A Competence-Focused Assessment Framework for Project Management Certifications

Full Paper

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Abstract

This paper presents a competence-focused assessment framework for evaluating project management certifications regarding their certification of success-relevant project manager competences. The framework's goal is to provide an instrument to assess the quality of certification frameworks for project managers that organizations such as the International Project Management Association (IPMA) and the Project Management Institute (PMI) offer. The framework is developed on the basis of a literature review of the competence construct, competence assessment methods, and competences that are said to be important for project management success. It assesses 1) how well the certification is able to assess relevant competences methodically during the certification process, and 2) the extent to which the certification content covers the relevant project success factors. Future research can use the framework to assess and improve existing project management certifications on the market, as well as project management courses and programs in higher education.

Keywords

Project management competence, project management competency, project management certification, certification assessment framework

Introduction

In recent decades, projects – especially those related to information technology (IT) – have often been referred to as having a high failure rate or being otherwise problematic regarding their costs, the resulting quality, or the time needed (Flyvbjerg and Budzier 2011; KPMG 2013; Sauer et al. 2007; The Standish Group 1995, 2013). To combat project failure, the literature offers different factors that are often stated as being important for the success of projects. Here, the project manager's competence is an important, commonly cited success factor (Belassi and Tukel 1996; Crawford 2000; Fortune and White 2006; Gillard 2009; Tukel and Rom 1998; Wateridge 1997). It complements, for instance, other commonly named success factors such as top management support (Fortune and White 2006; Tukel and Rom 1998), the need for a good communication culture (Verburg et al. 2013), and the use of a dedicated project management method.

Therefore, the proper education and assurance of the project manager's competences are important concerns for business practice. As a way of covering those two concerns, project management certifications have gained recognition during the past decade. These certifications aim to approve project management competences formally. The underlying claim is that the respective certification evaluates whether and confirms that the project manager has the necessary project management knowledge and competence and is able to properly apply them when managing a project. Considering the stated importance of the competences of project managers for projects' success, this claim implies that the successful certification of a yet-to-be assigned project manager increases the likelihood that the project will be successful, as well.

Several international organizations offer a range of project management certifications. Some of the best-known organizations in this regard are the International Project Management Association (IPMA), the

Project Management Institute (PMI), the Australian Institute of Project Management (AIPM), and AXELOS (a joint venture of the British Cabinet Office and the company Capita), the owners of PRINCE2. Every organization offers different project management certification levels. As the respective certifications are based on different underlying methods, assumptions, and guidelines, it is not easy to compare them with each other. Furthermore, because of their heterogeneous conceptions, it is not trivial to assess their evaluation quality regarding project management competences that are important for the success of projects.

Existing literature mainly focuses on the content-wise comparisons of the different project management certificates and their underlying methods (Demos Group 2010; Ghosh et al. 2012; Oestereich et al. 2009; Remer and Martin 2009). Besides this research, Giammalvo (2010, 2013) examines a broad range of different project management credentials but mainly focuses on the time-wise effort needed to gain a certificate and not on qualitative aspects. Existing competence frameworks, such as the European e-Competence Framework (e-CF) 3.0 (European Committee for Standardization 2014) and the Skills Framework for the Information Age (SFIA) v5 (SFIA Foundation 2011), do not adequately emphasize the major importance of the interpersonal competences as they do not address them specifically. These frameworks further are either rather project phase-oriented (e-CF) or IT function-oriented (SFIA) instead of competence-oriented. Most important, the mentioned approaches are designed in such a way that they can be used as part of a certification process to assess the level of demonstrated competence of an individual and not assess the certification process itself. This downside also applies to the competence frameworks that the IPMA and the AIPM use as the foundations for their respective certifications. Because of a potential assessment bias, it is also questionable whether it is legitimate to use an existing framework, which serves as the foundation for one of the certifications that is to be assessed later on, as the basis for the development of the new assessment framework.

