Retaining project management competence — Antecedents and consequences

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Abstract

Using a sample of 177 firms with matched dyads of middle managers and senior managers, we developed a model on the antecedents and consequences of project management competence retention (PMCR). Our results reveal that providing project managers formal developmental perspectives in project management, such as a career path or qualification opportunities, as well as establishing a formal lesson learned system both positively relate to PMCR. Moreover, our results show that PMCR is positively associated with average project success of the organization. Finally, our results confirm the substantial importance of average project success for overall business success in project-oriented organizations.

Keywords: Project management competence retention; Project success; Career path; Lessons learned; Structural equation modeling

1. Introduction

Recently, Smith et al. (2011) introduced a measure for the retention of human competences and defined it as the “extent to which an organisation has continuous access to the employee skills it believes it requires to achieve its long-term goals” (Smith et al., 2011, p. 412). Despite strong similarities, competence retention differs in two important ways from the extensively researched constructs of employee retention and employee turnover. First, it explicitly refers to a firm’s long-term strategic perspective (Smith et al., 2011). Second, it measures the retention and availability of important competences and therefore refers to the inherent value of human assets, not the mere amount of employees. However, until today, empirical research on competence retention is scarce.

Contrary, employee turnover and its antecedents has been widely researched and recognized as harmful for organizational success in multiple studies and the importance of retaining key employees for long-term competitiveness has been extensively stressed (e.g., Chang et al., 2013; Hausknecht et al., 2009; Holtom et al., 2008; Huselid, 1995). However, even the numerous studies on employee turnover or retention have very rarely been applied to the specific context of projects and project-oriented companies, although the increased application of project-based structures is claimed to be strongly affecting human resource management (HRM) in organizations (Söderlund and Bredin, 2006).

In the present study, our focus lies on project management competence retention (PMCR) and its importance for project-oriented companies. For over 20 years, researchers and practitioners have been witnessing an increasing prevalence of projects as the main structure to organize business activities of firms with the aim to efficiently cope with the growing need for flexibility in dynamic environments (Midler, 1995; Söderlund, 2005). In such an increasingly project-oriented business, project management competence is claimed to be of utmost importance for business success and to be the core competence to achieve competitive
advantages (Hölzle, 2010; Söderlund, 2005). In general, it is well agreed that human resources play an important part in creating firm-specific long-term competitive advantages (Huselid, 1995). Key employees embody important competences and in the last three decades, researchers from strategic management and organizational theory stressed and analyzed the importance of human competencies and organizational capabilities to explain long-term business success (Chandler, 1992; Prahalad and Hamel, 1990; Teece and Pisano, 1994; Zollo and Winter, 2002). Besides analyzing the relationship with success, a main goal of this research stream is to generate a better understanding for the origin of competences (Zollo and Winter, 2002).

Accordingly, project managers have been recognized as key personnel in project management and their competences are found to be essential to project success (e.g., Brown and Eisenhardt, 1995; Crawford, 2005; Geoghegan and Dulewicz, 2008; Katz and Allen, 1985). In this paper, we argue that PMCR is positively related to average project success, which in turn predicts overall business success of project-oriented companies (Crawford, 2005). So far, to the best of our knowledge, no empirical study has investigated antecedents or consequences of PMCR, even though it appears to be a central mechanism in explaining project and overall business success of organizations which strongly rely on projects as the main organizational form. Additionally, studies that provide quantitative empirical evidence for the business relevance of project management (i.e., studies that investigate the relationship between project success and business success) are surprisingly rare (Pollack and Adler, 2014). Contrary, research on how to measure project success is extensive, and recently, researchers call for a more holistic approach (Serrador and Turner, 2015). Accordingly, we include customer satisfaction in addition to the triple constraint (budget, time, and scope) and define average project success as the extent to which all projects of the organization on average meet project goals along the four dimensions budget, time, scope, and customer satisfaction (Teller et al., 2012). We assume that this wider measure of project success is more strongly impacting on organizational success measures.

