PMOMM - The Project Management Office Maturity Model

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Abstract
The Project Management Office (PMO) is a relatively new type of organizational unit, responsible for supervising internal projects. However, PMOs do not always create and deliver the necessary knowledge for the decisional process. This paper proposes a solution to this problem through the literature-based Project Management Office Maturity Model (PMOMM) that evaluates whether if PMO related processes are implemented and supported by technology. PMOMM consists of 30 main project management processes, organized into 7 capability areas. In order to assess the maturity level of a PMO, a maturity assessment questionnaire was developed.Then, 10 case studies were conducted in which the PMOs of the corresponding organizations were evaluated against PMOMM. The results of the analysis were tested for validity and confirmed by the case study respondents. PMOMM received positive feedback from these experts. stating that the PMOMM represents an easy, yet detailed checklist for organizations to determine the current situation of their PMO.

Keywords: Project Management Office, Maturity Modeling, Organizational Benchmark, Project Management Processes

1. Introduction and Problem Statement

At present moment, nearly every company or organization is part of a dynamic economic environment, generally referred to as world economy or global economy. This economy, which is based on the economies of local societies, is characterized by a global distribution of products and services. For organizations to survive, they must adapt themselves to the globalization aspect, by means of gaining and sustaining competitive advantage. To achieve this, they must gather and process very rapidly information (Choo, 1995). Both tasks involve difficulty, as organizations often find themselves facing with uncertainty. To face this uncertainty, Kaye (1996) suggests that "organizations must collect, process, use, and communicate information, both external and internal, in order to plan, operate and take decisions".

The challenge of the global economy has meant that organizations need to revise the managerial decision process. This process is considered to be the most fundamental part of any organization, and has a direct impact on business operations. The quality and speed of the decisional process have been researched by various scholars (Forbes, 2005; Perlow, Okhuysen, & Repenning, 2002). To deliver on these attributes, there is a trend toward implementing a Project Management Office (PMO) within the organization. A PMO is described as "an organizational unit to centralize and coordinate the management of projects under its domain" (Committee, 2004). It is argued that the PMO exists in the broader context of project management, described as a "dynamic decision

process, whereby a business's list of active new product [...] projects is constantly updated and revised" (Cooper et al., 2001).

According to PMBOK (Committee, 2004), the PMO is responsible with: coordination of human resources across all projects, coordination of communications, quality standards and risk assurance activities, monitor project schedule, monitor project budget, and monitor overall risk and coordinate. Hence, the primary aspect of this organizational unit is to manage information that can be directly related to these features. In most scenarios, all the relevant information that managers need to make good decisions is not readily accessible, because of the lack of appropriate technologies to give the available information a usable form (Monahan, 2000). Business Intelligence (BI) technologies come to support the decision process regarding the management of projects, by means of gathering, analyzing and disseminating relevant information for various operations. These processes and the way in which they are employed are closely related to the maturity of the PMO.

Before organizations can undertake any initiative to improve the processes of a PMO, they must gain an understanding of its current state. Here is where maturity models come in place, by assessing an organization's PMO maturity level and identifying areas of improvement. The following statement best describes the idea behind maturity models: "the basic concept of all maturity models is based on the fact that things change over time and that most of these changes can be predicted and regulated" (Rajterič, 2010). Organizations can position their processes on the maturity scale by using a maturity model, which is put to practice through the use of an assessment instrument.

Although project management is a mature field of study, there is no maturity model to evaluate if the processes specific for a PMO are implemented and supported by technology. Therefore, this paper proposes a solution to the problem mentioned above by developing a Project Management Office Maturity Model (PMOMM), which provides an answer to the following research question:

How can the maturity of a PMO be assessed and acted upon?

2. Research Approach

The method selected in conducting this research is design science approach (Hevner et al., 2004). The case of design science as an Information Systems (IS) research paradigm is argued by March and Smith (1995). The authors state that the method contributes to the applicability of IS research by better addressing the problems faced by Information Systems (IS) practitioners.