Therefore, to the best of the authors' knowledge, no instrument that is currently available allows a dedicated and independent evaluation and assessment of the extent to which project management certifications actually evaluate the project success-related competences that the certified individuals possess. Since project managers and their capabilities are said to have a major impact on projects' success (see above), the absence of such an instrument prevents an elaborate assessment of established project management certifications in terms of their contribution to project success. In this light, this paper's goal is to develop an assessment framework for success-relevant project management competences that can be used to evaluate the coverage of the competences by the certifications that the aforementioned certification organizations offer. Project management practitioners in organizations can use the framework as decision support for project management standards (on which the certification standards are partly based) that are yet to be implemented, and to determine what to look for when assigning employees to project manager positions. The developed assessment framework can also be used to evaluate other certifications for project managers. Furthermore, practitioners as well as researchers can use the framework to assess the range of competences that project management courses or programs in large enterprises or higher education address. We develop the framework on the basis of an extensive literature review in the domains of project management and competence / competency assessment.

The remainder of the paper is structured as follows: The second section covers the framework's theoretical and conceptual foundations, namely the difference between competence and competency, existing methods for assessing competences, and project manager competences commonly associated with project success. The third section develops the assessment framework, and the fourth and final section discusses the framework and draws a conclusion.

Theoretical and Conceptual Foundations

In this section, we introduce the theoretical and conceptual foundations we use later on to build our assessment framework. These foundations are the differences between competences and competencies (reflected later on in different assessment levels in the assessment framework), extant competence assessment methods, and success-relevant project management competencies the current literature has identified.

Competences and Competencies

Several authors highlight that there is no common understanding of the term "competence" (Castillo et al. 2011; Hyland 1993; Moore et al. 2002; Mulder 2007; Skulmoski and Hartman 2010; Sultana 2009; Winterton 2006) and that it may even be used as a synonym for knowledge, skill, or ability. Another major problem that has been observed and is also acknowledged within literature is the often synonymous use of the terms "competence" (plural: competences) and "competency" (plural: competencies) both in practice and research (Dainty et al. 2004; Winterton 2009). Even English dictionaries often do not see any difference. The Oxford English dictionary and the Merriam-Webster dictionary, for instance, list the term "competency" as a synonym for "competence."

Following Dainty et al. (2004), Winterton (2006), and Young and Dulewicz (2009), we understand competency to comprise individual personal characteristics that influence behaviors. Competencies then serve as the input for the competence that is demonstrated in a job context in order to achieve performance (see Figure 1).
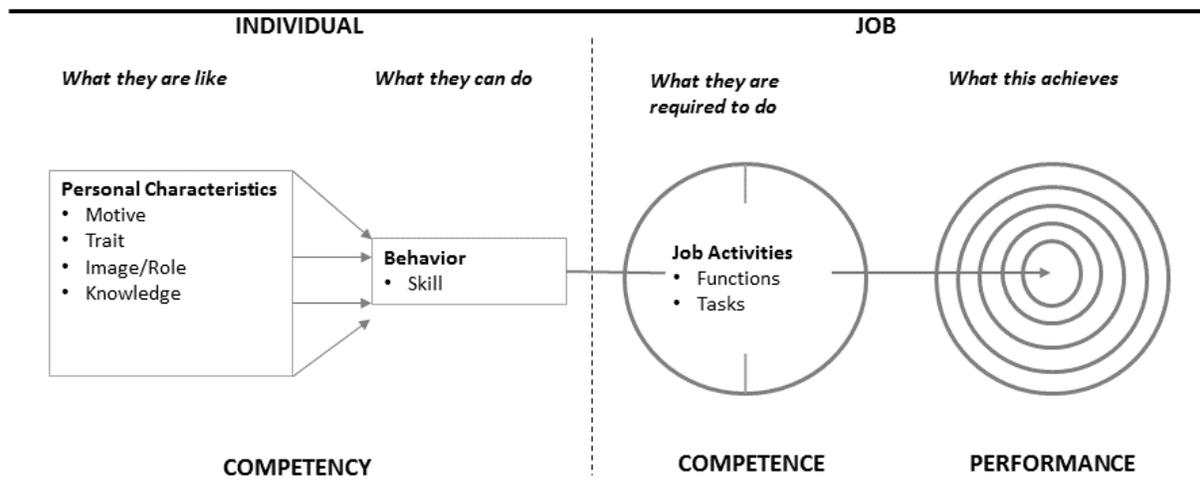

