Available online at www.sciencedirect.com

ScienceDirect

International Journal of Project Management 37 (2019) 14–26

International Journal of Project Management

www.elsevier.com/locate/ijproman

Exploring the value of project management certification in selection and recruiting

Ali Dehghanpour Farashah [a,*], Janice Thomas [b], Tomas Blomquist [a]

[a] Umeå School of Business, Economics and Statistics, Umeå University, 90187 Umeå, Sweden
[b] Organizational Analysis Academic Department, Athabasca University, 1 University Drive, Athabasca, AB T9S 3A3, Canada

Received 30 January 2018; received in revised form 7 September 2018; accepted 18 September 2018
Available online xxxx

Abstract

For many years project management has been moving toward professionalization through voluntary certification. Simultaneously, recruiters increasingly use voluntary professional certification as a signal of applicant competencies and likely future performance, to increase the efficiency of the selection process. This practice increases the value of certification to holders and leads to the growth of certification. However, despite significant research into the value of voluntary certification in numerous occupations, results linking certification with performance are tentative at best. We contribute to the growing body of research exploring the performance signaling ability of certification by empirically examining the case of project management professional certification using survey responses from 452 (certified (370), and uncertified (82)) international project managers. Our findings provide some support for this recruitment and selection practice, not through a direct relationship between certification and performance but by showing that self-efficacy mediates the relationship. Certification also relates to higher levels of professionalism. We conclude with a discussion of the implications of these findings for recruiters, project management professionals, and professional associations.

Keywords: Voluntary certification; Professionalism; Project management; Performance; Recruitment and selection; Self-efficacy; Signaling

1. Introduction

Project management certification has grown rapidly over the last decades (Blomquist et al., 2018). To assist project managers in solving practical problems professional associations accumulated "best practice" prescriptions in the form of several bodies of knowledge and standards (Ahlemann et al., 2013). However, little evidence exists to support the belief that the prescriptive guidance included in the bodies of knowledge apply to real-world settings, and yield the intended benefits (Ahlemann et al., 2013). Certified project managers, the end-users of the PM principles prescribed by professional associations, are assumed to deliver higher levels of project performance. This assumption is of crucial importance to the field of project management in general, and to professional associations in particular. However, there have been very few scholarly studies that examine the realized benefits of certification for better performance of project managers, or for any other voluntary certifications.

This lack of evidence is a real challenge for those charged with hiring and managing project management professionals, who need to understand what voluntary certification tells them about the applicants holding such certifications. Our purpose in this study is to explicitly address this gap by using a sample of certified and uncertified project managers to examine the effect of certification on the level of professionalization and likely performance of project managers. This quantitative study explores how voluntary professional certification acts as a signal of applicant competencies and likely future performance. Providing evidence regarding the extent and nature of the

* Corresponding author.
E-mail address: ali.dehghanpour@umu.se (A.D. Farashah).

https://doi.org/10.1016/j.ijproman.2018.09.005
0263-7863/00

impact of certification and professionalization on individual and organizational outcomes reveals the real value of voluntary certification, assists those charged with hiring and managing project management professionals in predicting performance, and suggests opportunities for professional communities to improve the certification process.

We begin with a discussion of the growth of voluntary certification in general and what we know about its value. Next, we provide a brief review of project management's path to professionalization. Then, we review theoretical literature on certification and professionalization to develop testable hypotheses regarding the impact of certification and professionalization on self-efficacy beliefs and performance. Self-efficacy is considered a good predictor of performance in the project management context (Blomquist et al., 2016). By including self-efficacy as well as self-reported performance measures, we broaden the scope of current knowledge and propose a model to explain the signaling role of project management (PM) certification and professionalization concerning likely performance. The result of our study of PM certification is likely generalizable to other occupations and may guide the future direction of hiring practices and certification bodies in these other occupations as well.

2. Literature review

2.1. Growth in voluntary certifications

Many occupations, including project management, have moved toward professionalization through standardization of the work, establishing professional associations and issuing voluntary certifications (Zwerman et al., 2006; Hodgson et al., 2015). Certification is now a preferred or required qualification across numerous management occupations (Lester and Dwyer, 2012) such as engineering, human resource management, and project management. Estimates exist that the total number of voluntary certifications exceeds 1600 (Hansen, 2006). The proportion of workers that hold at least one voluntary certification has risen from 5% in 1950 to nearly one third in recent years (Kleiner and Krueger, 2010). Today, there are more than one million certified project managers worldwide (number compiled from statistics provided on PMI.org and IPMA.org).

One reason for this growth in certification might be the agentic view of career. This view puts the responsibility of career decisions on the shoulders of the individual and promotes commitment to the profession instead of commitment to a specific organization/industry (Sullivan and Baruch, 2009) and encourages investment in employability (Baruch, 2004), all of which enhances the importance of professional and occupational affiliations. Management literature has failed to adequately respond to this change and study the rising salience of occupational and professional dynamics proportionate to the pace of professionalization of occupations and formation of professional associations (Anteby et al., 2016).

The lack of research concerning the effects of certification programs and the professionalization of occupations has been highlighted across many occupations (e.g., human resource management (Lengnick-Hall and Aguinis, 2012), teaching (Walsh, 2001) and career education (Bartlett, 2012)). Research in occupations as diverse as information technology (Wireschen and Zhang, 2010), nursing (Sechrist et al., 2006; Boltz et al., 2013), and procurement and contract management (Abutabenjeh, 2015), have explored the value of certification to both employers and individuals. However, little of this work has addressed the very practical question of whether certified practitioners are likely to perform differently than non-certified practitioners, nor why this is likely to be the case. Researchers looking at HR certification conclude that while the value of certification tests of knowledge and capabilities is unquestioned from the perspective of content validity (Cohen, 2012), more research is needed to provide further evidence of the criterion-related validity of the certification. These researchers go on to suggest that it is necessary to assess the value of certification and professionalization for the individuals, organizations, and professions, and especially, to provide empirical evidence of the value of certification as a predictor of performance (Latham, 2012; Lengnick-Hall and Aguinis, 2012). This paper addresses this gap by exploring the impact of voluntary certification on the professionalization and performance of project managers.

2.2. Project management professionalization and voluntary certification

Starting with the field of engineering and construction in the 1940s, project management began to establish its reputation as a distinctive management area with its own body of knowledge, planning, and control methods (Morris, 1997). Several influential events in the past decades cleared the way to introduce project management as an aspiring profession in the beginning of 1980s (Zwerman et al., 2006) with the creation of certification processes. These events include: defense mega-projects (Hughes, 1998), formation of specialized project management associations in the USA and UK in the 1960s/70s (Hodgson and Paton, 2016), the need for project management skills to reduce the high rate of failure among information technology projects (Schwalbe, 2015), and the broad adoption of project-oriented working in the 21st-century (Keegan et al., 2012). Today, project management certification has become a significant credential for project management professionals, and their practice is highly standardized. Many individuals have acquired PM certification; turning project management certification and accreditation into a prosperous industry (Blomquist and Söderholm, 2002).

PM certifications require demonstrating a minimum level of project management experience and passing an exam. The Project Management Institute (PMI), today the largest professional association by membership in the world, has developed eight areas of certification and recognizes over 658,000 active certifications worldwide (Schwalbe, 2015, p.33). The International Project Management Association (IPMA) has developed four levels of certification and has over 250,000 issued certifications (http://www.ipma.world). According to its proponents, PM certification validates competence to perform in

the role of a project manager, leading and directing projects and teams (http://www.pmi.org). For attribute-based standards (such as PMI), the certification examination is designed to reflect tasks and activities a PM is expected to perform on the job (based on PMBOK®). While the PMI and IPMA standards do not include performance-based criteria (GAPPS, 2007, p. 2), their certification processes attempt to capture elements of performance (Bredillet et al., 2015). By recognizing the competence of a project manager through certification, it appears therefore rational to assume that certified project managers will somehow demonstrate better performance results than non-certified project managers.