The research process follows the research steps of design cycle defined by Vaishnavi and Kuechler (2007): awareness of problem, development, evaluation, and conclusion. Awareness of the problem was raised from conducting literature review and discussing with project management practitioners and experts. Based on these sources, the problem, which was described in the previous section, was identified. As a solution to this problem, this paper aims at creating a maturity model (PMOMM) and corresponding assessment instrument, which can help organizations in identifying the PMO current maturity level and take actions upon it. The finding from the literature review and expert interviews led to identifying the components of the maturity model and formulating the initial version of the model and the assessment questionnaire. To evaluate the PMOMM, we adopted multiple-case study design (Yin, 2009). Ten

organizations belonging to the financial, services, and technology sector participated in this research. The respondents hold important position within the organization, from senior project manager, to head of global PMO. Each organization has more than 10.000 employees. Analysis of the data collected led to the formulation of an organizational benchmark, and the results of the research were tested for validity by conducting interviews with the same respondents from the case studies. In the final step, results are summarized, conclusions are drawn, and suggestions for further research are made.

3. PMOMM: the Project Management Office Maturity Model

The PMBOK (Committee, 2004) was used as a main foundation to develop the PMOMM, which can be depicted in Figure 1. We choose this body of knowledge on project management, because it is part of a global network for project management professionals. Project Management Institute has developed a complex knowledge center, which integrated publications, research and other resources to offer practices, methodologies and standards for professional development.

When analyzing the maturity of a PMO, we are taking a snapshot of an organization's PMO at the current moment in time. Therefore, in order to provide valid and relevant results, we must include in the analysis the most representative features in the PMO context. To effectively manage a project, a PMO uses various project management processes. The PMBOK (Committee, 2004) describes the main process groups, namely initiating, planning, executing, monitoring and control, and closing process group. Together with corresponding activities and deliverables, these processes are organized into project management knowledge areas, which are defined as areas of specialization. The knowledge areas include project time management, project cost management or project procurement management. Although the PMBOK (Committee, 2004) identifies nine knowledge areas, the PMOMM will be restricted to analyze only six of them. The reason behind the choice is that we aimed at offering a generic guide to manage most projects. This option was confirmed in the development phase, when the maturity model was presented to field experts for validation. These knowledge areas can be analyzed from the point of view of the information required to ensure that all consisting processes meet the internal needs of the organization. We also included in the model another dimension that focuses on the capability of information systems to store, process, and transfer information.

According to the above arguments, the PMOMM will consider seven capability areas, each of them having corresponding capabilities, as follows:

PMO MATURITY						
Time mgmt.	**Cost mgmt.**	**Risk mgmt.**	**Human resources mgmt.**	**Communications mgmt.**	**Quality mgmt.**	**Information technology**
Activity definition	Cost estimating	Risk planning	Human resources planning	Communications planning	Quality planning	Data inquiry

Figure 1. Project Management Office Maturity Model detailed view

Time management

The capabilities included in this area correspond to processes required for timely project completion. The processes presented here make use of different type of information, such as information that tracks the changes in the project schedule, or information that identifies the logical sequence between project activities.

Activity definition - The first step in estimating, monitoring and controlling a project is to break it down into standard phases, activities, and tasks.

Activity sequencing - It refers to the process of identifying and documenting the logical sequence between project activities. The responsibility of the PMO is to recognize dependencies and put them into a logical order***.***

Activity resource - It refers to the process of estimating the resources needed to perform schedule activities. Resources can take the form of people, materials or equipment used.

Activity duration - It refers to the length of action of each identified phase and activity. Activity duration involves a careful examination of the estimated phases and the activity schedule, the required resources to complete each schedule activity, and the number of work periods.

Schedule control - The last capability of time management capability area refers to the processes implemented by the PMO to monitor and control projects and to assure a continuous and efficient workflow.

Cost management

In a broad sense, cost management refers to the monetary value of a project. It consists of unique cost categories, such as direct/indirect costs or fixed/variable costs. Labor, materials and equipment costs are part of these categories. The processes included in

the cost management capability area are related to the estimation, monitor and control of project costs. Efficient cost management processes can improve decision-making and have a direct impact on the schedule of a project and boost the quality of products/services.

Cost estimating - It refers to the project management process that approximates the cost of resources allocated to schedule activities. It is defined as "a qualitative assessment of the likely costs of the resources required to complete the schedule activity" (Committee, 2004). An exemplary approach related to IT security is provided by the CITS framework (Spruit & Bruijn, 2012).

Cost budget - Cost budget is a critical process in project management, closely related to measuring project performance. The output of this process is a financial plan that reflects the total budget of a project.