Figure 1: Competencies, competences, and performance (Young and Dulewicz 2009)

So, competency is about what a person is capable of doing, and competence is about what the person actually does in a specific job-related situation to achieve performance. Based on the definitions provided by the European Committee for Standardization (CEN) (2014) and Müller and Turner (2010), we define a project management competence as a demonstrated ability to apply a specific combination of knowledge, skills, and personal characteristics to achieve observable results for a task within in a project context. Competence levels describe the degree to which a person demonstrates competence.

Competence Assessment Methods

Different methods are commonly used to assess the competence of individuals: multiple-choice, short answers, essays, interviews, case studies, or performance observation. However, not all of them are actually capable of capturing competence. This becomes clear when one considers the knowledge, skill, and competence related to the different types of assessment methods. We use Miller's (1990) framework (see Figure 2) to structure the different levels on which an assessment might occur and to illustrate what assessment methods are capable of assessing. We will adapt it for the project management context later on.
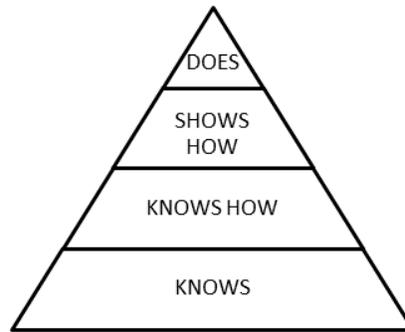
Figure 2: Framework for assessment levels

Assessment methods on the bottom level of Miller's pyramid test the knowledge base of a person, for instance, whether certain facts are known (e.g., "What is stakeholder management?"). On the level above, individuals also have to understand how the knowledge can be used (e.g. by writing a plan on how to conduct stakeholder management for a described scenario). For both levels, written response tests (e.g. short-answer questions or essays) can be used (Masters and McCurry 1990; van der Vleuten et al. 2010). The same authors assert that multiple-choice tests can also address the 'knows how' level if they are well developed, despite common misgivings about them. Oral examinations can also be used to test both levels and can moreover be used to assess interpersonal and communication competencies during the assessment.

Considering their definition, competencies come into play on the 'shows how' level, where they have to be applied in a scenario assessment situation (e.g. in a project role play in an assessment workshop) where the actions are directly observed. The top level addresses real job performance (demonstrated competence), so that the assessment method has to evaluate what the person is capable of doing within his or her specific working environment. One assessed method used for this purpose is direct observation through an assessor (Masters and McCurry 1990). Assessment portfolios are another type of assessment method used on the 'does' level (McMullan et al. 2003; van Tartwijk and Driessen 2009). They consist of different types of evidence provided by the person that will be assessed and are meant to allow an ex-post assessment of the demonstrated competence.

Even though assessment methods on higher levels in Miller's pyramid are able to assess competence, whereas the lower ones target different kinds of knowledge, it is not advisable to limit assessment to a single method. Instead, a combination of assessment methods should be used in order to improve the assessment validity (van der Vleuten et al. 2010).

Success-relevant Project Management Competences

Project managers can demonstrate competence in a job context based on the individual competencies they possess. For the assessment framework, the question arises which of those underlying competencies are actually relevant for project success. Since all common project management certifications aim to certify project management competence, regardless of the industry the candidate is coming from, only those success-relevant competencies that can also be considered generic for the project management profession are of interest here.