Using a sample of 177 firms with 354 informants, the present study (1) aims to confirm the positive relationship between average project success and overall business success of project-oriented companies, (2) investigates the influence of PMCR on average project success and on overall business success of project-oriented companies, and (3) analyzes the relationship between PMCR and two specific antecedents from the realm of project management. With the suggested managerial influential factors in our model, we try to address both facets of PMCR: (1) the retention of key personnel in project management, namely project managers, and (2) the continuous development of project management competence through systematic learning mechanisms. Therefore, we selected developmental perspectives for project managers and the establishment of a formal lessons learned system as antecedents of PMCR due to the following reasons.

Seminal studies of Arthur (1994) and Huselid (1995) stressed the impact of HRM systems or the so called high-performance (or high-involvement) work systems on employee turnover and firm performance. Among various practices, such work systems include promotion systems, formal training opportunities, and information sharing (Guthrie, 2001; Huselid, 1995). Developmental opportunities, such as promotion systems and formal training, are important to provide employees long-term perspectives and appear to yield positive associations with employee retention (Hausknecht et al., 2009). Hence, developmental perspectives may reduce turnover and therefore lead to the accumulation of experiences, a central learning mechanism which leads to the development of organizational competences (Zollo and Winter, 2002). However, project managers often lack such career and developmental perspectives, partly due to the inherent short-term orientation of project work. The project management profession is neither a well-described job nor a well-defined career path in most organizations (Hölzle, 2010; Pinto and Kharbanda, 1995). We suggest that providing project managers such long-term developmental perspectives may influence their turnover intentions such that they may be more willing to stay in project management positions and by that increase PMCR.

Referring to our second influential factor, the results of Smith et al.’s (2011) study suggest that an organization’s learning orientation along with the establishment of a learning culture is an important factor in enabling long-term competence retention. Elements of such a learning culture, such as information sharing, appear to be positively related to employee retention (Guthrie, 2001; Huselid, 1995). Employees may be more likely to stay in organizational settings, in which they perceive an opportunity to constantly learn and develop (Smith et al., 2011). More importantly, projects are recognized as important sources of learning and the creation of new knowledge (Bartsch et al., 2013; Söderlund and Bredin, 2006). Learning in and between projects, enabled through well-established lessons learned systems, may be positively associated with a continuous development of project management competences, and is required for enduring organizational success of project-oriented organizations (Bartsch et al., 2013; Müller, 2015; Prencipe and Tell, 2001). To substantiate our predictions on the relationship between a formal lessons learned system and the development of project management competence, we refer to knowledge creation (Nonaka, 1994) and competence development (learning) theories (Zollo and Winter, 2002).

To summarize, the two independent variables in our model, developmental perspectives and lessons learned system, may positively influence the retention of project managers in their positions and the continuous development of project management competences. With the present study, we aim to provide practitioners with insights into potential management practices related to the specific context of project management, which may yield positive impacts on PMCR. Therefore, we apply a model in which different HRM practices aimed to retain project managers as well as knowledge management practices aimed to enable learning in project environments are related to PMCR and how this is associated with project and overall business success of project-oriented companies.

Furthermore, we aim to advance research on competence retention and apply this new construct in a specific context. The measure of competence retention may have diverse advantages compared to the extensively analyzed construct of employee turnover, since it directly refers to the strategic value of the retained
employees for the organization. Therefore, it may yield more strongly and unique associations with organizational performance and success. Our purpose is to show that this focus on the retention of project management competences is positively influenced by specific factors from the organizational level and in turn predicts project and overall business success in modern project-oriented companies.

2. Framework and hypotheses

Fig. 1 depicts the proposed model of the present study. PMCR is predicted to be influenced by two different aspects. On the one hand PMCR may be enabled through retaining key personnel, i.e., employees who embody important project management competences. This employee retention may be realized through formal developmental perspectives, captured through the provision of long-term career perspectives. On the other hand, PMCR comprises a learning aspect, since learning enables companies to continuously develop new competences. This notion is captured through the establishment of a formal lessons learned system. Hence, in order to substantiate the predictions of our framework, we refer to turnover theories as well as research on organizational learning and competence development.