Cost control - It involves managing the factors that influence the cost budget, in such ways that cost changes are made according to these factors, and documented properly in the cost management plan.

Risk management

Risk is defined in ISO 31000:2009 as an uncertain event that, in case of occurrence, will affect the outcome of projects. All projects have risks associated, depending on various factors. If a risk occurs, it will certainly have an impact on either time, cost, quality or performance objectives. Therefore, risk management primary focus is to decrease the probability of risk occurrence and minimize the impact.

Risk planning - Risk planning is the process of deciding how to approach, plan, and execute risk management activities in a project (Committee, 2004). The planning process is decisive for performing related processes, such as analysis and response.

Risk identification - It is related to the management process that determines which are the risks that might occur in a project. Risks are identified by using information gathering techniques, such as interviews or SWOT analysis (Strengths, Weaknesses, Opportunities, Threats analysis).

Risk analysis - Risk analysis can employ two methods, namely quantitative and qualitative analysis, to analyze and manage activities against risk factors. Kindinger and Darby (2000) describe risk factors as "the issues, topics, or concerns that may ultimately drive the behavior of the top-level schedule and cost performance measures for a given activity".

Risk response - It consists of a series of processes that are performed in order to mitigate project risks and to reduce threats that might have a negative impact on project objectives.

Risk monitoring and control – It is a continuous process that keeps track of previously identified risks, but is also responsible for determining new risks. The capability is closely related to project performance.

Human resources management

This capability area includes all processes related to planning and managing the project team. It starts with identifying and documenting roles, responsibilities, and interactions between project team members. Once the staff requirements to complete

schedule activities have been approved, they can be satisfied by the acquisition and allocation of team members to meet the conditions.

Human resources planning **–** It is responsible with identifying and documenting the roles of project team members, as well as responsibilities and relationships among all members.

Allocate human resources **–** It refers to the process of assigning the team for a project. The staffing management plans documents how human resources have been assigned to schedule activities, with a focus on selecting available staff to achieve project objectives.

Manage human resources **–** It refers to the process of "tracking team member performance, providing feedback, resolving issues, and coordinating changes to enhance project performance" (Committee, 2004).

Communications management

This capability area includes the processes related to the distribution of project information. It starts with determining the information and communications needs of project stakeholders. Once determined, the required information is delivered in a timely manner, and it consists of performance reports. These reports comprise time, cost and quality information, which show how resources are used to achieve project objectives.

Communications planning **–** It is the key element in determining what type of information the project stakeholders require. It includes attributes that specify the method of information distribution (sender, receiver, time of delivery, format of delivery).

Information distribution **-** Based on what is documented in the communications management plan, the PMO has to deliver timely reports to stakeholders, but also has to respond to new requests for information.

Performance reporting **–** It refers to the capability to "organize, summarize the information gathered, and present the results of any analysis as compared to the performance measurement baseline" (Committee, 2004).

Manage stakeholders **–** It refers to communications methods in place when distributing information to stakeholders. Requirements, objectives, and expectations are documented and managed accordingly.

Quality management

Quality management is responsible for implementing standard procedures and practices that provide continuous process improvement. The capability incorporates systematic quality assurance activities; likewise the project management team is responsible with delivering the required quality level. Thus, processes employed are checked against requirements, and project results are reviewed for inadequate performance.

Quality planning **–** It refers to the joint effort of the project management team to establish relevant quality standards and determine how these identified standards can be applied to the project at hand.

Quality assurance - Andersen et. al (2007) research suggest that the role of the PMO is to contribute with recommendations related to project quality assurance. It offers support to projects by ensuring that relevant standards are applied to meet project requirements.

Quality control - It involves the use of control mechanisms to monitor project results. Various tools and technique are employed (e.g. cause and effect diagrams, control charts). Based on active monitoring of quality standards, the PMO is able to identify factors that might lead to unsatisfactory performance.

Information technology

Information technology refers to the ability of computers to store information, but also the capability to retrieve and distribute this information at request. In the context of this research, information technology capability area refers to the ability of information systems to gather, analyze and disseminate relevant information for the use of the PMO.

Data inquiry – It assesses the capability of the information system to access, select and extract data, which is relevant to different goals of project analysis. As part of this effort, the organization's master data management capabilities may need to be assessed (Spruit & Pietzka, 2015).