In fact, research suggests that most of the most important project management competencies are indeed industry-independent (Cheng et al. 2005; Keil et al. 2013). However, their relative importance is project-specific. Müller and Turner (Müller and R. Turner 2010), for instance, showed that different leadership styles are appropriate for different types of projects in order to be successful. The results of a study that Skulmoski and Hartman (2010) conducted even show that, in different phases of projects, different competencies are more important than others. Project managers should therefore have a broad competency portfolio and need to adapt and apply different sets of competencies depending on the project's specifics (Wateridge 1997). In general, competencies are not static and can be applied to demonstrate competence in the same manner for every situation. The outcomes have to be carefully observed and may change how the project manager applies his or her competencies (Fisher 2011).

A valid question is how it can be that important project management competencies are generic, even though the projects they are applied to are context-specific and different, especially between industries (e.g., construction vs. IT). In literature one can identify one major reason: At present, successful project management is understood as being mostly based on people management, as opposed to having appropriate technical skills (Jurison 1999; Wateridge 1998). Jurison (1999) identifies a major project risk in a too narrow concentration on technical matters while paying little attention to people and teamwork issues. However, the suggested shift toward people management and the lesser emphasis of technical expertise do not mean that project managers no longer need a basic understanding of the technology used within the industry they are working in. Literature acknowledges that technical understanding in the respective industry is still a necessary competency project managers need to possess in order to be successful (Ahsan et al. 2013; Gillard 2009; Jurison 1999; Keil et al. 2013; Kerzner 2013). This competency can be described as one that enables the project manager to evaluate technical concepts and solutions and to communicate effectively in technical terms with the project team (Kerzner 2013). Furthermore, the project manager needs to understand the technologies involved and their relationships, as well as specific related requirements, and be able to assess related risks and opportunities.

Based on the literature, we identified the following 21 most success-relevant competencies (the demonstrated competences) as shown in Table 1. Note that we did not conduct an in-depth assessment of each paper's understanding of project success as we consider this aspect outside of this research project's scope.

Competency	Description	Sources
Technical Understanding	Can evaluate technical concepts and solutions and can communicate effectively in technical terms with the project team. Furthermore, he or she understands the technologies involved and their relationships, as well as specific related requirements, and is able to assess related risks and opportunities.	(Ahsan et al. 2013; Gillard 2009; Jurison 1999; Keil et al. 2013; Kerzner 2013)
Stakeholder Management	Can identify key stakeholders that can influence the projects performance, tries to build an effective relationship with them and manages their expectations. Furthermore, he or she understands the importance of stakeholder satisfaction for the assessment of project performance.	(Crawford 2000; Kerzner 2013; Mazur et al. 2014; Müller and J. R. Turner 2010; Wateridge 1998; de Wit 1988)
Scope Management	Is aware of the crucial importance of defining the proper scope and requirements during the project initiation phase and carefully evaluates the scope and requirement changes that may occur during the project's life cycle with regard to their impact. Furthermore, he or she actively involves all relevant stakeholders during project initiation in order to agree on common success criteria that are eventually used to assess project performance.	(El Emam and Koru 2008; Keil et al. 2013; Kerzner 2013; Schmidt et al. 2001; Tukel and Rom 1998; Verner and Evanco 2005; Zielinski 2005)
Project Planning	Can divide high-level objectives into logical measurable tasks, plan phases and activities, and create meaningful milestones. Furthermore, he or she understands project planning as a recurring activity that is of importance throughout the entire project life cycle, and is capable of adjusting plans to changing requirements.	(Ahsan et al. 2013; Crawford 2000; El-Sabaa 2001; Keil et al. 2013; Wateridge 1997; Zielinski 2005)
Resource Management	Can allocate resources to the tasks agreed on and activities in an efficient manner and understands the importance of carefully managing scarce resources.	(Kerzner 2013; Müller and J. R. Turner 2010)