While mastering the PM body of knowledge has been considered a key factor in project manager performance, researchers have questioned its impact. Almost no empirical research explores the benefits of accreditation at the individual level for the practitioner, at the organizational level for the employers, or at the macro level for the PM profession (Morris et al., 2006). Similarly, little research exists to clarify the impact of certification on improved attitudes, behaviors, and performance of project managers (Morris et al., 2006). Morris (2013, 2014) asserted the importance of a culture shift toward practice and doing over the knowledge and knowing evidenced by certification. As in other certified occupations, there is a need to empirically evaluate the effects of certification and professionalization of project management to legitimize the important premise on which certifications, are built, and to validate the assumptions about the use of such certifications in recruitment and selection decisions.

The following sections build testable hypotheses about the nature of these assumed relationships based in theoretically derived relationships between signaling; certification and professionalism; professionalism and performance; and, the role of self-efficacy in each of these relationships.

2.3. Certification as signal in recruitment and selection

In light of a lack of readily available information on an applicant's competencies, managers consider voluntary certification an important criterion when making decisions regarding recruiting, promoting and payment (Scott, 2016; Weaver and Whitney, 2015; Aguinis and Lengnick-Hall, 2012; Wiley, 1999). Since there is no instrument to measure the future performance of a professional in an entirely accurate way, the assumption is made that an applicant who holds professional certification possesses the skills and qualities that will lead to a higher level of performance (Pohler and Willness, 2014; Chen et al., 2008). Despite the popularity and convenience of using certification as a staffing tool, as well as a criterion for promotion and level of payment (Albert, 2017), there is little evidence about its ability to predict performance. This assumption needs more scrutiny.

One of the central functions in human resources is recruitment and selection. The appropriate assessment of a candidate is highly challenging because an individual's competency in any skill set is difficult to identify or to measure precisely. While there has been movement toward creating reliable new methods for selection and competency assessment, human resource professionals frequently use signals as a shortcut (Lyons et al., 2012; Spence, 1973). Signals come in the form of a visible indicator of a quality which is not readily observable (Hopp et al., 2016). Efficient use of signals is dependent on the assumption that while competencies cannot be known directly, there are signals that provide evidence of the individual's capabilities and subsequent productivity (Albert, 2017; Spence, 1973). Educational credentials are one of the most frequently used signals of applicants' abilities (Suazo et al., 2009), since they suggest the level of field knowledge and skills of an applicant as well as an appropriate level of motivation, focus and organizing skills.

Similarly, certification as a credential identified by industry or occupation indicates that the holder has acquired the essential knowledge and skills assessed by these credentials. Certification comes into play in three ways in the hiring process. First, it can be a formal job requirement that limits those who can apply for or be considered for the position. Second, it can be an easy filter to help in the initial screening of applicants to reduce the number of resumes considered or to decide between equally qualified applicants. Finally, it can be used as a substitute for education or experience thereby increasing the ways a person may be qualified for a position and expanding the applicant pool size (Lyons et al., 2012; Aguinis and Lengnick-Hall, 2012).

Certification is a signal used by HR professionals in selection and recruitment for many occupations. In a study of IT and HR professionals, researchers found that HR professionals on average believed that certified IT professionals possess higher levels of competency than non-certified professionals and that by hiring a certified professional, the HR person minimized their responsibility for assessing technical competence (Cagielski, 2004). IT professionals, on the other hand, were less supportive that certification correlated with ability (<20%) and none of them agreed with the belief that certification was a suitable mechanism to be used to justify hiring decisions (Cagielski, 2003). In the context of service marketing, certified employees are often thought to deliver higher service quality (Walker and Johnson, 2009). In line with empirical findings in other occupations, and these arguments based on signaling theory, we hypothesize that:

H1: The level of performance of the project manager is positively associated with having PM certification.

2.4. Certification versus professionalism

PM certification, which refers to mastering the body of knowledge, is helpful but project management is a practice-oriented profession (Morris, 2014) where skills and doing have equal importance as knowledge and knowing; therefore, professionalism would be another critical factor affecting the performance of the project manager. Professionalism, refers to mastery of the knowledge as well as going beyond mechanistic standard models and having the discretion to apply the knowledge reasonably within the context (Morris et al., 2006), represents an extension to certification. Traditionally,

any occupation wishing to exercise professionalism must first develop a technical basis for it and link the practice to standards of training. Project management is about executing and completing the project, and can be conceived as a series of distinctive tasks which are best accomplished by management with a certain level of technical knowledge and familiarity with tools and techniques (Kessler et al., 2015). Passing exams and having a PM certification suggests that the project manager has the necessary knowledge to master applying it and become a professional. While certifications in PM are not like the licenses in law or medicine and do not control access to the field of practice, the credentials increasingly develop and disseminate a knowledge base and a common base for ethics and practice standards in the area. Following this logic, we test,

H2: The level of professionalism of the project manager is positively associated with having PM certification.

2.5. Project management professionalism as an indicator of performance

Hodgson and Paton (2016) remind us that, a project manager requires both familiarity with the industry/organization and technical expertise. Schön (1987) noted that during uncertainty, technical rationality (i.e., certification) is not sufficient to deal with the problem, and called for professionals to incorporate reflection in action, a capacity to adapt, to overcome unpredictable, not well-formed, and complex challenges. Similarly, researchers have proposed that PM practitioners should not be imagined as trained technicians who carefully follow procedures and techniques prescribed by PM standards but as reflective practitioners who can operate, learn and adapt quickly (Cicmil et al., 2006; Crawford et al., 2006). Professionalism, referred to as mastery of, and having the discretion to apply the knowledge reasonably within the context (Crawford et al., 2006), appears to be a complement to the knowledge required for certification, which leads us to our third hypotheses:

H3: The level of performance is associated with the level of professionalism of the project manager.

2.6. The role of self-efficacy

Self-efficacy is an individual's judgment about how well they can perform in a particular task situation. Self-efficacy, the "belief in one's capability to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (Wood and Bandura, 1989:408), has often been linked to performance. Stajkovic and Luthans (1998) found self-efficacy to be the best-known predictor of job performance with a significant average correlation of 0.38. Many studies assert that self-efficacy is the best predictor of job performance that we have found to date (Sitzmann and Yeo, 2013). It is thought that self efficacy determines behavior by influencing the activities individuals undertake, the resources they expend in the effort and how long they persist in the face of obstacles or difficulties (Bandura, 1986, 1997). Succinctly, if a person believes they are capable of attaining a valued outcome, he/she will be more likely to repeat or engage in that behavior.

Bandura (1977) theorized four distinct sources which distill and strengthen self-efficacy beliefs. Mastery experience is the most reliable source of self-efficacy and refers to direct experience and successful accomplishment of the task in the past (Bandura, 1977). Vicarious learning or social modeling is believed to be the second most effective strategy to enhance self-efficacy, and refers to observing people similar to oneself, comparing one's competencies in relation to competencies of these others, and attempting to develop and imitate the competencies (Bandura, 2012; Muretta Jr, 2005). Verbal persuasion (e.g., encouragement, constructive feedback, education) and finally psychological/ emotional state (i.g. less anxiety, fear of failure and depression) are the third and fourth sources that lead to higher motivational levels and self-efficacy beliefs (Bandura, 2012). We assert that the mechanism through which certification and professionalism influence self-efficacy, is by affecting these sources of self-efficacy. Certification to a great extent ensures transfer of "know what" and "know how" and essential problem-solving tools and skills at the entry level and not the development of competencies to deal with complexity and leadership of the projects at the advanced level (Thomas and Mengel, 2008). Besides developing PM knowledge and competencies, certification inherently provides informational feedback including feelings of acknowledgment and consequently motivation. These benefits of certification increase the project manager's sense of job competency and permits them to act with more confidence. Finally, one reviewer of this paper suggested that these benefits might also link certification with an individual's need for self-actualization (Maslow, 1943) and striving to be the best that they can be. Hence, the fourth hypothesis is:

H4: Self-efficacy*mediates* the relationship between certification and performance.