Data manipulation – It evaluates the capability of the information system to organize previously extracted data in a suitable form for analysis.

Data analysis - It evaluates the capability of the information system to perform data mining processes. This process is responsible with creating knowledge by analyzing data sets, either in-house or outsourced (*e.g.* Vleugel, Spruit & Daal, 2010). The process uses data available from previous steps as input for discovering knowledge, which is further on used in the decisional process.

Reporting - It evaluates the capability of the information system to make information easily accessible to audiences. Results are displayed into written reports, which can facilitate the decision process and point to corrective actions.

Graphics - It evaluates the capability of the information system to give a visual representation to information. Graphics combine different elements, such as text or color to create an effective communication.

Information security – It evaluates the capability to protect the information from unauthorized access and modification. The recently developed ISFAM instrument provides a notable holistic quickscan for this purpose (Spruit & Roeling, 2014). Preferences for constraints or content can be defined to provide privacy of information.

Portability and accessibility - It evaluates the capability of the information system to be usable on diverse platforms. Accessibility refers to the ability of the information system to be used by people of diverse backgrounds (e.g. financial controller, resource manager).

In order to assess the maturity level of each capability, and consequently of each capability area, we developed a scoring/assessment instrument. The PMO maturity assessment questionnaire determines if certain processes are implemented and evaluates the information needed to manage these processes against quality criteria. The quality criteria used in this study are accuracy, timeliness and accessibility (Eppler

& Muenzenmayer, 2006). Accuracy criteria measures if the information is precise and close enough to reality, timeliness criteria determines if the information is processed and delivered without delays, while accessibility criteria measures if the information is ready for use. Moreover, each piece of information related to project management processes is rated for importance. This rating will enable us to interpret the maturity score of a capability area/capability against the importance score and to determine a good/poor alignment between the two.

The PMO maturity assessment questionnaire is contained in Appendix A. It is clustered into 2 major sections:

- General information (17 questions)
- Maturity assessment (93 questions). This part comprises of seven sub-parts, corresponding to the capability areas of the maturity model:

    - Time management (14 questions)
    - Cost management (14 questions)
    - Risk management (9 questions)
    - Human resources management (5 questions)
    - Communications management (7 questions)
    - Quality management (4 questions)
    - Information technology (40 questions)

Except the first part containing general questions, each capability question(s) from the questionnaire can be answered "yes" or "no". Importance and information quality criteria are graded as high, medium or low. An example of a maturity question is shown below.

Does the PMO identify and document the logical sequence between project activities?	Yes/No
Importance	Low/Medium/High
Accuracy/Reliability	Low/Medium/High
Timeliness	Low/Medium/High
Accessibility	Low/Medium/High

The scores that can be determined after filling in the assessment questionnaire are:

- A maturity score per capability area by calculating the average value (number of "yes"/ number of questions).
- An overall score by calculating the average value of the scores per each capability area.

Additionally, the score of one organization can be compared against all analyzed organizations or sector based organizations. Further analysis can be conducted using the rated importance, accuracy, timeliness, and accessibility.

The overall maturity scores, together with the detailed scores per capability area and the benchmark against other organizations give a fair representation of the current PMO situation for each analyzed case, and it offers a good understanding of strong and weak processes. The maturity assessment should serve as a starting point in evaluating the PMO maturity. The determined scores should point to specific processes worthy of

attention, but always in combination with an analysis of the organization itself (structure, strategy, change management).

4. Case study results

As mentioned earlier, multiple-case study research (Yin, 2009) was conducted. The method provides better results over a single case study, because it draws analytic conclusions based on multiple sources of evidence. The case studies have been conducted at 10 national and multinational Dutch organizations, headquartered in the major cities of the Netherlands, such as Amsterdam, Den Haag or Utrecht. Four organizations are financial, four provide services, and two organizations are technology-oriented. The 13 pages interview protocol can be found in Appendix A. The respondents are described in terms of sector classification, together with organizational details, as depicted in Table 1. For convenience, each case was given an ID, based on the sector classification. For confidentiality reasons, the respondents' identity and company's name is kept anonymous.