Change Management	Can evaluate changes to the project (e.g. scope, requirements, team members, or other conditions) regarding their impact on project performance and conduct necessary actions to adapt to the change.	(Fortune and White 2006)
Flexibility	Is able to constantly cope with and adapt to new situations and shifting demands related to the project in order to foster project performance.	(Ahsan et al. 2013; Cheng et al. 2005; El-Sabaa 2001; Skulmoski and Hartman 2010)
Risk Management	Can plan the overall risk management approach for the project, identify project risks, analyze and assess their probability and impact, and plan how to respond to them. He or she also continuously monitors and controls identified risks and their agreed responses. Furthermore, risk management is understood as an activity that is of importance throughout the entire project life cycle.	(Kerzner 2013; Zielinski 2005)
Quality Management	Evaluates whether and ensures that the activities within the project are conducted according to the organization's quality policy and that the quality expectations of the customer are fulfilled. Furthermore, he or she is aware of the crucial importance of quality concerns related to project deliverables and project management activities for the perceived project performance.	(Kerzner 2013; Rose 2005)
Cost Management	Can conduct reasonable cost estimates for the project, track them during the project life cycle, and, if necessary, conduct amendments to the plans. Furthermore, he or she is aware of their crucial importance for the perception of project performance.	(Keil et al. 2013; Kerzner 2013; Zielinski 2005)
Achievement Orientation	Is able and willing to make decisions that may involve significant risks in order to foster project performance. Furthermore, he or she shows strong determination to achieve project's objectives and to exploit opportunities that have beneficial impacts on the involved stakeholders.	(Cheng et al. 2005; Dainty et al. 2004; Dulewicz and Higgs 2005; El-Sabaa 2001; Jurison 1999)
Analytical Thinking	Is able to analyze facts and opportunities, and identify their advantages and disadvantages, as well as shortcomings of ideas and proposals. Additionally, he or she is able to make decisions based on reasonable assumptions and factual information while being aware of the related impact on the project.	(Ahsan et al. 2013; Cheng et al. 2005; Dainty et al. 2004; Dulewicz and Higgs 2005; Keil et al. 2013; Müller and R. Turner 2010; Skulmoski and Hartman 2010)
Communication	Can establish a beneficial communication culture between all project participants and can adjust his communication style to the respective target audience (e.g. customer, team, or superiors) in order to clearly communicate instructions, win support, and give adequate feedback.	(Ahsan et al. 2013; Cheng et al. 2005; Dulewicz and Higgs 2005; El-Sabaa 2001; Jurison 1999; Keil et al. 2013; Kerzner 2013; Skulmoski and Hartman 2010; Wateridge 1998)

Conflict Management	Understands that conflicts are inevitable and therefore is able to identify project-related conflicts, analyze their causes, and take necessary actions to resolve them together with the stakeholders involved. Furthermore, he or she is aware that stimulating conflicts can sometimes have a positive impact on project performance.	(Fisher 2011; Keil et al. 2013; Kerzner 2013; Verma 1995)
Cultural Awareness	Can develop, display and apply an awareness of cultural differences of team members and other stakeholders and show an understanding of their values and beliefs. Furthermore, he or she can adapt the management style to appropriately manage people of other cultures (national and/or organizational) and create a common project culture that fosters project performance.	(Fisher 2011; van Marrewijk 2010; Müller and R. Turner 2007)
Emotional Intelligence	Can monitor his/her and others' feelings and emotions, analyze and use them to adjust his/her or others' thinking and actions in order to foster project performance. Furthermore, he or she understands the feelings and emotions of the stakeholders involved and shows honest understanding for their needs in order to create a productive project environment.	(Mazur et al. 2014; Müller and J. R. Turner 2007, 2010; Müller and R. Turner 2010; Obradovic et al. 2013)
Leadership	Is able to effectively lead a project team by inspiring and empowering the team members to work collaboratively in order to achieve the project objectives. Furthermore, he or she is able to collect and filter relevant information for decision-making in a dynamic environment and effectively involve project-external managers and other stakeholders. He or she is also aware of the impact of different leadership styles and adopts the one most suitable to the specific project context.	(Ahsan et al. 2013; Cheng et al. 2005; Crawford 2000; Fisher 2011; Jurison 1999; Keil et al. 2013)
Motivation	Can motivate and mobilize himself/herself and others and ideally create intrinsic long-term commitment fostering project performance among the stakeholders.	(Fisher 2011; Keil et al. 2013; Müller and R. Turner 2010; Skulmoski and Hartman 2010; Wateridge 1997; Young and Dulewicz 2009)
Team Building	Is able to get the right people with the necessary expertise involved and provide an atmosphere that contributes to collaborative and effective teamwork. Furthermore, he or she is able to create an open communication culture, foster good interpersonal relations and a common team spirit, and get all the individuals involved to work together to achieve the project objectives.	(Ahsan et al. 2013; Cheng et al. 2005; Crawford 2000; Fisher 2011; Jurison 1999; Kerzner 2013; Skulmoski and Hartman 2010)
Negotiation	Can persuade others (e.g., managers higher up, or team members) by providing a convincing rationale to change a viewpoint, obtain support (e.g. additional resources), or stimulate another intended reaction in order to foster project performance.	(Cheng et al. 2005; Dainty et al. 2004; Dulewicz and Higgs 2000; Fisher 2011; Jurison 1999; Keil et al. 2013; Müller and R. Turner 2010; Skulmoski

