stummbillig Planungs-GmbH Herrn Prof. Dr.-Ing. Jörg Wallmeier Eschstr. 15 44629 Herne Tel. 02323/9548-0 Fax 02323/9548-55 Wallmeier@fh-trier.de
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Appendix IC : Project Management Companies' contact details

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Appendix II

UNIVERSITY OF CAPE TOWN BERGISCHE UNIVERSITÂT WUPPERTAL

A STUDY ON THE PRACTICE OF THE PMO WITHIN THE CONSTRUCTION SECTOR

General Information on the Organization

1. *What is your position in your organization?*

- ☐ Executive(President, V. president, Director)
- ☐ PMO Manager/ staff
- ☐ Project Manager
- ☐ Functional Manager
- ☐ Other (Please specify)

2. *In which sector of the industry is your organization involved? (Multiple answer possible)*

- ☐ Contractor
- ☐ Project Management
- ☐ Developers

3. *Size of your organization*

- ☐ 0- 49 Employees
- ☐ 50-499 Employees
- ☐ 500-1,000 Employees
- ☐ over 1,000 Employees

4. Please give us your email address through which we can send you a summarized copy of the findings

Next Reset

UNIVERSITY OF CAPE TOWN BERGISCHE UNIVERSITÄT WUPPERTAL

A STUDY ON THE PRACTICE OF THE PMO WITHIN THE CONSTRUCTION SECTOR

PMO capability and implementation experience

1. *What does your organisation's PMO capability look like?*

- ☐ There is no PMO capability in the organisation
- ☐ There is a virtual PMO set to informally serve specific projects/departments
- ☐ There is a virtual PMO set to informally serve the entire organization
- ☐ There is a real PMO set to formally serve specific projects/departments
- ☐ There is a real PMO set to informally serve the entire organization

2. *If your organization posses PMO capabilities, what do you call your PMO?*

- ☐ Project Management Office (PMO)
- ☐ (Strategic) Project Office ([S]PO)
- ☐ Project Management Centre of Excellence (PMCoE)
- ☐ Project/Programme Support Office (PSO)
- ☐ Enteprise Development
- ☐ Others (Please specify)

3. *How long is since your PMO incepted?*

- ☐ < 2 years
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ >10 years

4. *What activities did you undertake to create your PMO? (Please click all that apply)*

- ☐ Established the vision and strategy for the PMO
- ☐ Prepared a plan for the PMO implementation project
- ☐ Facilitated collaborative work within the organization

- [ ] Implemented project management training programs
- [ ] Developed structure for the PMO
- [ ] Hired consultant
- [ ] Others (please specify)

5. *What was the business case for your PMO? (please pick all that apply)*

- [ ] Formalize the knowledge management practices of the organization
- [ ] Organizational performance improvement
- [ ] Help build a project management oriented culture
- [ ] Increase staff professionalism in PM
- [ ] Implement predictable and reusable project management tools, techniques and processes
- [ ] More successful implementation of projects
- [ ] Other (please specify)

Next Reset

UNIVERSITY OF CAPE TOWN BERGISCHE UNIVERSITÄT WUPPERTAL

A STUDY ON THE PRACTICE OF THE PMO WITHIN THE CONSTRUCTION SECTOR

The Status of the PMO

Functions of the PMO and its experience

1. *What does your PMO do?*

- ☐ Centralizes project reporting
- ☐ Documents lessens learnt on projects
- ☐ Conducts project KM activities
- ☐ Develops methodologies, standards and templates for PM
- ☐ Disseminates information
- ☐ Conducts PM mentoring, training and education
- ☐ Formalizes project selection through project portfolio management
- ☐ Plans for and effects continuous improvement strategies
- ☐ Supports in corporate strategic planning
- ☐ Conducts benchmarking in best practices of project management(e.g. guidelines of ISO:100006, PMI, etc)
- ☐ Manages customer interface
- ☐ Conducts project audits and tracking
- ☐ Allocates resources and coordinates between projects
- ☐ Manages one or more programmes
- ☐ Executes specialized tasks for project managers e.g. preparation of schedules
- ☐ Monitors and controls project performance
- ☐ Others (Space unlimited, please specify as many as possible)