We furthermore argue that with increasing PMCR, project success in terms of fulfilling schedule, budget, and quality objectives as well as customer satisfaction will be more likely. Finally, we propose that average project success will be positively connected to business success for project-oriented companies. Overall, the model implicitly assumes two mediation effects. PMCR mediates the effects of developmental perspectives and lessons learned system on average project success, and average project success mediates the effect of PMCR on business success. In the following, we argue in detail for the proposed hypotheses.

2.1. Antecedents of project management competence retention

Around the millennium, researchers identified the existence of a research gap in turnover research. Most literature on employee turnover focused on the individual level, and research on determinants of turnover at the organizational level was scarce (Guthrie, 2001; Shaw et al., 1998). Recent literature on employee turnover more strongly adopts an organizational perspective rather than individual perspective in order to explain employee turnover by analyzing the interface between employees and the organizational environment (Chang et al., 2013; Holtom et al., 2008; Smith et al., 2011). The more recent analysis of organizational level factors such as perceived organizational support (Allen et al., 2003) strongly indicates that organizational practices directly influence employee turnover (Smith et al., 2011). However, the quantitative analysis of concrete organizational practices and their impact on employee retention is surprisingly scarce, even more in the specific context of project-oriented companies.

Seminal studies of Arthur (1994) and Huselid (1995) stressed the impact of HRM systems on employee turnover and firm performance. Such high-performance work systems constitute a combination of various HRM practices, e.g., promotion systems, pay systems, employee participatory programs, information sharing, training, coaching, mentoring, attitude surveys, formal dispute resolution, team work, job rotation, and performance appraisal (Guthrie, 2001; Huselid, 1995). They are aimed to enhance employee skill levels, motivation, knowledge, and empowerment (Guthrie, 2001; Huselid, 1995). Guthrie (2001) found that such HRM practices are positively related to employee retention. Further studies on the organizational impact of high-performance work systems found results supporting such notions (e.g., Macky and Boxall, 2007). In their meta-analysis, Griffeth et al. (2000) demonstrated a small to moderate relationship between more distal predictors of the work environment for turnover, including promotional chances.

However, Smith et al. (2011) found strong inconsistencies in the associations of diverse HRM practices with turnover. The results appear to be strongly dependent on the specific employee and skill group. Accordingly, the present study particularly focuses on project managers and applies two important aspects of project management research in order to predict PMCR: providing developmental perspectives, captured through the existence of a high-quality career path and qualification opportunities, as well as supporting learning in and between projects, captured through the existence of a lessons learned system, which enables employees to capture and share knowledge in and between projects.

Fig. 1. Conceptual framework.
2.1.1. Developmental perspectives and PMCR

Projects are temporary organizations and project managers may suffer from not having long-term perspectives over and above the duration of the current project. This may give reason to the observation that project managers generally tend to remain shorter in certain positions or firms compared to functional line managers (El-Sabaa, 2001). This makes it even more important to provide project managers with clearly defined career paths which are comparable to those of other management career paths and are aligned with qualification programs in order to retain project managers in their positions. Hence, developmental perspectives is conceptualized as a second-order construct comprising (1) the existence of a formal career path for project managers, (2) a career path of equal value to other management career paths, and (3) formal qualification opportunities. However, as mentioned, such structures are often not existent in modern organizations.

Yet, numerous studies supported the notion that such developmental opportunities positively influence the retention of employees. Guthrie (2001) integrated internal promotions as mental opportunities positively influence the retention of employees. However, as mentioned, such structures are often not existent in modern organizations. Hence, developmental perspectives is conceptualized as a second-order construct comprising (1) the existence of a formal career path for project managers, (2) a career path of equal value to other management career paths, and (3) formal qualification opportunities. However, as mentioned, such structures are often not existent in modern organizations.

2.1.2. Lessons learned systems and PMCR

The results of Smith et al.’s (2011) study suggest that a strong learning orientation along with the establishment of a learning culture in organizations is an essential factor in enabling long-term competence retention. Earlier studies showed that information sharing as a specific feature in learning systems and as part of high-performance work practices reduces turnover (Guthrie, 2001; Huselid, 1995). Organizations, which foster such a learning culture, may be more successful in retaining employees (Smith et al., 2011).