Professionalism is the perception of collective norms of the profession and defines the way that a practitioner views their job (Hall, 1968). Professionalism incorporates elements beyond the technical practice, managerial ability and efficiency improvement embedded in certification (Hanlon, 1998). In their theoretical framework, Hall (1967) and Snizek (1972) suggested that professionals possess specific attributes. Their framework includes five elements of professionalism and is used to theorize the relationship between professionalism and self-efficacy. The elements of professionalism include (1) *belief in public service*; (2) *belief in self-regulation*; (3) *autonomy*; (4) *dedication and sense of calling to the field*; and (5) *Affiliation to the professional community and sense of professional belonging.*

Belief in public service encourages the practitioner to follow the profession to provide services to fellow man and have a robust internal source of motivation and more perseverant in the face of difficulties and challenge. Furthermore, the general public has difficulty believing in the indispensability of services performed by some professions and developing a belief in public service is a slow process (Snizek, 1972). Therefore, holding such a belief means that the professional

has received positive feedback, accepts that he/she is doing the right thing and that she can conduct the professional duties competently. This belief creates a positive emotional state and assists the practitioner to be confident in his competencies. Further, acceptance of the need for self-regulation of the PM profession and autonomy means that the professionals perceive themselves to be supremely competent and self-efficacious in making decisions and have the control to independently decide about occupational activities. Perceived behavioral control and human agency are positively associated with self-efficacy beliefs (Bandura, 1982; Terry and O'Leary, 1995). Higher levels of dedication and calling for the profession is associated with higher level of motivation and perseverant effort (Thatcher et al., 2012) and provides a sense of confidence and certainty to individuals (Duffy and Sedlacek, 2007). Belonging to a PM professional community is recognized as a means to improve self-efficacy through networking activities and providing the opportunity for the PM professional to observe from peer behavior and lean, have access to social and technical support and receive competence feedback. Professional attitudes toward project management correlate with project management self-efficacy and, through that correlation, are likely to be a good indicator of project management capability. Thus, we test,

H5: Self-efficacy*mediates* the relationship between professionalism and performance.

3. Methods

3.1. Survey instrument and the sample

A web-based survey was implemented for this study. Some of the respondents were identified by asking participants of project management gatherings whether they would like to participate in a research project. The rest of the participants were solicited through national project management associations and their local chapters. We did not find any significant differences in the answers between participants sourced in these two ways. Data obtained through online instruments is considered better, or at least as good as, representations of the general population compared with data collected through traditional pencil-and-paper samples (Gosling et al., 2004). The 2014 survey collected information on whether or not the individual was certified; type of certification held; professional association issuing the certification(s); demographics (e.g. age, years of experience, education); type of projects they are involved with (budget, complexity); project management self-efficacy beliefs; and project performance.

Out of 598 project managers participating in the in the survey, 452 responses were complete and usable. The number of incomplete surveys is linked to the length of the survey which appears to have compromised completion rates. 367 (81%) respondents were certified, and 85 (19%) were non-certified. Note that having only 85 non-certified project managers could be considered a limitation of this particular study. While we made every effort to include as many non-certified project managers as possible in the study, we found it very difficult to engage project managers who were not interested in certification to complete a lengthy survey about certification. In the end, we were happy to receive 85 non-certified participants as this number allowed us to test our questions. Certifications issued by the Project Management Institute (PMI) were the most common type of the certificate among the participants (53%) followed by certifications issued by International Project Management Association (IPMA) (34%) and PRINCE2 (24%). The majority of certificate holders had an advanced level certification. However, since we could not find a significant difference in the level of professionalization nor performance among entry-level and advanced-level certified project managers, both groups are treated merely as certified project managers in further analyses. The majority of the respondents were male (72%) and in the mid-career stage (46% with 5 to 16 years of experience). Table 1 presents an overview of the respondents.

3.2. Measures

Professionalism was measured by selecting items from the shortened five dimension scale of professionalism scale developed by Snizek (1972). Following Dinger et al. (2015) and Kalbers and Fogarty (1995), terminology was adjusted to refer to the project management occupation and context. The respondents rated their level of agreement or disagreement to the professional attitudes in a Likert-type continuum from "1 = strongly disagree" to "5 = strongly agree". Self-efficacy was measured by a 6 item domain specific project management self-efficacy scale as recommended by Bandura (1977, 1982) and developed by Blomquist et al. (2016). The scale examines the level of confidence of the project manager in conducting specific tasks associated with best practice project management in a Likert-type continuum from "1=cannot do the task" to "5=totally confident of doing the task". Certification was measured by asking participants "Do you hold a project management certification of any type?". The answer resulted in a dichotomous "Yes" or "No" variable with follow up questions on the nature and level of certification for those who answered "Yes".

Project performance contains two dimensions (Judgev and Müller, 2005; Mir and Pinnington, 2014), operational performance (Walton and Dawson, 2001) and strategic performance (Bourne, 2008; Kerzner, 2003; Meredith and Mantel Jr, 2011). Operational performance refers to the utilization of resources. Operational performance reflects the degree of meeting budget allowance as a proxy of cost, meeting deadlines as a proxy of time, and delivering on specifications as a proxy of quality. ALikert-type scale was used to capture the level of operational performance, including "less than 20%", "21–40%", "41–60%", "61–80%" and ">80"and "100%". The strategic performance dimension includes three indicators: contribution to strategy; meeting stakeholder expectations; and delivering business benefits. Table 2 and Table 3 present the dimensions and indicators for the main variables of the study.

The sample included 80% of the participants, ages 40 years and above. Age could indicate the level of professionalism, standing in as an assumption of experience, which is related to

Table 1
Descriptive analysis of the data.

Project Managers	Certified		Non-Certified	
	n = 367	100%	*n* = 85	100%
Gender				
Female	97	26	20	23
Male	253	69	55	75
Missing	17	5	10	12
Year of PM experience				
<1	7	2	6	7
1–5	36	10	10	12
6–10	80	21	17	20
11–15	82	22	14	16
16–20	59	16	12	14
21 and more	78	21	14	16
Missing	25	7	12	14
Education				
High School Diploma	10	3	1	1
College/Technical Degree	35	10	11	13
Bachelor Degree	56	15	16	19
Graduate degree	249	67	55	65
Missing	17	5	2	2
Age				
Until 29	7	2	5	6
30–39	55	15	10	12
40–49	114	31	27	32
50–59	121	33	18	21
60 and over	48	13	19	22
Missing	22	6	6	7
Project Management Certification	**Number**	**100%**		
Number of certifications holding by the project managers				
No certification	85	19		
One certification	272	61		
Two certifications or more	88	20		
Issued by Professional Associations				
PMI	193	43		
IPMA	123	27		
Prince2	88	19		
Other	48	11		
Level				
Entry level [a]	54	15		
Advance [b]	306	83		
Missing	7	2		

[a] Entry level certifications include Certified Associate in Project Management (CAPM), Prince II and Certified Project Practitioner (IPMA D).

[b] Advanced certifications include Project Management Professional (PMP), Program Management Professional (PgMP), Portfolio Management Professional (PfMP), PMI Agile Certified Practitioner (PMI-ACP), PMI Risk Management Professional (PMI-RMP), PMI Scheduling Professional (PMI-SP), Certified PM Professional (IPMA C), Certified Project Manager (IPMA B), Certified Project Director (IPMA A).

the higher levels of self-efficacy. Therefore, the years of experience of the project manager provides a control variable. Also included as control variables, to control for the level of performance, are project size and project complexity included as control variables.

