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Assessing project management maturity in Sweden

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Abstract: Baseline Management has since 2013 conducted project management maturity (PMM) measurements in Sweden using a model called the Swedish project index (SPI) which consists of seven perspectives. SPI is influenced by the P3M3 maturity model. This study is based on data from 3,953 individual questionnaires, including both private and public organisations, for the period 2013–2019. The purpose of this article is to visualise levels of Swedish organisations' PMM as well as their performance improvement potential in different maturity perspectives. Results of this study indicate that different roles in the project organisation perceive PMM of their organisation differently and that maturity varies between business sectors and types of organisations. The SPI data indicate that the level of the perceived PMM is usually within two to three, on a scale ranging from one to five. The article describes in detail the earlier unpublished SPI model.

Keywords: maturity model; performance measurement; project management; PM; project management maturity; PMM; project management performance; project success.

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Raine Isaksson is an Associate Professor in Quality Management at Uppsala University, Department of Civil and Industrial Engineering Sciences. He has a background as a Chemical Engineer and has some 20 years of experience as development engineer, line manager and consultant, including some ten years of managerial work in Africa. His research interest focuses on how process management can be applied for sustainable development and how quality management can be used in developing organisations, with focus on building sustainability and on building material sustainability in Sub-Saharan Africa.

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1 Introduction

In today's society, innovation and globalisation are key challenges for organisations. The contemporary market is characterised by shorter product life cycles, an increased competition and higher expectations from investors. This means that productivity and fulfilment of customer and stakeholder demand are becoming more and more important. To be able to cope with the rapid changes, companies and organisations need to excel in managing change. Using projects can be seen as the ideal instrument for managing change (Marcelino-Sádaba et al., 2015). The goal for management of projects is to create conditions for successful outcomes (Berssaneti and Carvalho, 2015; Jha and Iyer, 2005).

Still, far from all projects are successful. There are several studies done regarding problems and failures of projects like Sauser et al. (2009) and Cerpa and Verner (2009). Indications are that project failure rate seems to be high. Sauser et al. (2009) state that many studies demonstrate that most projects fail to fulfil time or budget goals or to satisfy customer expectations. This indication is also noted by for instance Sols (2018) and Johnson and Mulder (2020) who among others refer to The chaos reports which have been compiled by the Standish group since 1994. The chaos reports state that approximately 1/3 of the American IT-projects are successful, approximately 20% of the

projects are cancelled. The rest, approximately 50% are completed, but are significantly over budget, over time or having fewer functions than specified. Simultaneously Mir and Pinnington (2014) state that project success has not improved significantly through the years, despite the evolvement of various project tools.

On a general level, project success is related to compliance with the three parameters, cost, schedule and performance of the iron triangle (de Carvalho et al., 2015; Berssaneti and Carvalho, 2015; Crawford, 2007; Kwak and Ibbs, 2002). The focus of project success has evolved through the years shifting from an exclusive focus on the parameters of the iron triangle in the 1970´s to a focus which involves various internal and external stakeholders having different perceptions of project success (Davis, 2014; Atkinson, 1999). According to Jha and Iyer (2005), there are many variables that affect the outcome of a project.

In order to improve capabilities within a specific field like project management (PM), maturity models could be used. The focus of maturity models is to systematically assess and/or improve capabilities within a field in order to reach business excellence (Van Looy et al., 2011, 2013; Dahlin, 2020). Within the field of PM, maturity models are generally grounded in the bodies of knowledge of PM associations and institutes, like the PM body of knowledge (PMBOK) by PMI and the IPMA competence baseline (ICB) (de Carvalho et al., 2015). These bodies of knowledge focus mainly on hard PM skills (de Carvalho et al., 2015; Besner and Hobbs, 2012), which could indicate their limitations in order to support complete guidance regarding improvement of project success. Söderlund and Maylor (2012) state that hard skills of PM, like work breakdown structures, critical path planning, etc., many times falling back to the dimensions of the iron triangle, are seen as skills that are central within PM. However, in order to measure and control project success on an operational level, the hard skills must be combined with leadership and other soft skills in order to improve project success (ibid).

Sweden is a country having a long tradition of project work, where many companies like for instance LKAB (mining), Vattenfall (energy), Volvo and Scania (vehicles) as well Swedish banks are organisations seen as being mature in the field of PM.

Baseline Management, a Swedish consultant company within the field of PM has since 2012 conducted project management maturity (PMM) measurements. They have used a self-made web-based PMM model named SPI (Swedish project index). The SPI model is inspired by OGC´s (2010) (nowadays Axelos) PMM model P3M3 version 2.1, both regarding content and structure. The results of all PMM measurements conducted by Baseline Management during one year are summarised in an annual report. The first annual report containing maturity measurements from year 2012 was presented in the beginning of 2013. So far, the data of SPI collected have not been analysed in detail.

The purpose of this article is to visualise actual levels of Swedish organisations PMM and the potential of organisational performance improvement in the different PMM perspectives. This is done by analysing present data in the SPI database based on various categorisations such as business sector, type of organisation and the role of the respondent.

2 Literature review

2.1 Project success

Within the commercial sector of PM, the PMBOK has been widely used for over two decades in order to support project success of organisations. According to PMBOK there are ten PM knowledge areas which are central in order to succeed with PM (PMI, 2017). These areas involve management of communication, cost, integration, procurement, quality, resource, risk, schedule, scope and stakeholder, which are mainly hard skills. Simultaneously indications are that the support of PMBOK and a focus on hard skills is not sufficient in order to achieve project success solely. The importance of soft skills in PM are also crucial (de Carvalho et al., 2015; Söderlund and Maylor, 2012).

According to Berssaneti and Carvalho (2015) there are no explanatory variables which lead to overall success of a project. Mir and Pinnington (2014) state that project success is more complex than complying with short term variables like time, budget and quality, where also variables like staff and leadership affect project success. Kumaran (2022) sees the project team as an important aspect of project success, where project managers need to focus on team dynamics and team processes in order create a shared mindset. Hussain et al. (2021) state that the personality of the project manager plays an important role regarding project success, where more extrovert and open managers could improve project success. Alvarenga et al. (2020) deem that project success can be seen as two-dimensional, containing project success criteria and the project manager's competencies, i.e., soft skills, like communication, commitment, leadership and teamwork.

According to Lawrence and Scanlan (2007) project failures are often associated with eight factors; poor initial planning, lack of clear objectives and deliverables, lack of understanding of dependencies, inadequate resource allocation, poor risk analysis, poor change management, lack of 'buy-in' from stakeholders and poor understanding of priorities.

However de Carvalho et al. (2015) deem that there seems to be no uniform definition of project success, since the way of measuring success in projects varies based on for instance different project types and different perspectives, where various stakeholder groups have various perceptions of project success. Additionally, Jha and Iyer (2006) deem that there is no consensus regarding success criteria of PM. The problem of unification of project success is also addressed by Moradi et al. (2020) stating that success factors of projects can be divided into two main parts, project success factors of general significance for all projects and success factors for specific project types, i.e., business specific project success factors. According to a literature review conducted by Lamprou and Vagiona (2022), the most cited success criteria are time, cost, quality, and user satisfaction. Beside these, goals/scope, top management commitment, project communication and project planning/control are the most cited critical success factors of projects (ibid).