However, learning or practices aimed to enable continuous learning per se are not commonly analyzed antecedents of employee turnover (Griffeth et al., 2000; Holtom et al., 2008). Yet, learning may yield additional positive associations with competence retention through its impact on competence or capability development. According to the knowledge-based theory of organizational capability, the integration of new knowledge (i.e., learning) is the central mechanism to create capabilities and determines the firm’s potential to generate long-term competitive advantages, especially in dynamic environments (Grant, 1996).

Learning in and between projects has been extensively analyzed because projects, characterized by temporary, non-routine activities, multidisciplinarity, and dynamics, are recognized as important sources of new knowledge (Arthur et al., 2001; Ayas, 1996; Bartsch et al., 2013; Müller, 2015). However, after project completion, project team members are regularly reallocated to different units of the companies without retaining the essential lessons learned for future projects. But the competences developed during project execution should remain in the company to yield positive effects for future project endeavors (Disterer, 2002).

Capturing and sharing lessons learned from projects has been discussed as appropriate practice to enable the continuous creation of organizational capabilities (Davies and Brady, 2000; von Zedtwitz, 2002; Zollo and Winter, 2002) and to realize increased average project performance in future (Newell and Edelman, 2008). Based on two case studies, Davies and Brady (2000) proposed an organizational learning cycle, which models the building of organizational capabilities based on lessons learned from initial projects and which leads to improved project management procedures and higher project performance of similar follow-up projects.

Addressing the dynamic theory of knowledge creation of Nonaka (1994), the construct lessons learned systems refers to main aspects of the proposed knowledge creation processes. Capturing lessons learned is a precondition to the process of “combination” (i.e., the creation of new explicit knowledge based on informal and formal learning processes).
on existing explicit knowledge), which may be realized through the access to existing information in storage systems and the reconfiguring of such information, which has been documented previously by other project teams (Nonaka, 1994). The sharing of lessons learned has associations with the processes of “externalization” (i.e., the conversion of tacit knowledge into explicit knowledge) and “internalization” (i.e., the conversion of explicit knowledge into tacit knowledge) (Nonaka, 1994). Externalization may be realized by social interaction and the individual description of lessons learned and the storage of such information in databases or documents. Internalization, which is more similar to the traditional notion of learning, may be realized by the provision of information from previous projects at project start which is then applied in new contexts and leads to a process of learning by doing (Nonaka, 1994). According to Nonaka (1994), such processes lead to the continuous transformation of individual-level knowledge to organizational-level knowledge.

Zollo and Winter (2002) describe the deliberate processes of knowledge articulation and knowledge codification in order to explain the development of collective competence. Knowledge articulation refers to the sharing and discussion of individual experiences during e.g., project meetings or debriefing sessions by which “organization members can achieve an improved level of understanding of the causal mechanisms intervening between the actions required to execute a certain task and the performance outcomes produced” (Zollo and Winter, 2002, pp. 341–342). Knowledge codification refers to the documentation of important performance implications in written tools, databases, or project management software and facilitates the learning and clarifying processes for the individuals executing this exercise (Zollo and Winter, 2002). But more importantly, it “provides the opportunity for sharing the lessons across projects so that learning is institutionalized across the organization” (Newell and Edelman, 2008, p. 585; Zollo and Winter, 2002). The construct lessons learned system addresses the notion of both of these processes.

Hence, the establishment of a formal lessons learned system in a project environment may result in the constant development of organizational capabilities, such as advanced project management, and therefore supports the retention of a healthy level of important project management competences. In sum, lessons learned system is modeled as a second-order construct which comprises (1) the extent to which lessons learned are captured during project execution and (2) the extent to which lessons learned are shared between projects and other organizational units. Both aspects are linked together and are assumed to be the key for organizational learning and competence development. We propose:

**Hypothesis 2.** The establishment of a formal lessons learned system is positively related to project management competence retention.