3.3. Reliability and validity of the measures

Professionalism and self-efficacy are reflective measures, and the results of reliability and validity tests on these variables are in Table 2. Cronbach's alpha (α) and composite reliability (CR) are used to assess internal consistency and reliability. Loading of the indicators on latent variables and average variance extracted (AVE) are used to assess convergent validity (Hair et al., 2016). To assess discriminant validity, cross-loadings of the indicators were examined using the Forner-Larcker criterion.

Professionalism is a second-order reflective construct. Therefore, the same procedure is repeated for establishing the reliability and validity of its five second-order dimensions and results are reported in Table 3. Confirmatory factor analysis (CFA) was run to assess the reliability and validity of the measures. Three indicators of professionalism were deleted since the loading coefficient on designated dimensions were <0.70. AVE and CR and Forner-Larcker test show satisfactory results (AVE > 0.50, CR > 0.70 the indicators load significantly only on the designated dimension, the square root of the AVE for each construct exceeded the construct's bivariate correlation with other constructs.). Thereby establishing the reliability and validity of these reflective measures.

Performance is modeled as a formative measure since indicators are independent and do not necessarily covary with each other. Serrador and Turner's (2015) work suggest that time, cost and scople do not correlate strongly and so they distinguished between project efficiency (i.e., meeting cost, time, and scope goals) and project success (meeting broader business and enterprise goals as defined by key stakeholders) and propose, considering the two aspects distinctively to have a better understanding of overall business success of the project. In addition, other researchers provide evidence that a formative measure is appropriate because time, cost andscope do not necessarily correlate (Gardiner and Stewart, 2000) and since project crashing is prevalent in project management, cost and time are often negatively correlated because of the tradeoffs project managers must make (Khang and Myint, 1999; Babu and Suresh, 1996). Thus, a formative measure of performance as used in this study is appropriate.

Following Gudergan et al. (2008) and Bollen (1990), confirmatory tetrad analysis (CTA) was conducted to statistically justify the formative indicator specification of the performance measure. The CTA procedure requires at least five indicators for the construct, and therefore we include all six performance indicators to construct the general performance measure. The CTA results show a significant test statistics and Bonferroni-adjusted confidence intervals do not include zero for any of the model-implied vanishing tetrads. This casts doubt on the reflective nature of the performance measure in favor of the alternative formative measure. Therefore it is justifiable to measure performance with a formative specification. Following Hair's et al., (2016) procedure for assessing formative measures, performance indicators showed satisfactory results regarding redundancy analysis (path coefficients among performance and single-item indicators is higher than 0.80) and showed no multicollinearity (variance inflation factor (VIF) for all indicators is <5). Furthermore, since either the performance indicators' weight (relative importance) or loading (absolute importance) is

Table 2
Result summary for establishing validity and reliability of reflective measures.

Constructs and dimensions		Indicators [a]	Loading Coefficient	AVE	CR
Professionalization [a]	Belief in Public Service (α = 0.77)	I think that project management is essential to society.	0.86	0.69	0.86
		Project management is an indispensable occupation.	0.86		
		The benefits that project management gives to society are understated	0.76		
	Belief in Self-Regulation (α = 0.56)	My fellow project managers have a pretty good idea about each other's competence	0.88	0.67	0.80
		There is not much opportunity to judge how a fellow project manager does their work	0.75		
	Autonomy	Project managers ought to be given the opportunity to make decisions about project management issues	0.98	Single-item construct	
		The conclusions made by project managers are rightly subject to detailed review by their supervisor [c]	0.15		
	Dedication (α = 0.71)	It is encouraging to see a project manager that is idealistic about his or her work [c]	0.45	0.78	0.87
		I would stay in project management even if I had to take a slight pay cut [c]	0.51		
		People in project management have a real" calling" for their work	0.83		
		The dedication of people in project management field is most gratifying	0.86		
	Community Affiliation (α = 0.78)	I subscribe to, and systematically read, project management journals and other professional publications.	0.76	0.60	0.86
		I regularly attend and participate in meetings of the local chapter of the project management association.	0.80		
		I often engage in the interchange of ideas with project manager form other organizations.	0.79		
		I believe that project management associations should be supported.	0.75		
Project Management Self-Efficacy Beliefs [b] (α = 0.81)		Communicate in a way that ensures all stakeholders have the same understanding, no matter their level of technical or operational understanding.	0.65	0.52	0.87
		Break the work down into tangible work items with measurable completion criteria that team members will commit to delivering.	0.69		
		Hold regular status meetings comparing progress to plan, analyzing variances, and taking corrective actions (to get back on plan) where necessary.	0.80		
		Clearly define key characteristics and business benefits of the product of the project and acquire sign off from key stakeholders on these specifications.	0.66		
		Write a project charter (or similar document) that describes the project in enough detail to obtain agreement from key stakeholders to begin work.	0.79		
		Evaluate project reviews and suggested improvements, discuss with key stakeholders and take appropriate action.	0.66		

α = Cronbach's alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

[a] The respondent's indicated the level of agreement with the statement. The Question was asked as: "The statement below describes one's attitude toward project management. Please note your level of agreement with each statement. (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree".

[b] The respondent's confidence in conducting the task was self-reported. The Question was asked as: "The statement below describes situations that commonly arise in projects. For each situation, please rate how confident you are that you could manage them effectively today? (1 = 0%, cannot do, 2 = 25% confident, 3 = 50% confident, 4 = 75% confident, 5 = 100%, totally confident)".

[c] Item is deleted due to low loading coefficient.

Table 3
Result summary for establishing validity and reliability of second-order professionalism measures.

Constructs	Dimensions	Loading Coefficient	AVE	CR
Professionalism (α = 0.72)	Belief in Public Service	0.72	0.65	0.77
	Belief in Self-Regulation	0.67		
	Autonomy	0.67		
	Dedication	0.81		
	Community Affiliation	0.77		

Table 4
Correlation among key variables.

Variable number and names	Mean	s.d.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Having Certification [a]	0.81	0.38	1						
(2) Professionalism	3.71	0.48	0.10 *	1					
(3) Project Management Self-Efficacy [b]	4.21	0.59	0.09 *	0.30 **	1				
(4) Operational Performance [c]	4.60	1.18	0.09	0.05	0.27 **	1			
(5) Strategic Performance [c]	4.75	1.22	0.08	0.09 *	0.29 **	0.67 **	1		
(6) Project Size [d]	1.83	0.94	0.10 *	−0.04	−0.01	−0.02	−0.04	1	
(7) Years of PM Experience	4.21	1.63	0.07	0.23 **	0.38 **	0.17 **	0.22 **	0.03	1
(8) Project Complexity [e]	2.27	0.61	0.11 *	−0.01	−0.02	−0.04	0.04	0.24 **	−0.08

* Significant at $p < .05$ level (2-tailed).
** Significant at $p < .01$ level (2-tailed).
[a] 0: Not having PM certification, 1: Having at least 1 PM certification.
[b] 1: The lowest level, 5: The highest level.
[c] Level of goal attainment; 1:"<20%", 2:"21–40%", 3:"41–60%", 4:"61–80%", 5:">80", 6:"100%".
[d] Measured by amount of budget (US Dollar); 1: <1 M, 2: 1 M to 50 M, 3: 50 M to 200 M, 4: 200 M to 500 M, 5: >500 M.
[e] 1: Less complex, 2: Just as complex, 3: More complex.

significantly greater than zero, theorized indicators contribute to the formative index of performance. In this way, the reliability and validity of performance as a second-order formative construct was established.