2. *What contributed to the success of your PMO? (Click as many as apply)*

- ☐ Organizational culture supportive of PMO

- [ ] Clear process in place for managing projects and collecting knowledge gained on projects
- [ ] Easy access by employees to PMO resources
- [ ] Others(please specify as much detail as possible)

3. *What obstacles did your PMO experience? (please click as many as apply).*

- [ ] Senior management acceptance
- [ ] Project manager acceptance
- [ ] lack of appropriate funding
- [ ] Formal definition of the PMO role
- [ ] Demonstration of the PMO success
- [ ] Unsupportive organizational culture
- [ ] Ensuring consistent application of defined processes
- [ ] PMO didn't meet its mandated requirement
- [ ] Applicability of the PMO to all projects
- [ ] Unreasonable work load to PMO staffs
- [ ] The PMO adding bureaucracy to the already existing organizational structure
- [ ] Lack of PMO authority to carry out objective
- [ ] Conflict over project management ownership
- [ ] Cost increase to the organization
- [ ] Making the case for change in adopting formal PMO
- [ ] Others (Please specify)

4. *If your PMO is in place, how did you overcome these obstacles (please specify as much detail at possible)*

5. *Is your PMO still in place?*

5. *Is your PMO still in place?*

☐ Yes ☐ No

The Structure of the PMO

6. *To whom does your PMO directly report?*

☐ No formal reporting relationship established

☐ To the VP level

☐ To board of directors

☐ to CEO/senior management team

☐ To manager/director level

☐ Others (please specify)

_____

7. *How do you characterize the maturity level of your PMO?*

☐ Level one, the PMO supports a single big project

☐ Level two, the PMO supports several projects under the same programme

☐ Level-three, the PMO supports a division or departments of an organization with all its projects

☐ Level-four, the PMO supports the organization within its projects

☐ Level-five, the PMO is placed strategically at an executive level and supports business strategy and resource

allocation at the enterprise level.

8. *How is your project reporting?*

☐ No formal processes for project reporting

☐ Reporting managed and compiled to the project level only

☐ Departmental or portfolio level reporting with PMO providing compilation and distribution only

☐ Departmental or portfolio level reporting with PMO providing compilation, analysis, interpretation and

distribution

☐ Consolidated organizational reporting with PMO providing compilation and distribution only.

☐Consolidated organizational reporting with PMO providing compilation, analysis, interpretation and distribution

9. *Your project managers report to?*

☐Functional departments

☐A separate project delivery organization

☐The PMO

☐Others (please specify)

next Reset

UNIVERSITY OF CAPE TOWN BERGISCHE UNIVERSITÄT WUPPERTAL

A STUDY ON THE PRACTICE OF THE PMO WITHIN THE CONSTRUCTION SECTOR

Impact of the PMO

1. *How do you rate the PMO's impact in improving the successful delivery of projects?*

- No real contribution (0)
- Little contribution (1)
- Some contribution (2)
- Significance contribution (3)
- Considerable contribution (4)

2.*PMO's contribution in instilling Project management culture and practices*

- No real contribution (0)
- Little contribution (1)
- Some contribution (2)
- Significance contribution (3)
- Considerable contribution (4)

3.*PMO's contribution in enabling your organization use its intellectual property gained on projects and enabling it a knowledge driven organization.*

- No real contribution (0)
- Little contribution (1)
- Some contribution (2)
- Significance contribution (3)
- Considerable contribution (4)

Submit Reset

Thank you very much for all your time and effort

You will recieve a summary of the Finding by the following E-mail Adresse:

[E-mail Adresse]