Table 1. Case respondents overview

ID	Respondent type	Sector	Category	Size
FIN1	Head of global project management office	Financial	Banking	10,000+
FIN2	Programme & change manager	Financial	Banking	10,000+
FIN3	Project management office manager	Financial	Insurance	10,000+
FIN4	Senior project management office	Financial	Banking	10,000+
SVC1	Global programme manager & project office manager	Services	Transportation	10,000+
SVC2	Senior quality manager	Services	Leisure	1,000 – 5,000
SVC3	Senior project manager	Services	Diversified services	10,000+
SVC4	Head of project management office	Services	Diversified services	1,000 – 5,000
TECH1	Program Support Officer	Technology	Telecommunications	10,000+
TECH2	Group leader development	Technology	Electronics	10,000+

Overall results of the case studies conducted are depicted in Table 2. The maturity scores for all organizations are shown by capability area. We can determine which is the lowest, respectively highest score of each area, as follows: Time management (lowest: 28.6%, highest: 100%), Cost management (lowest: 21.4%, highest: 100%), Risk management (lowest: 22.2%, highest: 100%), Human resources management (lowest: 0.0%, highest: 60%), Communications management (lowest: 42.9%, highest: 100%), Quality management (lowest: 0.0%, highest: 100%), and Information technology (lowest: 45.0%, highest: 87.5%). Communications management reaches the highest maturity, while the lowest maturity corresponds to Human resources management. For comparison reasons, median values were calculated for each capability area. A median separates the lower half of the scores from the higher half, based on the middle value. It is an indicator of how the maturity scores tend to gather around one value, which is the median value. Using this calculation, we can draw conclusions about the maturity of

each capability area. For example, FIN1 score for Time management is below the median, while for Risk management the PMO scores above the median value.

Table 2. Case study maturity scores

	FIN 1	FIN 2	FIN 3	FIN 4	SVC 1	SVC 2	SVC 3	SVC 4	TECH 1	TECH 2	Median
Time mgmt.	35.7%	57.1%	28.6%	71.4%	100%	64.3%	71.4%	64.3%	85.7%	85.7%	67.8%
Cost mgmt.	42.9%	21.4%	92.9%	42.9%	100%	21.4%	50.0%	28.6%	71.4%	50%	46.4%
Risk mgmt.	77.8%	66.7%	33.3%	66.7%	100%	55.6%	55.6%	33.3%	22.2%	88.9%	61.1%
Human resources mgmt.	20.0%	40.0%	0.0%	0.0%	60.0%	0.0%	0.0%	60.0%	80.0%	60.0%	30.0%
Communications mgmt.	85.7%	100%	71.4%	85.7%	85.7%	42.9%	57.1%	85.7%	85.7%	100%	85.7%
Quality mgmt.	50.0%	100%	0.0%	0.0%	75.0%	25.0%	0.0%	25.0%	100%	100%	37.5%
Information technology	50.0%	87.5%	60.0%	77.5%	72.5%	45.0%	50.0%	50.0%	85.0%	60.0%	60.0%

The PMOMM can serve as a benchmark tool for organizations to measure and judge the maturity of their PMO. This way, organizations can compare their scores in an objective way against the best practice and the average scores. The comparison can be done sector based, or across all sectors.

The analysis is based on the scores for each capability area contained in the maturity model, and the overall maturity score. For example, the organization identified as FIN1 has a maturity score of 50.0% for Information technology area, as can be seen in Figure 2. The average score for the same area is 63.8%, while the best score among the case studies is 87.5%. By comparing these figures, FIN1 can quickly position their processes on the maturity scale, and further on determine which is the area in most need of improvement.