3.4. Common method bias test

Self-efficacy, professionalism, and performance were self-reported and collected by only one questionnaire. Therefore, it is reasonable to measure the possible effect of common method bias (CMB) and systematic error in the model (Podsakoff et al., 2003). CMB was assessed by applying Harman's single factor test. An exploratory factor analysis we conducted on all 25 items related to self-efficacy, professionalism, and performance. None of the emerged factors was dominant and explaining the majority of variance. This suggests that the data is not susceptible to CMB.

4. Results

The direct and indirect effects proposed by our conceptual model were tested using Structural Equation Model (SEM). Since the model included both formative and reflective variables, they were estimated using a partial least square (PLS) algorithm (Ringle et al., 2015). Table 4 shows the correlation of the variables in the model. Having a certification is significantly related to higher levels of professionalism and PMself-efficacy and with more complex projects with higher budgets.

Standardized Root Mean Square Residual (SRMR), used as a criterion for PLS-SEM fit, evaluates the observed correlation among variables, and the model implied correlation matrix. The SRMR of the model is 0.065 which is less than the proposed threshold of 0.08 (Henseler et al., 2014; Hu and Bentler, 1999) indicating a good fit. Table 5 presents the effect sizes, and Fig. 1 demonstrates the resulting paths among the constructs.

Table 5
The effect size of main variables and control variables on operational and strategic performance.

Hypothesized variables	Effect size	Direct Effect	Indirect Effect	Total Effect
Certification	→ Operational Performance	0.059 ns	0.017 ns	0.076 ns
	→ Strategic Performance	0.033 ns	0.021 ns	0.054 ns
Professionalism	→ Operational Performance	−0.036 ns	0.054 **	0.018 ns
	→ Strategic Performance	−0.000 ns	0.053 **	0.053 ns
PM Self-efficacy	→ Operational Performance	0.271 ***	–	0.271 ***
	→ Strategic Performance	0.265 ***	–	0.265 ***
Control variables				
Years of experience of project manager	→ Operational Performance	0.074 ns	0.097 ***	0.172 ***
	→ Strategic Performance	0.128 *	0.101 ***	0.229 ***
Project size	→ Operational Performance	−0.015 ns	0.002 ns	−0.016 ns
	→ Strategic Performance	−0.066 ns	−0.005 ns	−0.071 ns
Project complexity	→ Operational Performance	−0.021 ns	0.005 ns	−0.016 ns
	→ Strategic Performance	0.074 ns	0.003 ns	0.077 ns

ns = "non-significant", $p > .05$.
* Significant at $p < .05$ level.
** Significant at $p < .01$.
*** Significant at $p < .001$ level.

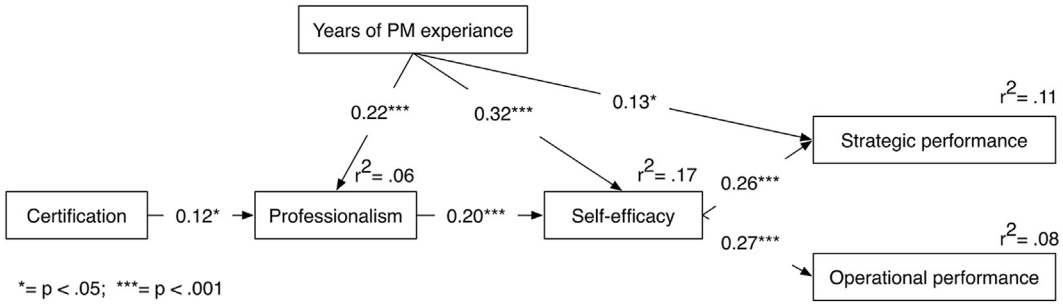

Fig. 1. Results of structural equation modeling.

The level of performance, either operational or strategic, is not related to having certification. For further investigation, we recoded certification in two other ways: (1) no certification, having one certification and having two or more certifications and (2) no certification, having entry-level certification and having advanced certification. The results of running these two new models after recoding the certification variables do not show any significant direct path between certification and operational/strategic performance. Therefore, H1 is not supported. Similarly, the level of professionalism is not associated with performance level, and H3 is not supported.

The relationship between having certification and professionalism is significant and positive. Certified managers demonstrate higher levels of professionalism (p = .03). Therefore, H2 is supported.

As Table 4 shows, the direct effect of certification on operational performance (p = .22) and strategic performance (p = .54) is not significant, and neither is there an indirect effect through self-efficacy (p = .29 and p = .18). Therefore, H4 is not supported.

The direct effect between levels of professionalism and operational performance (p = .49) and strategic performance (p = .99) is not significant, but the indirect effect through self-efficacy (professionalism→PM self-efficacy→performance) is significant for both operational performance (p = .002) and strategic performance (p = .003). Therefore, H5 is supported and PMself-efficacy mediated the relationship between professionalism and performance.

5. Discussion

Certification alone does not directly predict performance in project management outcomes for either operational or strategic performance measures. This finding supports similar findings in PM or other professions (Catanio et al., 2013; Walsh, 2001). Experts claim that certification should not be the only factor for taking career-related decisions such as a promotion or determining the level of salary (Paxton, 2012; Lester et al., 2011). Similarly, Thomas and Mengel (2008) professed that improved project management performance requires capabilities beyond knowledge-based certification. Simulating real-life settings in training, through the use of case studies and shared experiences that occur during the certification process, could provide valuable learning opportunities to execute the techniques and further develop project management skills and self-efficacy (Carbone and Gholston, 2004). This result indicates that screening based on certification alone is not the most accurate way of screening in the best project managers. This initial finding is not good news for professional associations and other proponents of certification in project management or other fields.

Although certification does not show a strong short-term direct effect on performance, by providing its complementary elements such as professional attitude and networking and its long-term effect such as higher levels of self-efficacy, certification certainly can be a smart move in the career of a project manager and can be useful for the whole occupation ofproject management. Connecting the project manager to peers and the professional community, imposing specific occupational values, spreading accepted codes of conduct and creating a space for discussion and circulating professional ideas, are all mechanisms through which the certification process may assist the project manager to develop professional attitudes and skills. Furthermore, voluntary certification impacts more than just the individual obtaining certification. There are consequences for the entire occupation such as enhancing the prestige of the given occupation through improvement of public image (Scott, 2016).

The most significant indicator of project performance in our study is project management self-efficacy beliefs – as would be predicted by Self-efficacy theory (Bandura, 1977, 1982) and empirical results in management research over the last several decades. Here we have the opportunity to compare the correlation between PMSelf-efficacy and project performance with similar relationships found in other contexts. In their meta-analysis, Stajkovic and Luthans (1998) reported a significant average correlation of 0.32 between self-efficacy and working performance. In a more recent meta-analysis, Judge and Bono (2001) reported this correlation at 0.23 on average. Further, research suggests that the correlation between self-efficacy and performance for a highly complex task and field measurement, like the context of our study, may decrease to 0.20 (Stajkovic and Luthans, 1998). Given this and the conclusions of the meta-analyses, it appears that the correlation between PMself-efficacy and strategic and operational project performance (0.27 and 0.29) is in congruence with previous findings.

Evidence that self-efficacy is a good indicator of both strategic and operational performance is good news for those who are hiring project managers. Our results suggest that testing applicants on a PMSelf-efficacy measure would be the

best indicator of an individual's ability to manage projects – better than both professionalism and certification. However, this leaves the question of the value of certification and professionalism only incompletely answered. If we stopped here, we might conclude that these two concepts are irrelevant for hiring for project managers, or even career development in project management and that all that matters is the individual's level of project management self-efficacy. Since testing for this directly is possible in an interview or hiring process, what need is there of any evaluation of professionalism and certification? The only hope for proponents of certification and professionalism lies in our final two hypotheses, where we tested the impact of certification and professionalism on self-efficacy.