BERGISCHE UNIVERSITÄT WUPPERTAL UNIVERSITY OF CAPE TOWN

STUDIE ÜBER DIE ANWENDUNG DES PMO (PROJEKTMANAGEMENT-UNTERNEHMENSEINHEIT) IM BAUSEKTOR

Allgemeine Informationen über das Unternehmen

1. *Welches ist Ihre Stellung im Unternehmen?*

- ☐ Unternehmensführung (Geschäftsführer, Vorstandsvorsitzender)
- ☐ Leiter des PMO (Projektmanagement-Unternehmenseinheit)
- ☐ Projektmanager
- ☐ Leitender Angestellter
- ☐ Andere (bitte benennen):

_____

2. *In welchem Bereich der Bauindustrie ist Ihr Unternehmen tätig? (bitte alles Zutreffende markieren)*

- ☐ Bauausführung
- ☐ Projektmanagement
- ☐ Bauträger

3. *Größe Ihrer Unternehmen*

- ☐ 0- 49 Beschäftigte
- ☐ 50- 499 Beschäftigte
- ☐ 500- 1.000 Beschäftigte
- ☐ Über 1.000 Beschäftigte

4. *Bitte geben Sie die E-Mail-Adresse an, an die wir Ihnen die Zusammenfassung der Ergebnisse dieser Studie senden können*

_____

Weiter Zurücksetzen

BERGISCHE UNIVERSITÄT WUPPERTAL UNIVERSITY OF CAPE TOWN

STUDIE ÜBER DIE ANWENDUNG DES PMO (PROJEKTMANAGEMENT-UNTERNEHMENSEINHEIT) IM BAUSEKTOR

Leistungsumfang des PMO und Erfahrung bei der Implementierung eines PMO

1. *Wie ist der Leistungsumfang des PMO Ihres Unternehmens?*

☐ Es gibt keine PMO-Funktionen im Unternehmen.

☐ Es existiert ein virtuelles PMO, welches informell bestimmte Projekte/Abteilungen unterstützt.

☐ Es existiert ein virtuelles PMO, welches informell das gesamte Unternehmen unterstützt.

☐ Es existiert ein tatsächliches PMO, welches formell bestimmte Projekte/Abteilungen unterstützt.

☐ Es existiert ein tatsächliches PMO, welches formell das gesamte Unternehmen unterstützt.

2. *Wenn Ihr Unternehmen PMO-Funktionen aufweist, wie nennen Sie Ihr PMO? (mehrere Antworten möglich)*

☐ Projektmanagement Büro

☐ (Strategisches) Projektbüro

☐ Projektmanagement-Kompetenzzentrum

☐ Projekt-/Programm-Unterstützungsbüro

☐ Unternehmensentwicklung

☐ Andere (bitte benennen)

3. *Seit wann besteht Ihr PMO?*

☐ < 2 Jahre

☐ 2-5 Jahre

☐ 5-10 Jahre

☐ > 10 Jahre

4. *Was wurde unternommen, um Ihr PMO zu implementieren (bitte alles Zutreffende markieren)*

☐ Etablieren der Vision und Strategie für das PMO

☐ Aufstellen eines Plans für die Implementierung des PMO

☐ Vereinfachen der Zusammenarbeit innerhalb des Unternehmens

☐ Implementieren von Projektmanagement Trainingsprogrammen

☐ Entwickeln einer Struktur für das PMO

☐ Beauftragen eines Beraters

☐ Andere (bitte benennen)

_____

5. *Was war das Ziel für Ihr PMO? (bitte alles Zutreffende markieren)*

☐ Formalisieren der Projekt-Wissensmanagement-Praxis des Unternehmen

☐ Verbesserung der Unternehmensleistung

☐ Hilfe, eine Projektmanagement-orientierte Kultur aufzubauen

☐ Steigern der Professionalität der Beschäftigten im PM

☐ Implementieren von berechenbaren und wiederverwendbaren Projektmanagement-Werkzeugen, Techniken und Prozessen

☐ Erfolgreichere Durchführung von Projekten

☐ Andere (bitte benennen)