Simultaneously, research conducted within the field of PM highlights the complexity and wideness of project success. This is illustrated by for instance de Carvalho et al. (2015) stating that project success is a multidimensional construct. Moradi et al. (2020) state that over 60 factors identified in literature, like communication, top management support, project managers competencies, risk management project success factors contribute to project success, in addition to more traditional project success criteria like

meeting cost, meeting time, meeting quality, customer satisfaction and business success. Other examples of emphasised project success criteria are for instance top management support or dedicated project managers (Berssaneti and Carvalho, 2015), the role of PM offices when using PM standards (Pirotti et al., 2022), the importance of needs of cultural skills and competencies of project managers (Rodrígues-Rivero et al., 2018), risk management (Rodríguez-Rivero et al., 2020), identifying and using components of sustainability (Phung et al., 2022), or an increased focus on stakeholders and thereby improving project success as well as sustainability (Klaus-Rosińska and Iwko, 2021).

2.2 Project management maturity

There is a growing interest in PMM models, which is stimulated by the importance of organisations' ability to manage projects in order to stay competitive (Fabbro and Tonchia, 2021). Berssaneti and Carvalho (2015) deem that PMM reflects the company's efficiency in completing projects, where a higher level of PMM increases the ability to successfully deliver a project (Karim et al., 2022). According to Anantatmula and Rad (2018) PMM leads to established, proven, and innovative practices and procedures which result in success regarding planning and completing projects. Through this, also better profits through efficiency in operations and effectiveness in using resources occur (ibid).

Maturity models are being used in different business disciplines like process maturity (Rosemann, et al., 2004), risk management maturity (Rae et al., 2014) and PMM (Aitken and Crawford, 2007). According Pöppelbuß and Röglinger (2011) and Maier et al. (2009) the purpose of maturity models can be divided into the three categories: Prescriptive, i.e., giving guidance of how to improve maturity, Descriptive, i.e., measuring the current level of maturity and Comparative, i.e., a tool for benchmarking of the level of maturity measured with other business units or organisations. This means that maturity measurements can be used in order to display the current level of performance of an organisation regarding for instance PM with the purpose of visualising improvement potential.

Moradi-Moghadam et al. (2013) describe maturity by stating that mature organisations have systematic ways of doing things, which implicitly include processes, compared with the immature organisations achieving their results based on heroic efforts of individuals using methods that have been created more or less ad-hoc. According to Berg et al. (2006), an increase of maturity affects and correlates with an increase in productivity of the organisation. PMM can be seen as a measurement of the level of organisational excellence in the area of PM (Berssaneti et al., 2010).

Maturity of different capabilities, like PM capabilities, within organisations is usually described on a scale relating to different levels of maturity, i.e., low maturity to high maturity, e.g., level 1 to level 5. When conducting improvements of maturity, the actual level of maturity is central, since the levels of maturity are inclusive, i.e., lower levels of maturity have to be achieved before improvements to higher levels of maturity can be made (Cronemyr and Danielsson, 2013).

Within the field of PM, work with PMM is often related to Project Management Institute (PMI´s) PMM model OPM3 (organisational project management maturity model) from the US or Axelos PMM model P3M3 (portfolio, programme and project management maturity model) from the UK. Both these models cover PM, program management and portfolio management. These models are based on described behaviours characterising mature PM behaviours, where it is up to the organisation to identify gaps

and implement improvement actions in order to reduce these gaps. A literature review done by Gareeb et al. (2022) states that maturity models within the field of PM often are similar, since many of these models are adaptions of existing models. The literature review of Fabbro and Tonchia (2021) state that the most common models when working with PMM has a five-level maturity scale.

P3M3 is based on a five-level maturity scale, where maturity is assessed within seven fields (called process perspectives), they are: management control, benefits management, financial management, stakeholder management, risk management, organisational governance, and resource management. These process perspectives contain a broad spectrum of attributes, i.e. description of behaviours characterising different levels of maturity reflecting each process perspective. In order to measure and improve the current level of maturity according to P3M3, self-assessment of these attributes is central.

However, the research area of PMM seems to be associated with various challenges. Berssaneti et al. (2010) state that there is a lack of articles focusing on PMM with experimental support. Challenges are also highlighted by Yazici (2009) stating that maturity models miss soft skills needed for improving maturity to higher levels. Besner and Hobbs (2013) state that maturity is affected by various other variables which ultimately also affect project success separately. Additionally, de Carvalho et al. (2015), state that PMM must be combined with an understanding of the manager's and project team's cultural orientations and skills, i.e. PMM is not an isolated effort. Simultaneously there seems to be other challenges connected to PMM. De Carvalho et al. (2015) state there is limited evidence in various studies conducted that improved PMM capabilities result in better project performance or Jiang et al. (2004), stating that benefits of increased project performance is visible from earliest maturity level 3.

3 Research methodology

3.1 Background to the case study

Around 2010, a group of experienced Swedish PM consultants looked for tools to raise organisational PM capacity. This experience was based on the observed problem that young and well-trained project managers lacked a challenging surrounding that would request their ambitions and skills. Simultaneously projects within organisations were often perceived being weakly defined and steering committees not asking for, or understanding professional PM reports.

In order to select a suitable model for improving the organisational PM capability, a short market survey on suitable models was carried out. The main focus was to find a model focusing on aspects in a larger perspective, not just the ability to deliver the single project, meeting its goals (time, cost and product). P3M3 was found being easily available and there were many reports and articles on use of P3M3, mainly in UK and Australia.

In order to create the SPI, P3M3-documentation was translated into Swedish and transferred to a straightforward electronic questionnaire for self-assessment. The English version of the questionnaire is available on Baseline Management´s website, see Baseline Management (2022). The core of the SPI model is based on the seven process perspectives of P3M3. However, the process perspectives of SPI are not literally the same

as the process perspectives of P3M3 since the authors of the SPI model found it relevant doing some adjustments based on their longstanding experiences of PM.

The seven process perspectives (later on called perspectives) in SPI model are defined as:

- Internal control – how projects are managed and followed up over their life cycle.
- Benefits realisation – the process for achieving the impact/revenue from a completed project. Benefits may be financial or nonfinancial.
- Financial control – ensures that the costs for a project are identified, calculated, followed up and evaluated throughout its life cycle.
- Stakeholder management – are all parties affecting or affected by the project and/or the result of the project. Stakeholders are on all levels, within and outside the organisation.
- Uncertainty – how the organisation deals with risks and opportunities arising during and after realisation of the project.
- Strategic control - harmonising the projects with both the overall strategies of the organisation and changes in the outside world.
- Resource management - includes the personnel, premises, equipment, information, tools and support required for the delivery of a project.