		and Hartman 2010)
Strategic Perspective	Is able to grasp the importance, relation, and impact of the project to the organizational context based on profound business knowledge and strategic understanding. Furthermore, he or she is sensitive to the concerns of the higher management, understands the influence of decisions within the organizations on the project, and is aware of the importance of aligning the project to the strategic goals of the organization.	(Dulewicz and Higgs 2005; Kerzner 2013; Morris and Jamieson 2005)

Table 1. Success-relevant competencies for project managers

For the purpose of the assessment framework development, we consider the listed competencies as being of equal importance, and therefore we do not rank them. Moreover, we understand each competency as an essential part of the overall competency portfolio a project manager should possess. As stated above, projects are context-specific, and different competencies are of different importance within different actual projects and project phases. The project manager has to be aware of that and adopt and apply the different competencies that depend on the project specifics, in order to demonstrate competence.

The competencies are also not meant to be clearly distinct; however, they are interrelated. Project planning, for instance, is closely related to scope management, resource management, and cost management but could also be understood as comprising all of them. Similarly, change management could be seen as a concern that is already addressed within scope management. However, the chosen separation is used because of the importance of the particular competencies for project success in the literature, and project managers still need to be aware of their respective importance.

A Competency-based Assessment Framework for Project Management Certifications

This section gives an overview of the assessment framework for project management certification we developed and presents its two dimensions – certification content and process – in greater detail.

Overview and Purpose

The assessment framework for success-relevant project management competences is meant to be used for assessing the evaluation quality of the chosen project management certifications. The evaluation quality describes the extent to which a project management certification fulfills a set of competence-related quality requirements.

One important and relevant concern is whether the certifications evaluate the actual competence or merely knowledge about the content that describes the competence. Related to this point, different assessment methods and their actual capability to assess competence can be found above. The outcomes serve as the foundation for Dimension 1 of the assessment framework that is used to assess the certification process. The other major concern relates to the extent to which the respective project management certification standards cover the success-relevant identified competences. The success-relevant competences described above therefore serve as the foundations for Dimension 2 of the framework, which is used to assess to what extent success-relevant competences are covered and to answer research question two. So, the assessment framework's overall evaluation quality describes to what extent the certification process is capable of actually assessing competence (Dimension 1) and to what extent the certification content covers the success-relevant competences (Dimension 2).

Dimension 1: Extent of competence assessment in the certification process

Dimension 1 serves to evaluate to what extent the certification process is capable of actually assessing competence. The dimension is separated into three different assessment levels (A1-A3) as illustrated in Figure 3 in an adapted version of Miller's (1990) pyramid (see Figure 2). Assessment level 1 represents the lowest assessment maturity, as it is limited to the capability to assess factual and applied knowledge.