_____

Weiter Zurücksetzen

BERGISCHE UNIVERSITÄT WUPPERTAL UNIVERSITY OF CAPE TOWN

STUDIE ÜBER DIE ANWENDUNG DES PMO (PROJEKTMANAGEMENT-UNTERNEHMENSEINHEIT) IM BAUSEKTOR

Der Zustand Ihres PMO

Funktionen des PMO und seine Erfahrung

1. *Was tut Ihr PMO? (bitte Zutreffendes ankreuzen)*

- ☐ Es zentralisiert das Projektberichtswesen
- ☐ Es dokumentiert die aus Projekten gewonnenen Erfahrungen (Lessons Learned)
- ☐ Es leitet Projekt-Wissensmanagement-Aktivitäten.
- ☐ Es entwickelt Methoden, Standards und Vorlagen für PM
- ☐ Es verteilt Information
- ☐ Es leitet PM-Mentorschaft, -Training und -Ausbildung
- ☐ Es formalisiert die Projektauswahl durch Projekt-Portfolio-Management.
- ☐ Plant und führt kontinuierliche Verbesserungs-Strategien durch
- ☐ Unterstützt strategische Unternehmensplanung
- ☐ Führt Benchmarking von Verfahren im PM durch (z. B. Richtlinien von ISO 10006, PMI, etc.)
- ☐ Steuert die Schnittstelle zum Kunden
- ☐ Führt Projektaudits und -verfolgung durch
- ☐ Disponiert Ressourcen und koordiniert Projekte untereinander
- ☐ Steuert ein oder mehrere Programme (Projektpakete)
- ☐ Führt spezielle Aufgaben für Projektmanager durch (z. B. Aufstellen von Terminplanen)
- ☐ Kontrolliert und steuert die Projektleistung
- ☐ Andere (bitte möglichst viele benennen)

_____

2. *Was trug zum Erfolg Ihres PMO bei? (bitte Zutreffendes ankreuzen)*

☐ Die Unternehmensphilosophie unterstützte ein PMO

☐ Vorhandensein klarer Verfahrensanweisungen für das Projektmanagement und das Sammeln von aus Projekten gewonnenem Wissen

☐ Einfacher Zugriff für Beschäftigte auf PMO-Ressourcen

☐ Andere (bitte möglichst genau benennen)

_____

3. *Welchen Hindernissen begegnete Ihr PMO? (bitte Zutreffendes ankreuzen)*

☐ Akzeptanz durch die obere Managementebene

☐ Akzeptanz durch die Projektmanager

☐ Mangel an Mitteln

☐ Formelle Definition der Rolle des PMO

☐ Belegung des Erfolges des PMO

☐ Fehlende Unterstützung durch die Unternehmensphilosophie

☐ Sicherstellen der durchgängigen Anwendung definierter Prozesse

☐ Das PMO erfüllte nicht die gestellten Erwartungen

☐ Anwendbarkeit des PMO auf alle Projekte

☐ Unzumutbares Arbeitsaufkommen für die PMO-Beschäftigten

☐ Das PMO erhöhte die Bürokratie in der Unternehmensstruktur

☐ Mangel an Befugnissen des PMO, um die Aufgaben zu erfüllen

☐ Konflikt bezüglich der Verantwortlichkeit im Projektmanagement

☐ Kostensteigerung für das Unternehmen durch das PMO

☐ Fragliche Notwendigkeit der Einführung eines formellen PMO

☐ Andere (bitte benennen)

_____

4. *Wie überwanden Sie diese Hindernisse? (bitte möglichst genau benennen)*

5. *Besteht Ihr PMO noch?*

☐ Ja ☐ Nein

Die Struktur des PMO

6. *An wen berichtet Ihr PMO unmittelbar*

☐ Es ist keine formelle Berichtsbeziehung vorgesehen

☐ an die Geschäftsleitungsebene

☐ an den Vorstand

☐ an den Vorstandsvorsitzenden

☐ an leitende Angestellte

☐ Andere (bitte benennen)