### 2.2. Outcomes of project management competence retention

Since research on skill or competence retention is scarce, we substantiate our predictions regarding the consequences of this construct mainly by referring to empirical studies from turnover research. According to research on the impact of HRM systems on firm performance through decreased turnover (Holtem et al., 2008), we assume that HRM practices, tailored to the specific needs of project managers, will enable increased average project success and a sustainable competitive advantage for project-oriented companies, by creating and retaining a pool of project managers “whose contributions are valuable, unique, and difficult for competitors to imitate” (Guthrie, 2001, p. 182; Pfeffer, 2005). This notion addresses the resource-based view of the firm (Barney, 1991) and positions project managers and their competences as the central resource of project-oriented firms to sustain competitive advantages.

#### 2.2.1. PMCR and average project success

Traditional turnover theory suggests that employee turnover is detrimental to organizational performance and success. Numerous studies have discussed and shown the negative impact of high turnover rates on various forms of firm or unit performance, such as efficiency, productivity, sales volume, and profit (e.g., Dess and Shaw, 2001; Glibbeek and Bax, 2004; Kacmar et al., 2006; McElroy et al., 2001; Shaw et al., 2005). For example, Batt (2002) found that quit rates partially mediated the relationship between high-involvement human resource practices and sales growth in the service sector. However, the impact of turnover on firm performance is not purely negative. McElroy et al. (2001) argue for the differentiation of turnover into voluntary, involuntary, and reduction-in-force (through downsizing) turnover and hypothesized that involuntary and voluntary turnover are not necessarily negatively associated with unit performance. Turnover of low performing employees and the subsequent substitution with new and better performing employees with new ideas and knowledge may have positive effects on firm performance (Abelson and Baysinger, 1984). Therefore, the pure amount of employees who are leaving is not important, rather if the right people stay and the poor performers quit (Guthrie, 2001). McElroy et al.’s (2001) result support the general notion that turnover is negatively related to unit performance, however, turnover through downsizing is particularly more strongly negatively associated with unit performance than the other forms of turnover.

These notions and findings motivate us to apply PMCR, not employee retention, as the central mechanism predicting average project success in our model. PMCR refers to the inherent value of the retained human assets, i.e., their competences, which are necessary for long-term organizational success. The construct captures not only the notion if the right amount of certain employees are available, but if the right amount of employees with the necessary competences are available. We propose that the availability of the necessary project management competences is positively related to average project success. This notion is in accordance with numerous studies modeling project manager’s capabilities as a central predictor for project success (e.g., Geoghegan and Dulewicz, 2008; Turner and Müller, 2005).

We conclude:

**Hypothesis 3.** Project management competence retention is positively related to average project success.
2.2.2. Average project success and overall business success

Astonishingly, although project management research has been extensively analyzing influential factors on project success for numerous decades (e.g., Cooke-Davies, 2002; Pinto and Prescott, 1988), to the best of our knowledge, empirical results on for numerous decades (e.g., Cooke-Davies, 2002; Pinto and Prescott, 1988), to the best of our knowledge, empirical results on the relationship between project success and overall business success are very rare (Cooke-Davies, 2002; Pollack and Adler, 2014). However, a positive relationship appears to be reasonable and has been assumed in project management literature, at least for project-oriented organizations, in which projects cover a significant share of the overall business volume (Cooke-Davies, 2002; Pollack and Adler, 2014). Depending on some contingencies, such as the size of the project and the degree of innovativeness and technological uncertainty, projects are generally assumed to not solely yield profits, but to generate strategic organizational benefits such as to enable product diversification, to increase market shares, to build new technological competencies, or to establish new product lines or entire new markets (Shenhar et al., 2001). We assume that the overall success of an organization, which relies to a strong degree on projects to organize business activities, is strongly influenced by the success of each of its projects. Recently, Lappe and Spang (2014) found a positive relationship between investments in project management and organizational competitiveness and thereby supported the notion that project management yields positive organizational benefits. Serrador and Tumer (2015) found that project efficiency, measured by the triple constraint of time, budget, and scope, is significantly correlated with the wider success measures of stakeholder satisfaction and overall business success of the project. To conclude, we hypothesize:

**Hypothesis 4.** Average project success is positively related to overall business success of the organization.

3. Method

3.1. Sample and data

We test the framework of hypotheses on a sample of German firms. In each firm we addressed two informants from different management levels. A senior management informant had decision authority over the project landscape regarding initiation or termination of projects. These informants had titles such as CEO, CIO, and head of R&D. Another informant from middle management had a good overview of the project landscape and the project management methods used in the firm. They typically had titles such as department manager, portfolio management, or head of PMO (project management office). By addressing two informants in each firm, we obtained different hierarchical perspectives on project management practices, competences, and consequences. Furthermore, this procedure reduced common method bias as the middle managers assessed all exogenous variables and the senior managers assessed the endogenous variables.

This study was part of a larger study on (multi-)project management practices and success factors. We contacted medium-sized and large German firms from different industries and explained the study and called for participation. After the mailing, we made follow-up phone calls. Registered informants received e-mail with a letter explaining the multi-informant design and the questionnaires with an introduction describing the terms and definitions. Again, follow-up phone calls ensured an increased response rate. We received 189 senior manager questionnaires and 195 middle manager questionnaires from 200 firms, resulting in 184 matched dyads with data from both types of informants. Some questionnaires had missing data, so the final sample consisted of 177 firms. Table 1 shows some characteristics of the sample firms and their project landscape. The firms come from diverse industries and show a reasonable spread according to size (employees and revenue). All firms are active in project management and engage in multiple projects in parallel, as this was a condition for sample inclusion. However, there is considerable variance in the number of parallel projects, the focus of projects, the percentage of employees actively involved in projects, and the length and magnitude of what middle managers constituted as a normal project. Overall, the sample covers a wide range of companies and projects.

3.2. Measurement

Constructs relied on existing scales taken from the literature when available or adapted from previous work. All scales were pretested with 12 representatives from academia and industry to assure face validity of constructs, improve item wording, and remove ambiguity. All measures used seven-point Likert scales (1 = “strongly disagree” to 7 “strongly agree”) unless stated otherwise. Appendix A shows the exact item wordings for each construct.

3.2.1. Exogenous variables

Our independent variables were both assessed by the middle manager and conceptualized as second-order constructs. Developmental perspectives are defined as the existence of long-term opportunities to ascend in the hierarchy and to further develop skills as a project manager and were conceptualized as a second-order construct along three dimensions: (1) career path assessed the existence of a project manager career path using four items, (2) career quality used three items to measure the comparability of the project manager career path to the regular line manager career and thus the attractiveness of the project manager career path, and (3) project manager qualification assessed whether the company systematically qualifies project managers in alignment to their career stage using three items. The items are based on prior conceptual and qualitative work of Bredin and Söderlund (2013), Crawford et al. (2013), and Hölzle (2010).

**Lessons learned system** is defined as the systematic practice of capturing and disseminating knowledge gained during projects. Consequently, we used two dimensions to measure this second-order construct. Lessons learned capturing used four items assessing whether project knowledge is systematically documented, processed, and reflected. Lessons learned sharing used three items to measure whether this knowledge is also systematically distributed and transferred to future projects or organizational routines. The scales have been developed based on prior works.
from research on knowledge management and learning in project environments (Keegan and Turner, 2001; Newell and Edelman, 2008; Prencipe and Tell, 2001; Zollo and Winter, 2002).

3.2.2. Endogenous variables

The senior managers assessed all mediating and dependent variables. Project management competence retention was measured with five items that assessed the extent to which the company had continuous access to the necessary project management skills. The items were taken from Smith et al. (2011) and were adapted to the project management context. Average project success measured the average adherence to time, budget, and quality as well as the customer satisfaction across all projects and was taken from Teller et al. (2012). Business success measured the overall economic market success of the firm or business unit in comparison with competitors using three items taken from Reinartz et al. (2004).