Assessment level 2 represents the capability to assess competency. Assessment level 3 has the highest assessment maturity, as it is capable of assessing actually demonstrated competence. During the assessment, the assessors need to classify the certification process according to the three assessment levels, based on the given documentation of the assessment methods used in the process.
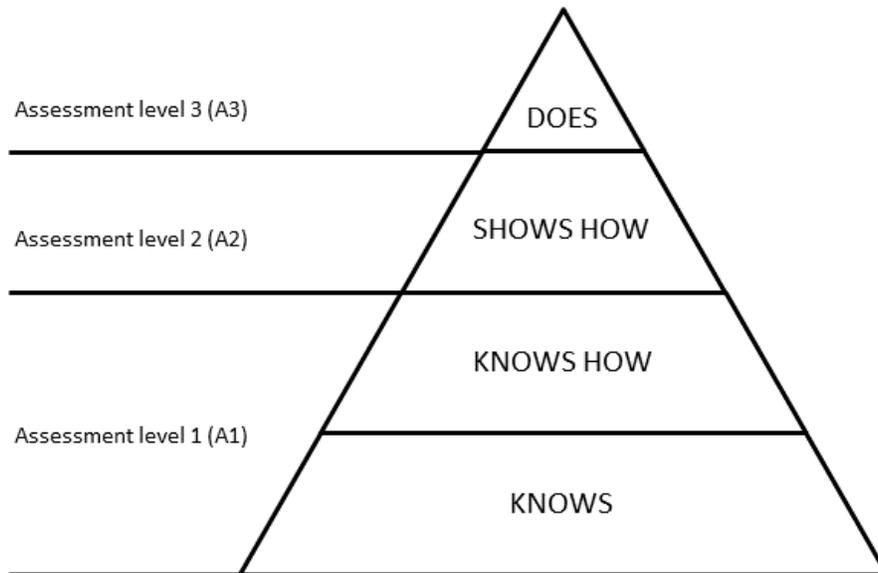

Figure 3: Assessment levels of certification processes

Table 2 shows the relation between assessment level (A1, A2, or A3), assessment capability (knowledge, competency, or competence), and assessment method.

Assessment Level 3 (A3)	**The certification process is able to assess competence.**
Assessment methods	• Direct observation in the real working environment • Assessment portfolios
Assessment Level 2 (A2)	**The certification process is able to assess competency.**
Assessment methods	• Oral examinations (limited to assessing 'A1' and interpersonal competencies) • Direct observation in a scenario situation
Assessment Level 1 (A1)	**The certification process is able to assess factual knowledge and knowledge application.**
Assessment methods	• Written-response tests (e.g., short-answer questions or essays) • Multiple-choice tests • Oral examinations

Table 2. Assessment level classification scheme for certification processes

Dimension 2: Extent of coverage of success-relevant project management competences in certification content

Dimension 2 of the assessment framework is used to assess to what extent the certification content covers the success-relevant project management competences. It consists of the competences identified in Table

1 as being success-relevant for projects, with the exception of 'technical understanding' and 'strategic understanding.' Both can be seen as industry-specific, and therefore using them to assess generic, industry-independent certifications seems inappropriate.

During the assessment, the assessors are to evaluate the degree to which it the certification's documentation covers each defined competence content-wise and rate it as follows: "not covered," "insufficiently covered," or "sufficiently covered." This evaluation is to be conducted by using the competences' explanations of Table 1 as a generic high-level outline of the aspects that have to be covered. The certifications' content should acknowledge the importance of the different success-relevant competences by directly mentioning them or by indirectly emphasizing their importance by comprehensively covering relevant concerns. The content should also provide information that defines what the candidate has to know about the competence and what he or she has to be able to do in order to demonstrate competence.

Specifically, the assessors' task is to contrast the certification content with the relevant extant literature and derive and justify their assessment on this foundation. Since eventual assessment is, to some extent, up to the individual assessors' interpretation and judgment, we recommend an extensive written justification for each assessment and that at least two assessors conduct the assessment.