_____

7. *Wie charakterisieren Sie den Reifegrad Ihres PMO?*

☐ Erste Stufe, das PMO unterstützt ein großes Einzelprojekt

☐ Zweite Stufe, das PMO unterstützt mehrere Projekte eines Programms/Projektpakets

☐ Dritte Stufe, das PMO unterstutzt eine Sparte oder Abteilungen des Unternehmens in allen dortigen Projekten

☐ Vierte Stufe, das PMO unterstützt das Unternehmen innerhalb von dessen Projekten

☐ Fünfte Stufe, das PMO ist strategisch auf leitender Ebene angesiedelt und unterstutzt die

Geschäftsstrategie und Ressourcendisponierung auf Unternehmensebene

8. *Wie ist Ihr Projektberichtswesen?*

☐ Es gibt keine formellen Prozesse für Projektberichte.

☐ Das Berichtswesen wird nur auf Projektebene geführt.

☐ Berichtswesen auf Abteilungs- oder Portfolioebene, bei dem das PMO nur zusammenfasst und versendet

☐ Berichtswesen auf Abteilungs- oder Portfolioebene, bei dem das PMO zusammenfasst, analysiert, interpretiert und versendet

☐ Konsolidiertes Unternehmensberichtswesen, bei dem das PMO nur zusammenfasst und versendet

☐ Konsolidiertes Unternehmensberichtswesen, bei dem das PMO zusammenfasst, analysiert, interpretiert und versendet

9. *Ihre Projektmanager berichten an (mehrere Antworten möglich)*

- ☐ Fachabteilungen
- ☐ Eine separate projektverantwortliche Unternehmenseinheit
- ☐ Das PMO
- ☐ Andere (bitte benennen):

Weiter Zurücksetzen

BERGISCHE UNIVERSITÄT WUPPERTAL UNIVERSITY OF CAPE TOWN

STUDIE ÜBER DIE ANWENDUNG DES PMO (PROJEKTMANAGEMENT-UNTERNEHMENSEINHEIT) IM BAUSEKTOR

Wirkung des PMO

1. *Wie bewerten Sie die Wirkung des PMO hinsichtlich der Verbesserung der erfolgreichen Projektabwicklung?*

- ☐ Kein realer Beitrag (0)
- ☐ Geringer Beitrag (1)
- ☐ Gewisser Beitrag (2)
- ☐ Signifikanter Beitrag (3)
- ☐ Beträchtlicher Beitrag (4)

2. *Wie bewerten Sie den Beitrag des PMO zur Projektmanagementkultur und -prozess?*

- ☐ Kein realer Beitrag (0)
- ☐ Geringer Beitrag (1)
- ☐ Gewisser Beitrag (2)
- ☐ Signifikanter Beitrag (3)
- ☐ Beträchtlicher Beitrag (4)

3. *Wie bewerten Sie den Beitrag des PMO, es dem Unternehmen zu ermöglichen, sein aus Projekten gewonnenes geistiges Eigentum zu nutzen und es zu einem wissensgesteuerten Unternehmen zu machen?*

- ☐ Kein realer Beitrag (0)
- ☐ Geringer Beitrag (1)
- ☐ Gewisser Beitrag (2)
- ☐ Signifikanter Beitrag (3)
- ☐ Beträchtlicher Beitrag (4)

Absenden Zurücksetzen

Vielen Dank für Ihre Zeit und Mühe.

Sie werden eine Zusammenfassung dieser Studie erhalten an die nachfolgend angezeigte angegebene E-Mail-Adresse:

[T141] [Email adresse]

Appendix III

UNIVERSITY OF CAPE TOWN BERGISCHE UNIVERSITÄT WUPPERTAL

A STUDY ON THE PRACTICE OF THE PMO WITHIN THE CONSTRUCTION SECTOR

Background Information

Dear participants,

The Project Management Office (PMO) is an organizational entity (department) which can be designed to facilitate the management of individual projects on one level and to continuously improve the project management (PM) practice of the entire enterprise on other. It is an organizational entity entrusted to instill project management culture and best practice within an organization.