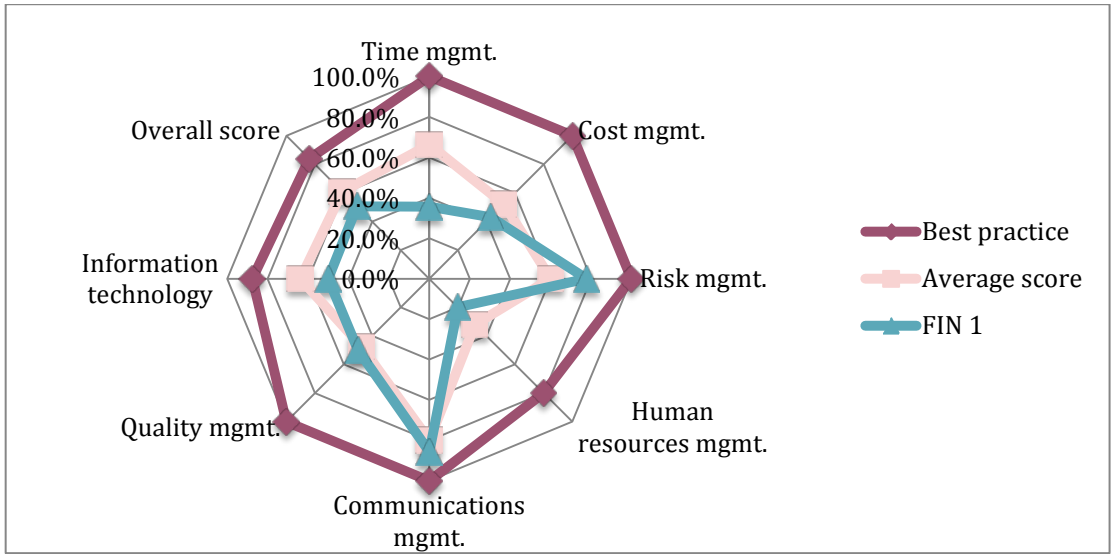

Figure 2. Benchmark for FIN1

Moreover, each capability area can be broken down into capabilities, and the maturity scores can be compared. For example, FIN1 has an overall maturity score of 50.5%, as can be seen in Figure 2. The score for Time management capability area is 35.7%. This area consists of five capabilities, each having a maturity score. Activity duration has a maturity score of 50.0%; the average score for the same area is 77.5%, while the best score among the case studies is 100%, as depicted in Figure 3.

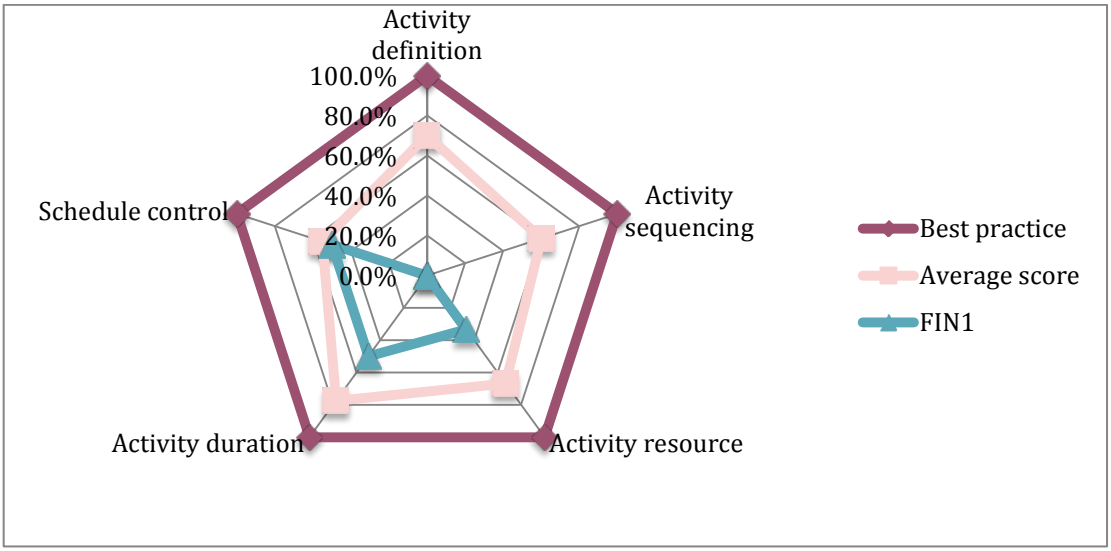

Figure 3. Time management area detailed benchmark for FIN1

Another interesting discussion can be related to the alignment between the maturity score of a capability area and the importance given by the respondents to that area. When the two measures are aligned, it means that the capability is implemented according to its importance. Otherwise, it shows an area of improvement. Radar graphs provide an easy and comprehensive way for the organizations to determine which are the areas that are of high importance, but lack implementation. For example, we can see in Figure 4 that FIN1 rated the Human resources management capability area as highly important, but only 20% of the processes related to this area are implemented. This rationale should trigger a warning for organizations to focus on specific areas that need fast improvement.