Sample Outcomes of a Framework Application

When applying the framework, the combination of the results of Dimension 1 and Dimension 2 are used to make the final assessment of the evaluation quality of the project management certification that is being assessed. Table 3 shows a sample assessment for Dimension 1 with three sample comments, one for each assessment outcome (●, o, X). For an assessment of an existing certification, we would fill each row in the "Detailed assessment" column with an in-depth justification for our assessment that may well comprise a full page or more. Table 4 shows the combined result for both dimensions for a sample certification. The sample certification X is thus found to be lacking in scope (only nine out of 19 competence areas are sufficiently covered) and certification process quality (the process does not assess competences, just competencies and knowledge).

#	Competence	Certification X	Detailed assessment
1	Stakeholder Management	●	Certification X covers all the important areas of stakeholder management.
2	Scope Management	o	
3	Project Planning	●	
4	Resource Management	●	
5	Change Management	o	Certification X covers several aspects of change management throughout the certification's scope but does not devote a specific section to change management competences
6	Flexibility	●	
7	Risk Management	o	
8	Quality Management	●	
9	Cost Management	o	
10	Achievement Orientation	●	
11	Analytical Thinking	●	
12	Communication	o	
13	Conflict Management	X	
14	Cultural Awareness	X	Certification X does not cover the cultural aspects of

			project management
15	Emotional Intelligence	X	
16	Leadership	●	
17	Motivation	●	
18	Team Building	X	
19	Negotiation	X	

Table 3. Sample assessment of dimension 2 (●: sufficiently covered; o: insufficiently covered; X: not covered)

Certification	Dimension 1: Assessment levels represented by the used assessment methods	Dimension 2: Number of sufficiently covered competences
Certification X	A1, A2	9 of 19

Table 4. Sample combined results from applying the assessment framework

Discussion and Conclusion

Prevalent project management certifications claim to evaluate whether and confirm that the certificate holder has the necessary project management knowledge and competence and is able to properly apply them when managing a project. To examine this claim, the assessment framework developed in this paper can help project management researchers and practitioners evaluate to what extent project success-related competences are actually covered by the certifications. Each certification process is examined regarding its capability to assess competence (Dimension 1 of the assessment framework). The respective content that may be evaluated within the certification process is examined regarding its coverage of success-relevant project management competences (Dimension 2 of the assessment framework). The framework thus contributes an instrument to assess and compare extant project management certifications and curricula for competence development. Note that the results of applying the assessment framework cannot be used to deduce a reliable statement about the actual competences of the respective certificate holders. If a particular certification cannot certify competences, it does not mean that the certificate holders do not possess the project management competencies, or that they are not able to demonstrate them as competences in a real job context. They were simply not evaluated in this light and may therefore nevertheless possess the competences anyway.

Note that, in this paper's scope, we did not conduct an evaluation of the developed assessment framework. We therefore see potential for future research in the application of the framework to certificates given out by the four most prevalent certification institutions: International Project Management Association (IPMA), the Project Management Institute (PMI), the Australian Institute of Project Management (AIPM), and AXELOS, as owners of the PRINCE2 framework. A successful assessment and comparison of these certifications will thus serve as an application as well as an evaluation of this framework. The most relevant certifications these organizations offer to project managers are:

- Certified Project Manager (IPMA Level C) and Certified Senior Project Manager (IPMA Level B), offered by the IPMA

- Project Management Professional (PMP), offered by the PMI

- PRINCE2 Practitioner and PRINCE2 Professional, offered by AXELOS

- Certified Practicing Project Manager (CPPM), offered by the AIPM.

The entry-level certifications are omitted, since they commonly focus on knowledge and not on competency. The highest-level certifications often target competencies individuals higher up in rank than project managers should possess (program or portfolio managers, for example).

Project management and course directors in higher education and practice (typically, in large enterprises in project-intensive domains) can also use the framework in future research and assess and compare to what extent their programs or courses comprehensively address the necessary competences for project management success. On this foundation they can then derive concrete actions to improve the programs or courses.

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