Certification exhibited a relationship to self-efficacy in our tests with only a significance of $p = .08$. Professionalism, however, significantly influences self-efficacy and certification is significantly associated with professionalism. It appears that certification is a good signal of professionalism, which in turn is an indicator of project management self-efficacy, which is our best measure of project manager performance. This three-part relationship may seem to be a relatively circuitous route from certification to performance, as in fact, it is. However, the ease of checking a resume for certification rather than having to individually test for professionalism or self- efficacy may make certification the most cost-effective proxy for screening large numbers of candidates. Used in conjunction with interview processes or questions that are designed to get at the candidate's level of professionalism and self-efficacy, certification can play a role in improving the hiring of qualified and capable project managers. Certification's role in signally is especially important for younger professionals as, when we excluded the years of experience, the effect size of certification on both professionalism and self-efficacy tends to be larger.

Years of experience shows a stronger relationship with professionalism ($\beta = 0.22$) than having a certification ($\beta = 0.12$). Similarly, it shows a stronger relationship with self-efficacy ($\beta = 0.32$) than professionalism ($\beta = 0.20$). This verifies the notion that mastery experience is the primary source of self-efficacy. Interestingly, years of experience is positively related to strategic performance and not related to operational performance. From this observation, one may infer that processes and tools for operational management of a project can be learned quickly but, a higher level of strategic performance needs more cognitive ability and insight, developed over time, and needs higher-level positions which usually would be reached later during one's career progress. Project complexity and project size (measured by the amount of the budget) were not related to any of the model variables.

6. Conclusions

Voluntary certification is a well-established and growing phenomenon across occupations. While certification has clear relevance to the project management profession, it has so far received very little research attention. Much of the published research on certification looks at the value and process of voluntary certification to the profession rather than the impact certification has on performance. Our study is a validation that it is the combination of certification(s), experience and professionalism that influence self-efficacy and performance. This study addresses the practical interest of recruiters, head-hunters, human resource practitioners in project-oriented organizations and project managers in certification as a means to take faster, more objective, and informed decisions about which candidate to hire, thus increasing the efficiency and effectiveness of activities related to pre-screening and selection of candidates. This is particularly important in project-oriented companies where the performance of project managers are vital for organizational success (Keegan et al., 2012). Certification is a popular way for project managers, and members of other similar occupations, to signal their proficiency in the practice of their occupation and for hiring managers to filter job applications.

While our research does not provide unequivocal empirical evidence of a direct relationship between certification and project management performance, it does enrich our understanding of precisely what certification does signal. Where certification is taken as a predictor of an increase in both professionalism and self- efficacy beliefs and evaluated in conjunction with years of PM experience and training, it can certainly provide a signal to organizations of the knowledge level of candidates and thus is a useful first selection criterion. Our research suggests that adopting measures of professionalism and project management self-efficacy would be excellent additions to the hiring processes, especially for project managers expected to manage highly complex projects. For human resource professionals/hiring manager and organizations, in the absence of other measures available to winnow down large numbers of applicants, certification may prove a reasonable criterion for this activity when combined with years of PM experience and level of PM training. However, in a smaller group of candidates, or in the second step in a large-scale hiring process, questions exploring professionalism and self-efficacy more directly are better indicators of project management competence than certification.

For the project management practitioner, since certification is likely to continue to be an essential initial screening tool for project management positions, it remains valuable in increasing their success in the market. This result is not necessarily because obtaining it directly indicates PM proficiency, but mainly because the process of obtaining it, joining a professional association, and increasing PM knowledge are all likely to increase self-confidence and professionalism, both of which will likely increase the level of performance. Recognizing that certification is a signaling effort (like advertising commitment to the occupation), rather than a statement about proficiency, encourages practitioners to develop an ongoing professional development program starting with certification and continuing to increase other professional attitudes and attributes.

Several important and interesting questions are raised but not answered in this study. The sample in this study is highly educated, comprised of 376 (87%) participants with a Bachelor or Master degree, and, except for only 10 participants, the rest of the sample had at least a technical or college degree. Future research should study the combined effect of formal PM

education and certification on project performance. In addition, fully 60% of this sample (272 participants) report only one certification. Why is this? Why stop at one, if certifications are important? For future data collection, it would be interesting to ask the participants did they find the information included in successive certifications repetitive, for example?

Finally, this study must be interpreted in light of three potential limitations. First, some may question the use of self-reported measures of performance since such measures are susceptible to social desirability bias and the potential for upward response bias. Although we recognize this potential limitation, we believe that it has had limited impact on this study because there was no real gain associated with misrepresenting performance data in this anonymous survey. However, while we would typically expect that participants with the lowest performance would have the most to gain by misrepresenting their scores (Kuncel et al., 2005), exploration of performance indicators showed that 27% of our respondents had self-reported a very low performance (with the level of goal attainment <40%) in at least one of six indicators of performance. This self-reported poor goal attainment suggests that self-reported measures represent realistic performance. Second, some may question the generalizability of the findings beyond project managers who belong to a professional association. However, our findings are reflective of research in other occupations, like human resource management and IT professionals. Also, there doesn't seem to be any difference in our data between PM certifications from different certification bodies. These two findings suggest that our results are likely generalizable to a great many of the occupations currently seeking professional status by pursuing the certification strategy. Finally, and perhaps more substantively, we only had 85 non-certified respondents. This relatively small number of uncertified project managers compared to the number of respondents may have limited our ability to conduct the types of analysis necessary. Luckily for us, this number of uncertified participants was enough to generate statistically significant results that allow us to provide preliminary insights into the differences between certified and uncertified respondents. Future research should attempt to capture the opinions of more non-certified project managers.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Abutabenjeh, S., 2015. The Value of Procurement Certification. Old Dominion University, Virginia, United States (Unpublished doctoral dissertation).

Aguinis, H., Lengnick-Hall, M.L., 2012. Assessing the value of human resource certification: a call for evidence-based human resource management. Hum. Resour. Manag. Rev. 22 (4), 281–284.

Ahlemann, F., El Arbi, F., Kaiser, M.G., Heck, A., 2013. A process framework for theoretically grounded prescriptive research in the project management field. Int. J. Proj. Manag. 31 (1), 43–56.

Albert, K., 2017. The certification earnings premium: an examination of youngworkers. Soc. Sci. Res. 63, 138–149. https://doi.org/10.1016/j.ssresearch.2016.09.022.

Anteby, M., Chan, C.K., Dibenigno, J., 2016. Three Lenses on Occupations and Professions in Organizations: Becoming, doing, and Relating. Acad. Manag. Ann. 10 (1), 183–244. https://doi.org/10.1080/19416520.2016.1120962.

Babu, A.J.G., Suresh, N., 1996. Project management with time, cost, and quality considerations. Eur. J. Oper. Res. 88 (2), 320–327.

Bandura, A., 1977. Self-efficacy: toward a unifying theory of behavioral change. Psychol. Rev. 84 (2), 191. https://doi.org/10.1037/0033-295X.84.2.191.

Bandura, A., 1982. Self-efficacy mechanism in human agency. Am. Psychol. 37 (2), 122–147.

Bandura, A., 1986. The explanatory and predictive scope of self-efficacy theory. J. Soc. Clin. Psychol. 4 (3), 359–373. https://doi.org/10.1521/jscp.1986.4.3.359.

Bandura, A., 1997. Self-Efficacy: The Exercise of Control. W. H Freeman and Company, New York, NY.

Bandura, A., 2012. On the functional properties of perceived self-efficacy revisited. J. Manag. 38 (1), 9–44. https://doi.org/10.1177/0149206311410606.

Bartlett, K.R., 2012. A theoretical review of the signaling role of certifications in career and technical education. Proceedings of annual conference of the Association for Career and Technical Education Research, Atlanta, GA.

Baruch, Y., 2004. Managing Careers: Theory and Practice. Pearson Education.

Blomquist, T., Söderholm, A., 2002. How project management got carried away. In: Sahlin-Andersson, K., Söderholm, A. (Eds.), Beyond Project Management: New Perspectives on the Temporary-Permanent Dilemma. Liber, Malmö, pp. 25–38.