Together with many others, the PMO is believed to do the following core activities:

- Documenting lessons learned on projects
- Disseminating information
- Developing methodologies, standards and templates for PM
- Benchmarking PM best practices
- Planning for and effecting continuous improvement strategies
- Conducting and facilitating training and education in PM
- Planning and coordinating effective utilization of resources
- Centralizing communication management across projects
- Acting as a home of project managers
- Formalizing project selection through project portfolio management
- Managing customer relationship
- Supporting corporate strategic planning
- etc

The PMO has different names in different companies and sectors and may exist as a real entity (with allocated space and responsible champion) or as a virtual one where the organization does much of the above indicated activities (and much more) but often separately with no specific champion allocated.

This research work is done under the supervision of Univ.-Prof. Dr.-Ing. C. J. Diederichs, Department of Construction Economy at the University of Wuppertal, and Dr. D. Root, Department of Construction Economics and Management at the University of Cape Town. It intends to explore the adoption of the PMO concept as a roadmap to improve project management performance within the German construction sector. It specifically focuses on looking into the advantages it can bring, the obstacles that could be faced in its implementation and possible ways of alleviating these obstacles.

BERGISCHE UNIVERSITÄT WUPPERTAL UNIVERSITY OF CAPE TOWN

STUDIE ÜBER DIE ANWENDUNG DES PMO (PROJEKTMANAGEMENT-UNTERNEHMENSEINHEIT) IM BAUSEKTOR

Hintergrundinformation

Sehr geehrte Teilnehmer,

Das Project Management Office (PMO, Projektmanagement-Büro) ist eine Unternehmenseinheit (Abteilung), welche dazu gedacht sein kann, das Management von einzelnen Projekten zu vereinfachen, aber auch stetig die Projektmanagement-Praxis des gesamten Unternehmens zu verbessern. Es ist eine Unternehmenseinheit, die die Projektmanagement-Kultur und bewährte Verfahren in einem Unternehmen implementieren soll.

Zusammen mit vielen anderen, übernimmt das PMO nach heutigem Wissensstand die folgenden Kernaufgaben:

- Es dokumentiert die aus Projekten gewonnenen Erfahrungen (Lessons Learned).
- Es verteilt Informationen.
- Es entwickelt Methoden, Standards und Vorlagen für PM.
- Es führt Benchmarking von Verfahren im PM durch.
- Es plant und führt kontinuierliche Verbesserungs-Strategien durch.
- Es leitet und vereinfacht PM-Training und -Ausbildung.
- Es plant und koordiniert die effektive Ressourcenverwendung.
- Es zentralisiert das Kommunikationsmanagement zwischen Projekten.
- Es fungiert als Zentrale der Projektmanager.
- Es formalisiert die Projektauswahl durch Projekt-Portfolio-Management.
- Es steuert die Schnittstelle zum Kunden.
- Es unterstützt strategische Unternehmensplanung.

Das PMO hat in verschiedenen Unternehmen und Branchen unterschiedliche Bezeichnungen und kann als eine reale (mit zugewiesenem Raum und verantwortlicher Leitung) oder als eine virtuelle (viele der genannten Tätigkeiten werden im Unternehmen ausgeführt, jedoch oft einzeln ohne zugewiesene spezifische Leitung) Einheit existieren.

Diese Forschungsarbeit wird betreut von Univ.-Prof. Dr.-Ing. C. J. Diederichs, Lehr- und Forschungsgebiet Bauwirtschaft an der Bergischen Universität Wuppertal, und Dr. D. Root, Lehrstuhl für Bauwirtschaft und -management an der Universität Kapstadt. Sie will die Übernahme des PMO-Konzeptes als eine Zielrichtung zur Verbesserung der Projektmanagement-Leistung im deutschen und südafrikanischen Bausektor untersuchen. Sie fokussiert besonders auf Betrachtung der möglichen Vorteile, der drohenden Hindernisse bei der Implementierung und gangbarer Wege, diese zu überwinden.