By comparing the perspectives of SPI and P3M3, the differences are:

- SPI has chosen the word uncertainty instead of risk management in order to underline that a risk is reflecting uncertainty, where both threats and opportunities are included.
- In SPI, benefits realisation is used instead of benefits management used in P3M3.
- Management control and organisational governance in P3M3 are transformed into internal control and strategic control in SPI, in order to underline the 'internal rules' to control project activities in the organisation and the ability of connecting the projects to the strategy and the overall objectives of the organisation.
- Financial management of P3M3 is named financial control in SPI in order to underline the focus of control.

Each perspective of the SPI model is described by five alternative statements reflecting organisational behaviours related to the five maturity levels of the model. The respondent has to choose the statements which best describe their organisation. This means that the respondent can answer the electronic questionnaire in 10–15 minutes. Further, the management vocabulary was transferred to a Swedish context. In comparison to professional interviews, an electronic questionnaire could deliver answers from several respondents at a reasonable cost. Baseline Management added questions about for instance business area, project type, role of the respondent and the organisation in the questionnaire. In the self-assessment questionnaire, there are also open questions where the respondents have the possibility to suggest actions, aiming at higher levels of maturity for each perspective.

In order to make maturity measurements comparable on an annual basis, no core questions regarding perspectives or maturity levels have been changed through the years. They have been the same since the start. Each set of answers is stored in a database for future analyses.

So far, two practice areas are central for data stored in the SPI database.

The first practice area is collection of PMM measurements based on a voluntary approach, where employees within different positions of an organisation complete the electronic questionnaire. Here the overall purpose is to provide the respondent an opportunity to compare the level of perceived PMM of the respondents' organisation with general or branch specific levels of maturity presented in the annual SPI reports compiled by Baseline Management.

The second practice area of the SPI database is related to collection of PMM measurements of an organisation in order to suggest tailor-made development and training conducted by Baseline Management or any other suitable vendor/consultant. In this case the SPI questionnaire is answered by multiple employees having different roles within projects in the organisation. The results of these questionnaires are compiled into an organisational report constituting input to discussions and plans regarding on which level the tailor-made training for the organisation shall start. The tailor-made training includes for instance various workshops in PM conducted by Baseline Management in order to efficiently improve the organisations level of PMM - From an agreed current situation to a new desired set point.

3.2 Data analysis

The results of this article are based on studies of data from the SPI database.

The gaps of PMM presented in the results section of this article are found by analysing collected data from the SPI database for the years 2013–2019. Within this study of PMM, 275 organisations have been included. The respondents of the questionnaire have been in different levels in the organisations, e.g., project managers, project members and project owners. In addition to data from these 275 organisations the database also includes PMM data from around 100 other organisations based on the voluntary data collected. However, the data collected in the voluntary way only include measurements of one person's perceived level of PMM of the organisation, e.g., the maturity perception of a project manager or a project member.

As total the SPI database contains 4,980 individual questionnaires for the period 2013–2019, where at least one PMM perspective has been assessed. A total of 1,027 questionnaires were excluded in this study since they did not respond to all seven perspectives. This means that this article is based on a total of 3,953 questionnaires. In Appendix, an overview of the number of submitted questionnaires in the SPI database are presented based on number of questionnaires per year and organisational type.

A delimitation is that an eighth perspective, agility, which was included in the SPI model from year 2017 has been excluded in this study. This due to the perceived level of agility has only been measured for a short period, i.e. the sample size was judged being too small.

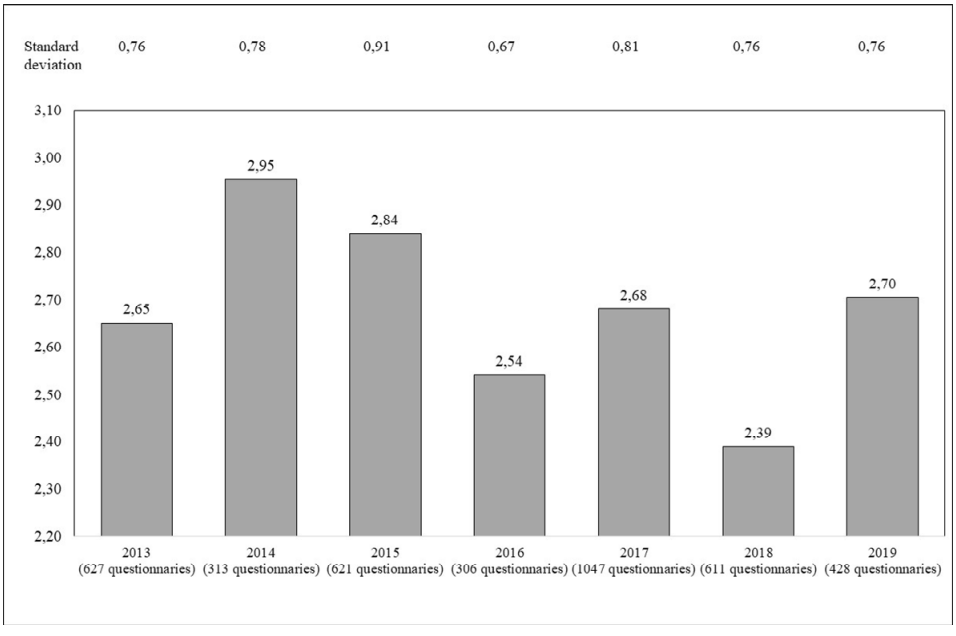
4 Results

In this section results from the analysis of data from the SPI database are presented. The scale for the PMM according to the SPI model is 1 to 5. Where level 1 is the lowest level of maturity and level 5 is the highest level of maturity.

The data of the SPI database indicate that the overall average PMM of the seven perspectives of the SPI model is 2.67 with the standard deviation 0.81. This average measure of PMM is based on all 3953 submitted questionnaires for the period 2013–2019. The questionnaires are based on a variety of employees of various Swedish organisations having an employment connected to project work in both private and public organisations.

On a general level the average PMM according to the data of the SPI database of the seven perspectives for the period 2013–2019 have varied, see Figure 1.

Figure 1 The figure shows the average maturity of the seven perspectives of the questionnaires in the SPI database in the period 2013 to 2019



The indications based on Figure 1 are that the data of the SPI database show no clear pattern regarding how the average maturity has evolved through the period 2013–2019. One important reason to the absence of a clear pattern could be that the organisations included in the study differ from one year to another. However, the average performance is relatively stable at about 2.5 over the period studied, i.e., performance is relatively low, indicating a substantial improvement potential of PMM.

The data from the SPI database also indicate that the PMM of the seven perspectives varies for the years 2013–2019. According to Figure 2, perspectives being similar to traditional aspects of management like financial control and strategic control exhibit the highest levels of PMM. T-test on a 95% confidence interval (CI) confirms the significant

difference in average between all seven perspectives, with the exception between internal control and resource management, where the conditions for 95% confidence significant difference are not met.