Blomquist, T., Farashah, A.D., Thomas, J., 2016. Project management self-efficacy as a predictor of project performance: Constructing and validating a domain-specific scale. Int. J. Proj. Manag. 34 (8), 1417–1432.

Blomquist, T., Farashah, A.D., Thomas, J., 2018. Feeling good, being good and looking good: Motivations for, and benefits from, project management certification. Int. J. Proj. Manag. 36 (3), 498–511. https://doi.org/10.1016/j.ijproman.2017.11.006.

Bollen, K.A., 1990. Outlier screening and a distribution-free test for vanishing tetrads. Sociol. Methods Res. 19 (1), 80–92.

Boltz, M., Capezuti, E., Wagner, L., Rosenberg, M.C., Secic, M., 2013. Patient safety in medical-surgical units: can nurse certification make a difference? Medsurg Nurs. 22 (1), 26–32.

Bourne, L., 2008. Advancing theory and practice for successful implementation of stakeholder management in organisations. Int. J. Manag. Proj. Bus. 1 (4), 587–601. https://doi.org/10.1108/17538370810906273.

Bredillet, C., Tywoniak, S., Dwivedula, R., 2015. What is a good project manager? An Aristotelian perspective. Int. J. Proj. Manag. 33 (2), 254–266. https://doi.org/10.1016/j.ijproman.2014.04.001.

Cagielski, C.G., 2003. The value of certification: an empirical assessment of the perceptions of end-users of local area networks. Inf. Syst. J. 13 (1), 97–108. https://doi.org/10.1046/j.1365-2575.2003.00140.x.

Cagielski, C.G., 2004. Who values technology certification? Commun. ACM 47 (10), 103–105. https://doi.org/10.1145/1022594.1022627.

Carbone, T.A., Gholston, S., 2004. Project manager skill development: a survey of programs and practitioners. Eng. Manag. J. 16 (3), 10–16. https://doi.org/10.1080/10429247.2004.11415252.

Catanio, J.T., Armstrong, G., Tucker, J., 2013. The effects of project management certification on the triple constraint. International Journal of Information Technology Project Management 4 (4), 93–111. https://doi.org/10.4018/ijitpm.2013100106.

Chen, Y.S., Chang, B.G., Lee, C.C., 2008. The association between continuing professional education and the financial performance of public accounting firms. Int. J. Hum. Resour. Manag. 19 (9), 1720–1737. https://doi.org/10.1080/09585190802295363.

Cicmil, S., Williams, T., Thomas, J., Hodgson, D., 2006. Rethinking project management: Researching the actuality of projects. Int. J. Proj. Manag. 24 (8), 675–686. https://doi.org/10.1016/j.ijproman.2006.08.006.

Cohen, D.J., 2012. Identifying the value of HR certification: Clarification and more complex models required. Hum. Resour. Manag. Rev. 22 (4), 258–265. https://doi.org/10.1016/j.hrmr.2012.06.013.

Crawford, L., G, P.W., Thomas, J.L., Sheppard, M., 2006. Practitioner development: from trained technicians to reflective practitioners. Int. J. Proj. Manag. 24 (8), 722–733. https://doi.org/10.1016/j.ijproman.2006.09.010.

Dinger, M., Thatcher, J.B., Treadway, D., Stepina, L., Breland, J., 2015. Does professionalism matter in the IT workforce? An empirical examination of IT professionals. J. Assoc. Inf. Syst. 16 (4), 281–313.

Duffy, R.D., Sedlacek, W.E., 2007. The work values of first-year college students: exploring group differences. Career Dev. Q. 55 (4), 359–364. https://doi.org/10.1002/j.2161-0045.2007.tb00090.x.

Gardiner, P.D., Stewart, K., 2000. Revisiting the golden triangle of cost, time and quality: the role of NPV in project control, success and failure. Int. J. Proj. Manag. 18 (4), 251–256.

Gosling, S.D., Vazire, S., Srivastava, S., John, O.P., 2004. Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. Am. Psychol. 59 (2), 93–104. https://doi.org/10.1037/0003-066X.59.2.93.

Gudergan, S.P., Ringle, C.M., Wende, S., Will, A., 2008. Confirmatory tetrad analysis in PLS path modeling. J. Bus. Res. 61 (12), 1238–1249.

Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M., 2016. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Second Edition. Sage Publications, Thousand Oaks, California.

Hall, R.H., 1967. Some organizational considerations in the professional-organizational relationship. Administrative Science Quarterly 12 (3), 461–478.

Hall, R.H., 1968. Professionalization and Bureaucratization. Am. Sociol. Rev. 33 (1), 92–104.

Hanlon, G., 1998. Professionalism as Enterprise: Service Class Politics and the Redefinition of Professionalism. Sociology 32 (1), 43–63. https://doi.org/10.1177/0038038598032001004.

Hansen, K., 2006. Certifiably empowering: Hot fields in which certification may boost your career. Quintessential Careers Retrieved from. http://quintcareers.com/certification/career_certifications.html.

Henseler, J., Dijkstra, T.K., Sarstedt, M., Ringle, C.M., Diamantopoulos, A., Straub, D.W., Ketchen, D.J., Hair, J.F., Tomas, G., Hult, M., Calantone, R.J., 2014. Common beliefs and reality about PLS comments on Rönkkö and Evermann (2013). Organ. Res. Methods 17 (2), 182–209.

Hodgson, D.E., Paton, S., 2016. Understanding the professional project manager: Cosmopolitans, locals and identity work. Int. J. Proj. Manag. 34 (2), 352–364. https://doi.org/10.1016/j.ijproman.2015.03.003.

Hodgson, D., Paton, S., Muzio, D., 2015. Something old, something new? Competing logics and the hybrid nature of new corporate professions. Br. J. Manag. 26 (4), 745–759.

Hopp, C., Minten, A., Toporova, N., 2016. Signaling, selection and transition: empirical evidence on stepping-stones and vicious cycles in temporary agency work. Int. J. Hum. Resour. Manag. 27 (5), 527–547. https://doi.org/10.1080/09585192.2015.1020444.

Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct. Equ. Model. Multidiscip. J. 6 (1), 1–55.

Hughes, T.P., 1998. Rescuing prometheus: four monumental projects that changed the modern world. Pantheon, New York.

Judge, T.A., Bono, J.E., 2001. Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: a meta-analysis. J. Appl. Psychol. 86 (1), 80–92. https://doi.org/10.1037/0021-9010.86.1.80.

Judgev, K., Müller, R., 2005. Success is a moving target: a retrospective look at project success and our evolving understanding of the concept. Proj. Manag. J. 36 (4), 19–31.

Kalbers, L.P., Fogarty, T.J., 1995. Professionalism and its consequences: a study of internal auditors. Auditing 14 (1), 64–86.

Keegan, A., Huemann, M., Turner, J.R., 2012. Beyond the line: Exploring the HRM responsibilities of line managers, project managers and the HRM department in four project-oriented companies in the Netherlands, Austria, the UK and the USA. Int. J. Hum. Resour. Manag. 23 (15), 3085–3104. https://doi.org/10.1080/09585192.2011.610937.

Kerzner, H., 2003. Strategic planning for a project office. Proj. Manag. J. 34 (2), 13–25.

Kessler, I., Heron, P., Dopson, S., 2015. Professionalization and expertise in care work: the hoarding and discarding of tasks in nursing. Hum. Resour. Manag. 54 (5), 737–752. https://doi.org/10.1002/hrm.21695.

Khang, D.B., Myint, Y.M., 1999. Time, cost and quality trade-off in project management: a case study. Int. J. Proj. Manag. 17 (4), 249–256.