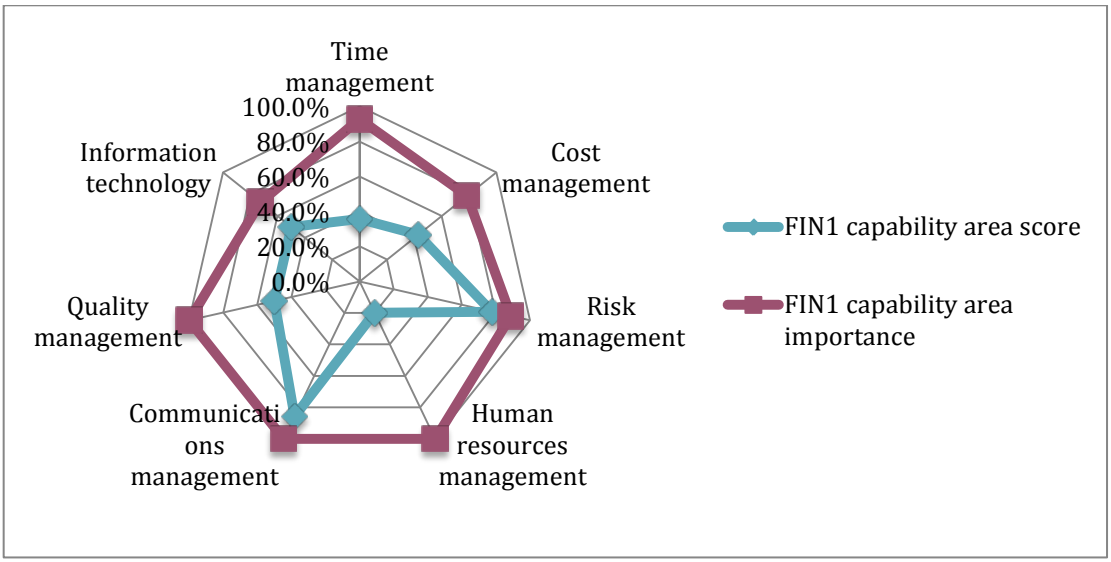

Figure 4. Alignment between FIN1 scores

5. Evaluation of the PMOMM

To evaluate the maturity model and the results of the maturity assessment, we use the validity measures introduced by (Yin, 2009), which are construct validity, internal validity, and external validity. Validity, in this case, is defined as the extent to which the research is able to scientifically provide a solution to the problem identified in Chapter 1. We offer a brief explanation for each type of measurement and the approach we took to meet the requirements for each validity measure.

Construct validity

Construct validity assesses the extent to which the construct measures the characteristics being investigated. It corresponds to the evaluation of the maturity model and the scoring instrument. It consisted of five semi-structured interviews with project management experts. The experts were interviewed and asked for their opinion about the maturity model and the scoring instrument. The focus was on conducting an in-depth investigation into PMO's; therefore the respondents were chosen based on knowledge and experience in the field. The respondents found the seven areas of the model to be appropriate for determining the maturity level of a PMO. They stressed on the importance of having a processes improvement framework, to provide them with a quick view on how mature the PMO is. They also recognized the add value of combining two perspective into a maturity model, namely the management processes that uses information, and the tools to generate accurate, relevant, and complete information. Changes were brought to both the maturity model and the assessment questionnaire, based on the suggestions expressed by experts.

All respondents gave positive feedback and expressed their optimistic belief that the maturity model could be applied for assessing an organization's current PMO situation.

Internal validity

Internal validity is assesses the extent to which the results are accurate and according to reality. This step corresponds to the evaluation of the results, and consisted of six structured interviews. The respondents for this phase are the same respondents as for the case studies. From the 10 case studies that were conducted, only six respondents showed interest in obtaining and discussing the results. Based on these interviews, conclusions can be drawn about the maturity model, in relation to its completeness, usefulness, and whether if the results of the maturity assessment give a fair representation of the current PMO situation. These three aspects were rated using a scale from one to 10, where 10 is the highest possible score. The average results are as follows:

- Completeness: 7.8/10
- Usefulness: 7.8/10
- Fair representation: 7.8/10

These results proved the maturity model to be viable and useful in assessing the maturity of a PMO. Indeed, the respondents had recommendations for model improvement, which explains the ratings and the average score above. The suggestions were considered as future research.