Figure 2 The average value of PMM of the seven perspectives according to the SPI database for the period 2013–2019

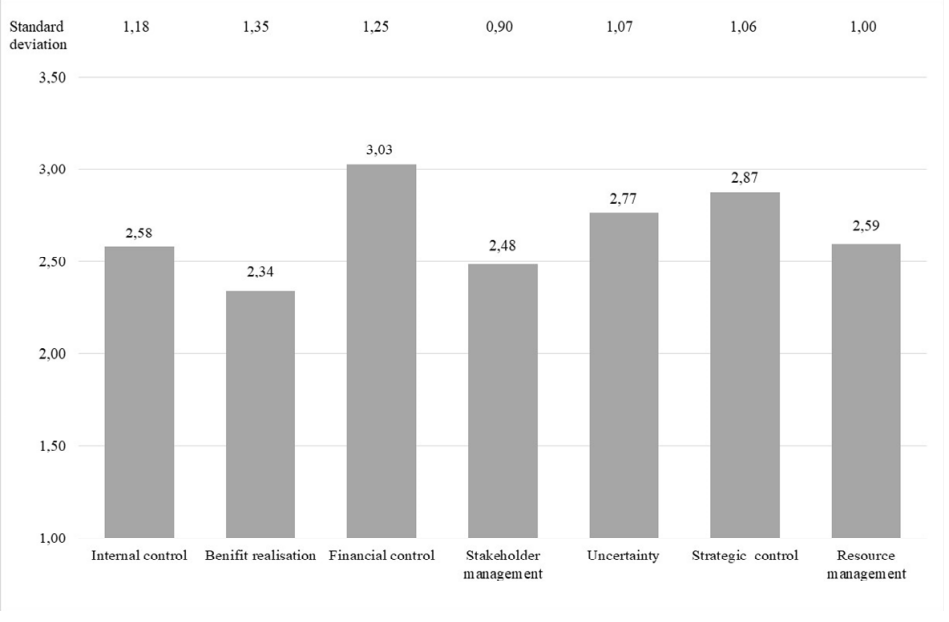
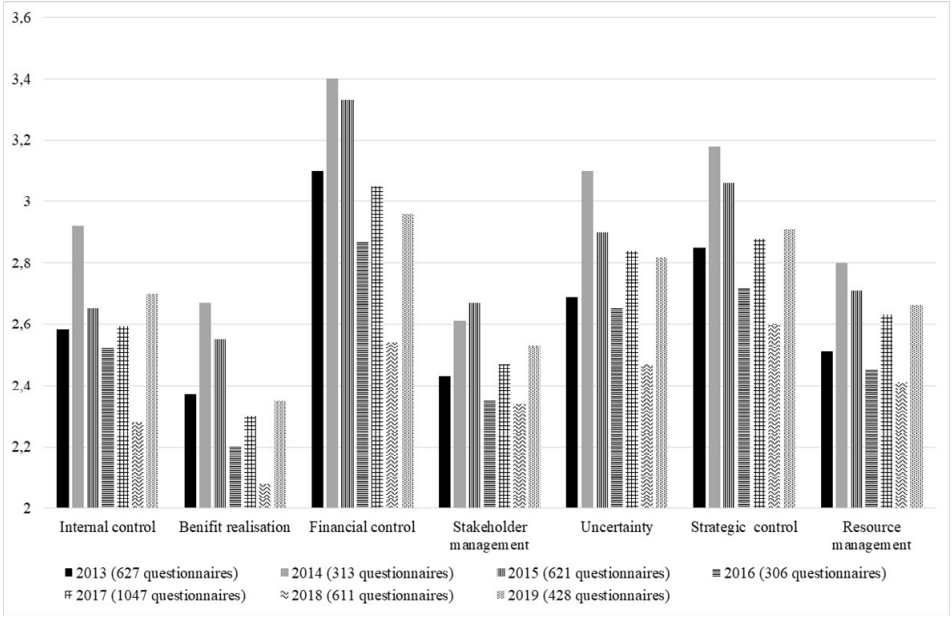


Figure 3 combines the information in Figures 1 and 2, providing more detailed information on the performance variation. The results of Figure 3 indicate that the answers regarding PMM in the SPI database varies for the years 2013–2019 for all seven perspectives.

Perspectives like financial control and strategic control indicate a higher level of maturity in comparison to the other perspectives of the maturity model during the period 2013–2019. T-test on a 95% CI indicate that there is a continuous significant difference for all seven years, where the perspective benefit realisation always shows lower levels of maturity than the perspectives uncertainty, strategic control and financial control. Additionally, the perspective stakeholder management also shows constantly lower levels of maturity than the perspectives strategic control and financial control for all years which is also stated on a 95% CI. Finally, a 95% CI indicates that there is a continuous significant difference for all seven years when it comes to the perspectives resource management, which is always lower than strategic control. Internal control is also stated on a 95% CI always being lower than financial control for all seven years.

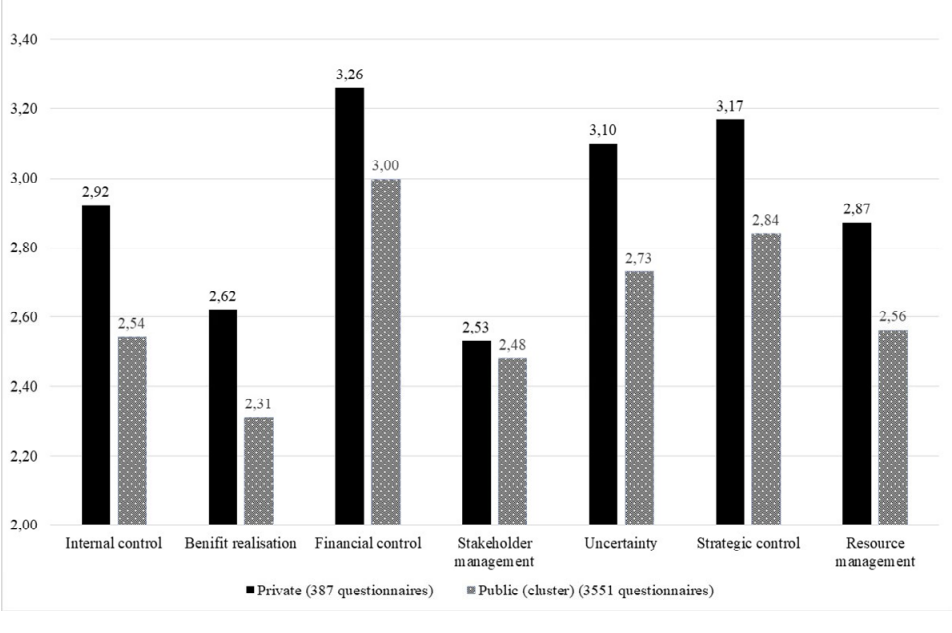
In Figure 4, the information of the SPI database for the years 2013–2019 is categorised based on type of organisation in terms of owner of the organisation. Here the PMM of the perspectives for private organisations are compared with a cluster forming public organisations. The cluster of public organisations include governmental organisations (i.e., organisations where the Swedish state is the owner), municipalities and counties (like county councils, etc.).