Kleiner, M.M., Krueger, A.B., 2010. The prevalence and effects of occupational licensing. Br. J. Ind. Relat. 48 (4), 676–687. https://doi.org/10.1111/j.1467-8543.2010.00807.x.

Kuncel, N.R., Credé, M., Thomas, L.L., 2005. The validity of self-reported grade point averages, class ranks, and test scores: a meta-analysis and review of the literature. Rev. Educ. Res. 75 (1), 63–82. https://doi.org/10.3102/00346543075001063.

Latham, G., 2012. What we know and what we would like to know about human resource management certification. Hum. Resour. Manag. Rev. 22 (4), 269–270. https://doi.org/10.1016/j.hrmr.2012.06.012.

Lengnick-Hall, M.L., Aguinis, H., 2012. What is the value of human resource certification? Amulti-level framework for research. Hum. Resour. Manag. Rev. 22 (4), 246–257. https://doi.org/10.1016/j.hrmr.2011.03.001.

Lester, S.W., Dwyer, D.J., 2012. Motivations and benefits for attaining HR certifications. Career Dev. Int. 17 (7), 584–605. https://doi.org/10.1108/13620431211283760.

Lester, S.W., Fertig, J., Dwyer, D.J., 2011. Do business leaders value human resource certification? Journal of Leadership & Organizational Studies 18 (3), 408–414. https://doi.org/10.1177/1548051811404422.

Lyons, B.D., Mueller, L.M., Gruys, M.L., Meyers, A.J., 2012. A reexamination of the web-based job demand for PHR and SPHR certifications in the United States. Hum. Resour. Manag. 51 (5), 769–788. https://doi.org/10.1002/hrm.21496.

Maslow, A.H., 1943. A theory of human motivation. Psychol. Rev. 50 (4), 370–396.

Meredith, J.R., Mantel Jr., S.J., 2011. Project management: a managerial approach. John Wiley & Sons, Hoboken, N.J.

Mir, F.A., Pinnington, A.H., 2014. Exploring the value of project management: linking project management performance and project success. Int. J. Proj. Manag. 32 (2), 202–217. https://doi.org/10.1016/j.ijproman.2013.05.012.

Morris, P.W.G., 1997. The Management of Projects. Thomas Telford, London.

Morris, P.W.G., 2013. Reconstructing project management reprised: a knowledge perspective. Proj. Manag. J. 44 (5), 6–23. https://doi.org/10.1002/pmj.21369.

Morris, P.W.G., 2014. Project management: a profession with a hole in its head or, why a change in the culture of academic support is needed for the profession. Engineering Project Organization Journal 4 (2–3), 147–151. https://doi.org/10.1080/21573727.2013.873717.

Morris, P.W.G., Crawford, L., Hodgson, D., Shepherd, M.M., Thomas, J., 2006. Exploring the role of formal bodies of knowledge in defining a profession–the case of project management. Int. J. Proj. Manag. 24 (8), 710–721. https://doi.org/10.1016/j.ijproman.2006.09.012.

Muretta Jr., R.J., 2005. Exploring the four sources of self-efficacy (Doctoral dissertation, ProQuest Information & Learning).

Paxton, R.A., 2012. A practitioner's perspective on the value of PHR and SPHR certification. Hum. Resour. Manag. Rev. 22 (4), 279–280. https://doi.org/10.1016/j.hrmr.2012.03.002.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J. Appl. Psychol. 88 (5), 879–903.

Pohler, D., Willness, C., 2014. Balancing interests in the search for occupational legitimacy: the HR professionalization project in Canada. Hum. Resour. Manag. 53 (3), 467–488. https://doi.org/10.1002/hrm.21579.

Ringle, C.M., Wende, S., Becker, J.-M., 2015. *SmartPLS 3*. Bönningstedt: SmartPLS. Retrieved from. http://www.smartpls.com.

Schön, D.A., 1987. Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions. Jossey-Bass, San Francisco, CA.

Schwalbe, K., 2015. Information Technology Project Management. Cengage Learning.

Scott, C.J., 2016. Value of Accounting Paraprofessional Certification as a Hiring Signal. Doctoral dissertation. Capella University.

Sechrist, K.R., Valentine, W., Berlin, L.E., 2006. Perceived value of certification among certified, noncertified, and administrative perioperative nurses. J. Prof. Nurs. 22 (4), 242–247. https://doi.org/10.1016/j.profnurs.2005.11.001.

Serrador, P., Turner, R., 2015. The relationship between project success and project efficiency. Proj. Manag. J. 46 (1), 30–39.

Sitzmann, T., Yeo, G., 2013. A Meta-Analytic Investigation of the Within-PersonSelf-Efficacy Domain: is Self-Efficacy a product of Past Performance or a driver of Future Performance? Pers. Psychol. 66 (3), 531–568. https://doi.org/10.1111/peps.12035.

Snizek, W., 1972. Hall's professionalism scale: an empirical reassessment. Am. Sociol. Rev. 37 (1), 109–114.

Spence, M., 1973. Job Market Signaling. Q. J. Econ. 87 (3), 355–374.

Stajkovic, A.D., Luthans, F., 1998. Self-efficacy and work-related performance: a meta-analysis. Psychol. Bull. 124 (2), 240. https://doi.org/10.1037/0033-2909.124.2.240.

Suazo, M.M., Martínez, P.G., Sandoval, R., 2009. Creating psychological and legal contracts through human resource practices: a signaling theory perspective. Hum. Resour. Manag. Rev. 19 (2), 154–166. https://doi.org/10.1016/j.hrmr.2008.11.002.

Sullivan, S.E., Baruch, Y., 2009. Advances in career theory and research: a critical review and agenda for future exploration. J. Manag. 35 (6), 1542–1571. https://doi.org/10.1177/0149206309350082.

Terry, D.J., O'Leary, J.E., 1995. The theory of planned behaviour: the effects of perceived behavioural control and self efficacy. Br. J. Soc. Psychol. 34 (2), 199–220. https://doi.org/10.1111/j.2044-8309.1995.tb01058.x.

Thatcher, J.B., Dinger, M., George, J.F., 2012. Information technology worker recruitment: an empirical examination of entry-level it job seekers' labor market. Commun. Assoc. Inf. Syst. 31 (1), 1–24.

Thomas, J., Mengel, T., 2008. Preparing project managers to dealwithcomplexity–Advanced project management education. Int. J. Proj. Manag. 26 (3), 304–315. https://doi.org/10.1016/j.ijproman.2008.01.001.

Walker, R.H., Johnson, L.W., 2009. Signaling intrinsic service quality and value via accreditation and certification. Managing Service Quality: An International Journal 19 (1), 85–105.

Walsh, K., 2001. Teacher Certification Reconsidered: Stumbling for Quality. The Abell Foundation, Baltimore, Maryland Retrieved from. http://files.eric.ed.gov/fulltext/ED460100.pdf.

Walton, E.J., Dawson, S., 2001. Managers' perceptions of criteria of organizational effectiveness. J. Manag. Stud. 38 (2), 173–200. https://doi.org/10.1111/1467-6486.00233.

Weaver, S.C., Whitney, D., 2015. The global growth of the CMA: IMA's highly respected certification is becoming more in demand by professionals around the world. Strategic Finance 96 (11), 26–29.

Wiley, C., 1999. A comparative analysis of certification in human resource management. Int. J. Hum. Resour. Manag. 10 (4), 737–762. https://doi.org/10.1080/095851999340378.

Wireschen, D., Zhang, G., 2010. Information technology certification value: an initial response from employers. Journal of International Technology and Information Management 19 (4), 89–109.

Wood, R., Bandura, A., 1989. Social cognitive theory of organizational management. Acad. Manag. Rev. 14 (3), 361–384.

Zwerman, B.L., Thomas, J.L., Haydt, S., Williams, T., 2006. Professionalization of Project Management. PMI Publishing, Newtown Square Philadelphia.