External validity

Yin (2009) explains the external validity in relation to the degree of generalization of the study. Maxwell (1992) considers the ability to generalize findings to wider groups and circumstances as one of the most common tests of validity for quantitative research.

The relative small number of case studies in this research clearly limits the possibility to claim a general applicability of the findings to all possible subjects in similar situations. Therefore, the external validity of this research need to be interpreted with caution by taking into account the above-mentioned limitation.

To reduce this limitation, we aimed at describing the case studies as clearly as possible for the reader to understand each situation. Based on the description, other organizations can reference their situation to one of the case studies described. We do not conclude that the results of this research can be generalized to another context, but the theory and analysis can be easily applied in similar studies, since the steps and procedures taken were fully documented.

6. Conclusions and Further Research

This section contains a summary of the findings of this research. Based on these findings, conclusions are drawn and recommendations for future research are made.

A remarkable finding is the difference in maturity scores between the capability areas of the PMOMM. The case study analysis led to some interesting results that deserve our attention. We begin our discussion with the area that has the highest score, Communications management. We observe that high maturity scores also correspond to high importance ratings. Communications management was rated as highly important by more than 90% of the respondents; therefore the effort put into this area can clearly be seen in the maturity score, which is the highest among the seven areas of the model. This can be explained by the fact that a PMO is a support unit, which is responsible with delivering project information to decision makers.

What came as a surprise to us were the low scores for both Human resources management and Quality management. Quality management has very much to do with the properties of the information. Especially for decision makers, quality of information should be of most concern. Human resources management is regarded as an important area, from where the PMO derives its value. The low scores for the importance aspect can be explained if we consider the amount of external consultants that are hired by the PMOs. This amount can take a maximum value of 80%. Being able to manage internal resource better and across the company would allow a PMO to differentiate itself as a strategic organizational unit.

The main conclusion of this research is that the maturity model we developed, and the maturity assessment questionnaire, delivers on its promise, which is to measure the maturity level of a PMO. The value add of this maturity model can be defined in terms of the benefit for the organizations who take the maturity assessment. It was acknowledged to be an easy checklist for organizations to see where their PMO currently stands. Once the weaknesses are detected, actions to improve each capability area can be taken. We do not claim the assessment to be sufficient to determine the maturity of a PMO, but it can be a starting point of an in-depth analysis, when situational factors specific to an organization (e.g. organizational structure, strategy) influence to a great extent the maturity level. The maturity model received positive feedback from the experts that reviewed and validated it. Moreover, the respondents from our 10 case

studies confirmed the results of the maturity assessment. The same respondents evaluated the completeness, usefulness, and whether if the results of the maturity assessment give a fair representation of the current PMO situation. The high ratings, give us confidence that more organizations will see the value in taking this assessment, now that its viability and usability have been confirmed. Even more so, we consider the possibility of further refining our current maturity model in line with the Situational Assessment Method (SAM) to better accommodate organization-specific characteristics (Bekkers & Spruit, 2010).

For further research, we strongly recommend to focus on the extension of the maturity model. Due to the exceptional complexity of the domain, our maturity model certainly needs to be further investigated. At this point, we consider the model to consist the most important perspectives of a PMO, but the assessment questions needs to be further refined. Some questions related to one capability might be suitable for another capability. Also the questions should be revised, to eliminate the possibility of confusion among the respondents. Furthermore, it would be interesting to investigate the PMO from a strategic perspective. Additional research should be conducted to determine if organizations regard their PMO as a strategic and value added department.

Because we conducted only 10 case studies, the generalization possibilities of this research are limited. The restriction of the benchmark can be considered in terms of this limited number of studies. Although the validation step confirmed our findings and supported the general pertinence and usefulness of the PMOMM in the investigated domain, future research involving a larger amount of case studies are needed to provide a more complete range of data for the benchmark.

Another possible avenue for follow up research is to introduce a condition for an organization that wants to take the maturity assessment. This condition relates to the number of respondents, which should be equal or more than two. This way we eliminate bias and assure the results to be more objective. On top of the suggestions provided above, the researchers could also investigate the possibility of sequential maturity levels, where the bottom level corresponds to processes that are barely controlled, while the top level describes completely mature processes. Input to this ordering of capabilities could be the ratings for the importance aspect of each capability.

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