Figure 3 The average value of each perspective of PMM for the period 2013–2019



Note: the total number of submitted questionnaires for the period is 3,953.

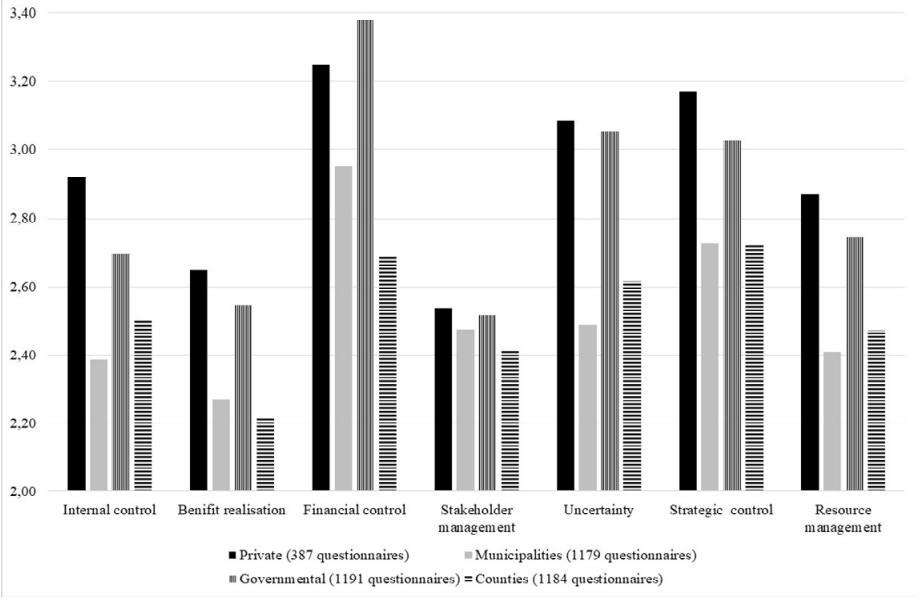
Figure 4 The average PMM value for the period 2013–2019 for each perspective based on a categorisation into public organisations and private organisations



The categorisation of organisations presented in Figure 4 indicate that the PMM of all seven perspectives of the SPI model is higher for private organisations than for public organisations for the period 2013–2019. The difference in average for private and public organisations based on a comparison of each separate perspective is also significant on a 95% t-test CI for all perspectives but stakeholder management. A total of 3,938 questionnaires were included in the study consisting of 387 private company questionnaires and 3,551 public organisation questionnaires. Out of the 3,953 questionnaires available in the SPI data, 15 questionnaires were also excluded due to lack of information about organisational type.

In Figure 5, the average for the 2013–2019 SPI data for all seven perspectives is presented based on a categorisation of organisational type. The same categories as in Figure 4 are used.

Figure 5 The average PMM value for the period 2013–2019 for each perspective based on a categorisation into private, governmental, municipal and county organisations



The data of the SPI database indicate that private organisations as well as governmentally owned organisations are showing higher levels of PMM than municipality and county organisations for all seven perspectives. These indicated differences of averages are also significant on a 95% t-test CI for all seven perspectives but for stakeholder management.

Simultaneously Figure 5 also shows a tendency that private organisations indicate a higher level of PMM than all the other categories of organisations in all seven perspectives, except the perspective financial control. Here governmental organisations show the highest levels of maturity. This finding may be explained by an organisational culture and rules of governmental organisations in Sweden regarding a focus on financial control. However, these differences do not fulfil the criterion for a 95% CI significant difference.

A total of 1,317 questionnaires in the SPI database include information about the business sector. A study of the average PMM based on the categorisation business sector is presented in Figure 6.

Figure 6 The average PMM of all seven perspectives based on business sectors according to the questionnaires of the SPI database for the period 2013–2019

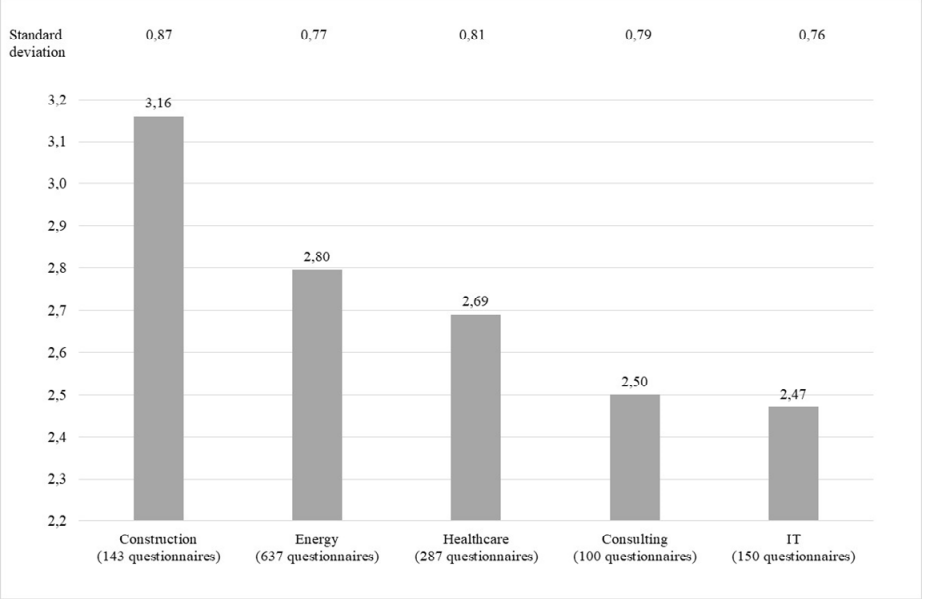
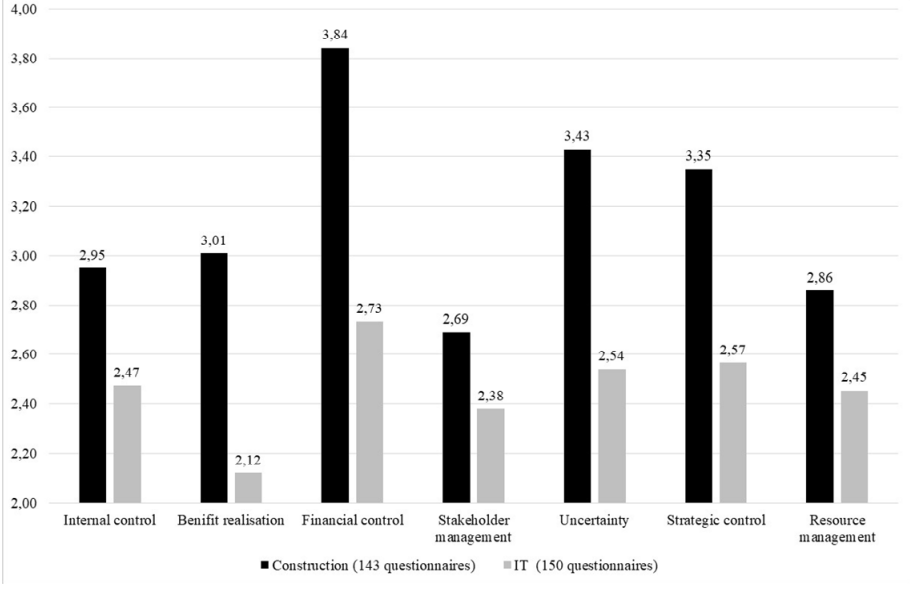