Diesen Fragebogen zu beantworten wird nur rund 15 Minuten Ihrer wertvollen Zeit beanspruchen und würde uns helfen, Einblick in die Anwendung des Konzeptes im

Appendix IIIB: Accompanying Email-English version

To: "Email address of contact person-or generic email address"

Project Management Research – Message to Mr "contact person's name"

Dear Mr "contact person's name",

The link below leads to a questionnaire for a study on the adoption of the Project Management Office (PMO) concept within the construction sector, a study supervised by Prof. Dr. C. J. Diederichs of the University of Wuppertal.

Filling the questionnaire will take only few minutes of your valuable time as it is mainly ticking options and your company's reply will make a very important part of the study.

http://www.pmo-survey.net/coverletter.htm

By participating in the survey, you will receive a summarized copy of the study.

Please click the link to go to the questionnaire page or please forward this message to a more appropriate person in your company, if necessary.

Faithfully yours

Solomon Desta

Appendix IIIB: Accompanying Email-German version

To: ''Email address der Kontaktperson oder generisches email address''

Forschung zu Projektmanagement – Schreiben an Herrn ''Name der Kontaktperson ''

Sehr geehrter Herr '' Name der Kontaktperson",
Sehr geehrte Frau '' Name der Kontaktperson",

der nachfolgende Link führt zu einem Fragebogen zu einer Studie über die Verbreitung des PMO(Projektmanagement-Unternehmenseinheit)-Konzeptes im Bausektor, die von Herrn Univ.-Prof. Dr.-Ing. C. J. Diederichs von der Bergischen Universität Wuppertal begleitet wird.

Das Ausfüllen wird nur wenige Minuten dauern, da es Ankreuzfragen sind. Die Antwort Ihres Unternehmens wird einen sehr wichtigen Beitrag zu der Studie leisten.

http://www.pmo-survey.net/coverletter.htm

Mit der Teilnahme an der Umfrage werden Sie eine Zusammenfassung der Ergebnisse erhalten.

Bitte klicken Sie auf den Link, um zur Umfrageseite zu gelangen oder bitte leiten Sie diese Nachricht an eine geeignetere Person in Ihrem Unternehmen weiter, falls sinnvoll.

Mit einem freundlichen Gruß

Solomon Desta

Appendix IIIC: Reminder-English version

To: "Email address of contact person-or generic email address"

Reminder: Project Management Research – Message to Mr/s "contact person's name"

Dear Mr/s "contact person's name",

Last time we sent you an E-Mail with a request to fill out a questionnaire for the study of the PMO concept in the construction sector:

http://pmo-survey.net/coverletter.htm

This email serves as a reminder to send us your answers by 15.07.2005.

As we promised, you will receive a summarized copy of the findings for participating in this questionnaire.

Thank you very much

Solomon Desta

To: ''Email address der Kontaktperson oder generisches email address''

Erinnerung: Forschung zu Projektmanagement – Schreiben an Herrn ''Name der Kontaktperson ''

Sehr geehrter Herr '' Name der Kontaktperson",

Sehr geehrte Frau '' Name der Kontaktperson",

in der 24. KW sandten wir Ihnen eine E-Mail mit der Bitte, einen Fragebogen zur Erforschung des PMO-konzeptes im Bausektor auszufüllen:

http://pmo-survey.net/coverletter.htm

Wir würden uns sehr freuen, Ihre Antworten bis zum 15.07.2005 zu erhalten.

Wie wir Ihnen zusicherten, werden Sie für die Teilnahme an dieser Befragung eine Auswertung der Forschungsergebnisse erhalten

Vielen Dank im Voraus und beste Grüße aus Wuppertal

Solomon Desta