Figure 7 The difference of the perceived level of PMM in the construction sector versus the it sector



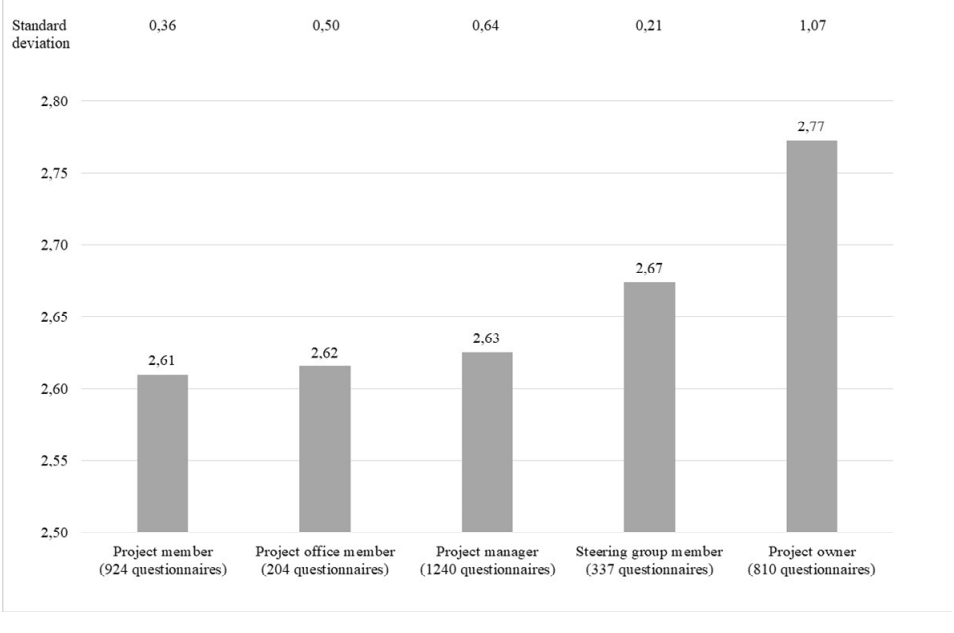
Indications are that there are differences regarding the average PMM based on a categorisation of business sectors, see Figure 6. Here the average PMM is calculated as the average of the maturity of all seven perspectives. According to the data of the SPI database, indications are that the perceived PMM of questionnaires related to the construction sector shows higher levels of PMM than the other business sectors. According to t-test, this difference is significant on a 95% CI. Additionally, the differences in terms of IT showing lower levels of maturity than energy and healthcare are also significant on a 95% t-test CI. Finally, the difference between consulting and energy is also significant on a 95% t-test CI.

In Figure 7, the average of all seven perspectives of PMM are presented for the construction sector, which showed the highest average level of PMM according to Figure 6, in comparison to IT the sector showing the lowest level of maturity.

This difference in average is also confirmed being significant on a t-test 95% CI for all seven perspectives. The calculated significant difference of the samples of PMM for the construction sector versus the IT sector is perhaps logical, since construction projects many times are supposed to last over 20 years involving a large amount of capital in comparison to IT projects. Logically the importance and budget of a construction project would motivate a more mature PM.

A total 3,515 of the questionnaires included in the SPI database for the years 2013–2019 are provided with information about the role of a project that the respondent represents. A categorisation of the questionnaires based on the respondent's role of a project indicate that different roles of the organisation's perceive the organisations PMM differently, see Figure 8.

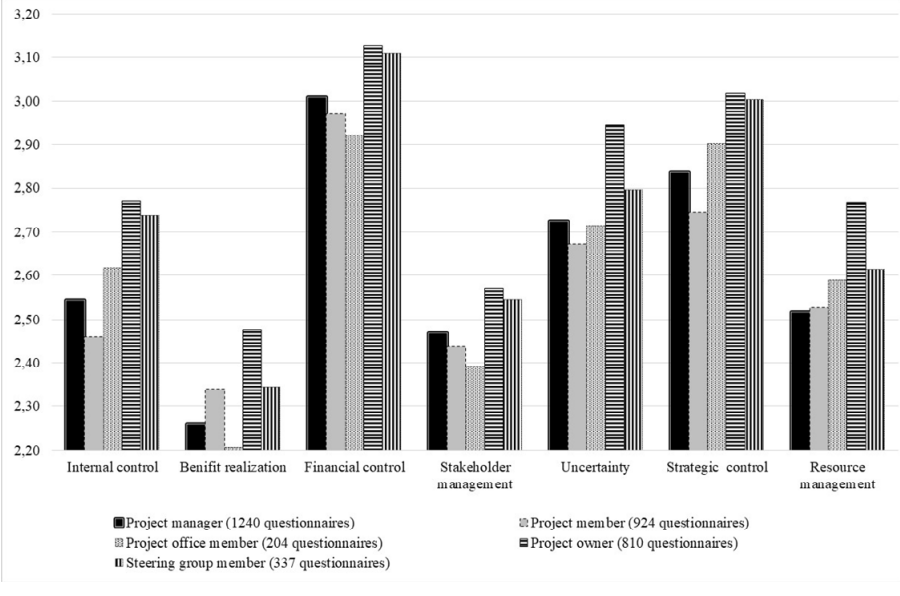
Figure 8 The average value of the perceived level of PMM of all seven perspectives categorised after organisational role of the respondent for the period 2013–2019



The results of Figure 8 show that project owners seem to estimate the organisation's level of PMM highest in comparison to other project roles. T –test on a 95% CI level shows that there is a significant difference in average of the perceived PMM between project owners and project members, project office members and project managers. Additionally, the difference of perceived PMM between steering group members and project members also fulfils the criteria for a 95% CI of significant difference.

In Figure 9, the perceived level of PMM of all seven perspectives based on organisational role of the respondent is visualised.

Figure 9 The perceived level of PMM according to the SPI database; a comparison of each perspective categorised based on the organisational role of the respondent, period 2013–2019



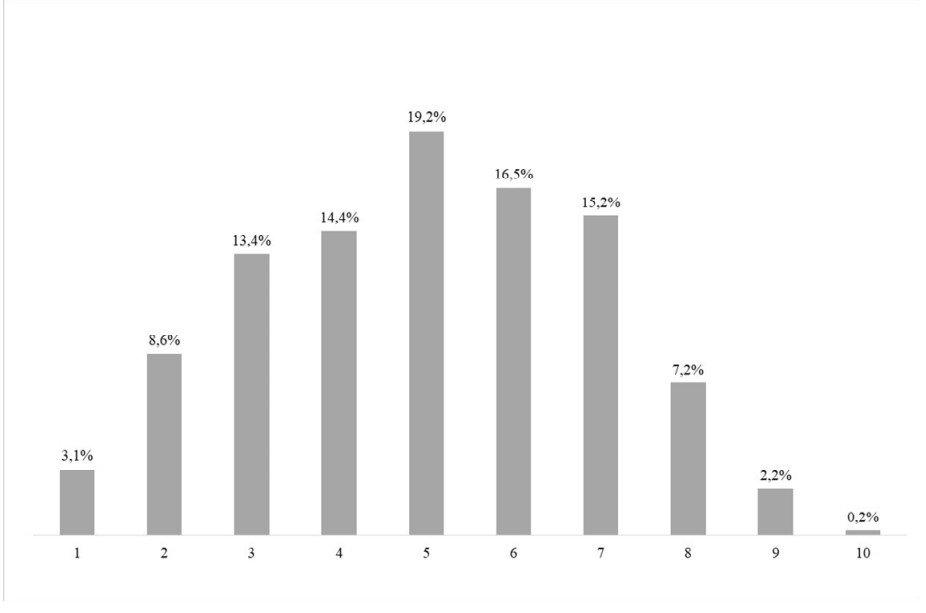
The data presented in Figure 9 indicate that project owners constantly seem to perceive the highest level of PMM in all perspectives of SPI in comparison to other project roles of the organisation. Simultaneously project managers and project members seem to perceive the lowest level of PMM. The difference in average where project owners constantly perceives a higher level of PMM than project managers and project members are also significant on a 95% t-test CI for all perspectives except stakeholder management for project managers and benefit realisation for project members.

Simultaneously, the difference in the perceived level of PMM, where project owners constantly tend to perceive the highest levels of PMM could be logical and perhaps be explained by project owners who feel the necessity to defend their organisation.

At the end of the SPI questionnaire an open overall question regarding the perceived level of PMM has been included. Here the respondent has the opportunity to comment on their own organisation's level of PMM in relation to the ideal way of managing projects on a Likert scale (1 = very far from an ideal way, to 10 = as ideal as we can think). Results are presented in Figure 10.

The result of this open question regarding how the respondents perceive their organisation's PMM in relation to the ideal way shows an average value of 4.99 and a standard deviation of 4.5.

Figure 10 An illustration of how ideal the respondents find their organisations project activities according to questionnaires in the SPI database



5 Discussion

The material in the SPI database is judged as being comprehensive since it consists of 3,953 submitted questionnaires for the period 2013–2019. Each answer consists of a submitted questionnaire reflecting various claims regarding the way of how an organisation works within the field of PM based on the seven perspectives of the SPI maturity model, on a 1–5 Likert scale. In addition to these claims, background information about the respondent was also collected in order to categorise answers. The complete questionnaire is available on Baseline Management's website, see Baseline Management (2022).

It needs to be taken into account that the results indicated in this article are associated with some assumptions, which must be considered when making conclusions. First of all, the questionnaires were collected through an open questionnaire accessible through an exclusive webpage of a PM consultant company. Most of the questionnaires used in this study have contact information for the respondent and obviously unreliable questionnaires have been sorted out.

The questionnaires are from either persons working in a Swedish organisation facing a tailor made consultant education in PM or persons working in a Swedish organisation finding the questionnaire on the consultant company's website. This means that the sample of questionnaires collected in the database is not controlled in order to reflect the

national structure of Swedish organisations. However, data collected mirror a variety of organisations, both based on ownership as field of business which should be representable for the Swedish situation.

Since the data of the study are among all collected in conjunction with PM development and training activities conducted by the consultant organisation, one source of bias in the data could be that the data collected are based on questionnaires from organisations considering PM skills being important.

The number of questionnaires submitted during the years 2013–2019 is not constant. Some years include a larger sample of questionnaires than other years. An effect of this is that some of the categories presented in the result section could be based on a low level of submitted questionnaires for a year. This may affect the accuracy of statistical analyses conducted. In Appendix, information about the number of submitted questionnaires per year in each category is presented.

The method used to collect data to the SPI database is intended to minimise bias. In this case the collection of data is conducted by questionnaires from individuals through self-assessment. Self-assessment is many times associated with business excellence programs like the European excellence model (EFQM), or for assessing maturity (Willems et al., 2012). When using self-assessment, the individual perception of the organisational situation, as well as the individual's interpretation of the questions stated in the questionnaire contributes to the answers being given by the respondent in the questionnaire. In order to minimise the variation and the bias of how different individuals perceive the organisational situation as well as interpret the questions in the questionnaire, many methodologies advocating self-assessment, follow up the self-assessment answers with consensus discussions. The aim of a consensus discussion is among all to enable a forum for discussion in order to create a shared picture of the organisational situation, as well as discuss interpretations of the questions stated in the questionnaire. This means that the effect of a consensus discussion is related to a pricier measure of the level of maturity, as well as a decrease of the variation of the individual answers. So far, the answers in the SPI database have been collected through self-assessment without processing of the individual answers through for instance a consensus discussion. This could partly explain the level of variation in the answers or constitute a source of bias in the results of this study. Baseline Management has, in several cases, performed consensus workshops as a central part in tailor-made consultant education in order to discuss differences in perceptions in order to agree on an organisational platform for further development and training. Simultaneously results from Figures 8 and 9 of this paper indicate that different roles of the project organisation perceive PMM differently. This indicates both a lack of consensus regarding the perceived level of PMM of the organisation as well as a source of bias when measuring PMM in terms of who is being asked that may affect the result.

In order to analyse whether there are significant differences or not between the selected clusters of the data in this study, t-test has been used. The selection of t-test as method was based on for instance Derrick and White (2017) stating that despite t-test mainly is suitable for normally distributed data, the use of t-test for analysing samples from 5-level Likert scale questionnaires bring little practical difference in the conclusions in comparison to other methods, especially when the sample size is large. Similar conclusions are also made by Meek et al. (2007).

Regarding the results found in the results section, Figures 1 and 3 which visualise the average PMM for each year during the period show no clear pattern of how the average

maturity has evolved through the years 2013–2019. Simultaneously these two figures show the lowest level of maturity for the year 2018, which may be explained by the sample of organisations included in the database for that year had a clear majority of questionnaires from county organisations. County organisations show constantly low levels of maturity according to Figure 5.

Figure 10 which illustrates the results of the question of how ideal the respondents find their organisations overall project activities in a 1–10 step Likert scale, shows an average of 4.99 which corresponds to approximately 43% of the maximum scale of 10. This result correlates well with the average value of maturity measured through the submitted SPI questionnaire questions stored in the SPI database showing an average of 2.67 on the five-level scale 1–5, which corresponds to approximately 42% of the maximum scale of 5. The strong correlation between this question and the average of all questions presented in the questionnaire, raises thoughts whether this strong correlation is a coincidence or if all the questions in the questionnaire which the respondent has just answered to affects the respondents answer to this question. Simultaneously this result also raises thoughts whether a shorter questionnaire would have given the same result as all the present questions in the questionnaire.

The purpose of improving PMM should logically be connected to the outcome of improving project success. On a general level the purpose of a maturity model is to either measure the current level of maturity in order to visualise improvement potential, or to give guidance of how to improve maturity (Pöppelbuß and Röglinger, 2011; Dahlin, 2020). However, opinions seem to differ on how project success should be improved through using PMM models. Many authors within research advocate both hard and soft aspects being central in order to improve or achieve project success. Here for instance authors like de Carvalho et al. (2015) deem that bodies of knowledge within the field of PM like PMBOK which focus on hard skills is not sufficient in order to achieve project success alone, but also other soft management skills are needed. Regardless of the complexity of project success or which factors are being relevant or not when measuring or improving project success, data of the SPI database which is based on a sample of Swedish organisations indicate that there is at least an improvement potential of the performance levels of traditional PM aspects which are covered in the SPI maturity model. This regardless if the perspectives of the SPI model mainly being related to traditional hard aspects of PM, which falls back to the aspects of the iron triangle being central for decades, or if also other soft aspects are needed in order to improve PMM and thereby improve project success.

The results of this study in comparison to other studies conducted by for instance Aitken and Crawford (2007), Andersen and Jessen (2003) and Hillson (2003) show similar maturity results, where the average level of PMM is approximately similar to half of the range of the scale. In Grant and Pennypacker (2006) conclusions are made that there is not a significant difference in PMM between industries, with some exceptions. Indications of this study shows the opposite where for instance private organisations and governmental organisations are showing higher levels of PMM than other types of organisations. This means that not much has happened during the last two decades regarding the actual perceived level of PMM of organisations. Simultaneously the results of this study also can explain Mir and Pinnington's (2014) statement that project success has not improved significantly through the years. Jiang et al. (2004) state that benefits of increased project performance is visible from earliest maturity level 3. If true, this would indicate that the majority of the organisations included in this study are around a

threshold value of PMM, i.e. efforts improving PMM would start resulting in increased project performance.

However, projects are seen as important and are increasingly used by organisations worldwide, but the improvement potential based on PMM measurements seems to remain constant.

6 Conclusions

The data of the SPI database show that the level of the perceived PMM is usually within the range of little over two to little over three, on the maturity scale ranging from one to five. This conclusion is also valid for various categorisations of the questionnaires included in SPI database such as, the perceived level of PMM for the different perspectives, the perceived PMM of different types of organisations, the perceived PMM of different roles within the project organisation as well as the perceived PMM of different business sectors.

According to this study which is based on a questionnaire submitted by 3,953 individuals during the period 2013–2019, indications are that Swedish organisations show the following pattern:

- The average value of the perceived level of PMM does not show an obvious increasing or decreasing trend for the period 2013 to 2019.
- PMM of perspectives being similar to traditional aspects of management like financial control and strategic control exhibit the highest levels of PMM.
- Private organisations as well as governmental organisations, where governmentally owned organisations are dominated by mining and power plants organisations are showing higher levels of PMM than other types of organisations.
- The level of the perceived level of PMM seems to vary based on which project role the respondent has. For instance, project owners perceive a higher level of maturity than project managers and project members.
- The perceived level of PMM varies between sectors. According to the data of SPI, organisations within for instance the construction sector show a higher level of maturity than the IT sector.

The originality of this this article is primarily in providing information about a large sample of PMM measurements conducted through a seven-year period in a Swedish context. The maturity measurements are conducted with a PMM model having influences of one of the larger PMM models within the field.

7 Further research

Today the SPI model is mainly used when making a snapshot of the perceived level of PMM of the organisation. It mainly is used as input parameter for starting from the right

level when planning change and training of PM in an organisation. The measurement is seldom repeated within the same organisation or followed up in order to measure and monitor the impact of improvements made. This makes it impossible to answer how PMM of an organisation improves over time, e.g., as indicator of the impact of the training conducted, or indicator of additional needs of improvement, etc. Here further research regarding repeated PMM measurements could help organisations in order to give feedback of efforts conducted regarding improvements and changes conducted in their PM work.

Another field of further research is related to additional collection of data in the SPI database. This in order to get a larger sample of answers from respondents, not least for the categories showing a low number of answers according to Appendix. By additional collection of data, the accuracy of statistical analysis improves. Simultaneously further research could also be conducted in order to make deeper analysis of the present data. This could be done by identifying new categories within the data collected as well as using other statistical methods in order to analyse the data.

Today the variation (standard deviation) of the results based on different categorisations of the data are approximately around one maturity step. This indicates either an actual variation in PMM, variation in the answers based on for instance the respondent's interpretation of the text of the questionnaire, or variation in the answers based on the respondents own personal opinion of the organisation. Here further research could be conducted regarding the effect of consensus meetings. This would involve respondents from the organisation discussing the organisational situation as well as the text of the questionnaire in order to minimise these components of variation in the PMM result.

Another field of further research could be connected to the content of a PMM model and how the SPI model could be improved. Today the scope of SPI is limited to PMM mainly based on hard aspects. Research indicates that hard skills are not sufficient in order to improve project success. Söderlund and Maylor (2012) for instance underline that a focus on leadership and soft skills also are needed. Moradi et al. (2020) state that over 60 factors are related to project success. Simultaneously an integration of parameters of sustainable development in PM could also be relevant, which is discussed by authors like Phung et al. (2022), Martínez-Perales et al. (2018), Martens and Carvalho (2017), Silvius (2017) and Marcelino-Sádaba et al. (2015).

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Appendix

The questionnaires in the SPI database are divided as follows

Numbers in each category corresponds to the number of complete questionnaires. Numbers within brackets corresponds to the number of questionnaires including questionnaires not given to all seven perspectives, which have been excluded in this article.

Owner of organisation/year	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*Total questionnaires per organisational type*
Not stated	2 (3)	2 (6)	11 (13)	0 (0)	0 (1)	0 (0)	0 (0)	15 (23)
Municipalities	245 (286)	135 (151)	406 (576)	119 (144)	151 (206)	120 (153)	3 (4)	1179 (1520)
Counties	137 (159)	18 (20)	6 (6)	82 (96)	281 (287)	391 (638)	269 (367)	1184 (1573)
Private	81 (88)	81 (98)	116 (125)	99 (114)	4 (7)	6 (6)	0 (2)	387 (439)
Governmental	162 (188)	77 (85)	82 (93)	6 (7)	611 (775)	94 (94)	156 (183)	1188 (1425)
Total questionnaires per year	627 (724)	313 (360)	621 (813)	306 (361)	1047 (1276)	611 (891)	428 (555)	3953 (4980)