3.2.3. Control variables

We furthermore controlled for three variables that potentially affect the endogenous variables in our model. First, project-orientation used a single item to determine how many of the company’s employees are actively involved in projects (ranging from “1” = <25% to “4” = 75–100%). This variable is an indicator for the importance of projects and the “projectification” of the firm. Second, we controlled for the logarithm of the average number of projects conducted in the firm each year. Third, we controlled for firm size measured as the logarithm of revenues.

3.3. Measurement assessment

In order to verify reliability and validity of our measures, we first performed a principal components factor analysis (PCFA) of the items and calculated Cronbach’s alpha values. PCFA tests for unidimensionality of each scale by checking whether all items load onto a single factor. The results showed that all items loaded onto their respective factors and there were no cross-loadings higher than .3. Table 2 shows descriptive statistics and correlations of all variables used in the analysis. As can be seen, Cronbach’s alpha values for all variables were above .7.

We next performed a confirmatory factor analysis (CFA) with all latent variables. The average variance extracted (AVE) and composite reliability showed values above .5 and .7, respectively. Only average project success has an AVE of .46, which is below the cut-off. However, we decided to keep this well-established construct of the triple constraints plus customer satisfaction (Jonas et al., 2013; Teller et al., 2012). Overall, the measures showed an acceptable reliability and validity according to the standards of Bagozzi and Yi (1988).

We further tested for discriminant validity examining the square root of the average variance extracted for each construct. Table 2, please see the Appendix, shows that they are all greater than the respective correlations with other constructs, which gives confidence in sufficient discriminant validity (Fornell and Larcker, 1981). Table 2 also shows that the sub-dimensions of the independent variables are highly correlated, which justifies the modeling as second-order constructs. In the CFA the second-order factor loadings are all higher than .75. According to the criteria defined by Hu and Bentler (1998) the measurement model also achieved an overall good fit ($\chi^2[377] = 1783.1; CFI = .44; TLI = .40; RMSEA = .145; SRMR = .052$). These results show that the overall measurement model is satisfactory and that subsequent analysis with structural equation modeling is adequate.

Although we used two types of informants – senior and middle managers – to reduce common method variance, the associations between PMCR, average project success, and business success are still subject to common method bias because all constructs were assessed by the senior manager. We therefore conducted Harman’s single-factor test using a CFA with all items loading on a single factor. This model had an extremely poor fit ($\chi^2[349] = 492.1; CFI = .94; TLI = .93; RMSEA = .048; SRMR = .052$). These results show that the overall measurement model is satisfactory and that subsequent analysis with structural equation modeling is adequate.

Finally, PMCR and average project success were also assessed by the middle manager. Both constructs correlate highly with the corresponding ratings by the senior manager ($r = .59, p < .00$ and $r = .57, p < .00$, respectively), which gives further confidence in the validity of our measurement.

4. Results

We used structural equation modeling with STATA 13 to test the hypotheses with maximum likelihood estimation. The basic model including control variables had a good fit ($\chi^2[436] = 630.31; CFI = .93; TLI = .92; RMSEA = .050; SRMR = .060$). The results of the hypothesis tests are shown in Fig. 2.
Developmental perspectives were significantly and positively related to PMCR (.26, p < .01), which is in support of Hypothesis 1. Hypothesis 2 stated that the existence of a lessons learned system is positively related to PMCR. The results support this hypothesis because the relationship was positive and significant (.20, p < .05). PMCR was strongly and significantly related to average project success (.50, p < .01). The high coefficient may be affected by common method variance. However, an alternative model, in which PMCR was measured by the middle manager, also yielded a significant relationship (.39, p < .01). This finding supports Hypothesis 3. Average project success in turn was strongly related to business success (.56, p < .01), which is in support of Hypothesis 4. Similar as in Hypothesis 3, an alternative model, in which average project success was assessed by the middle manager, also yielded a significant relationship (.36, p < .01).

We furthermore modeled the direct paths from developmental perspectives and lessons learned system on average project success, as well as from PMCR to business success. As expected, all paths were non-significant. This supports the implicit mediation assumption of the framework. The influence of developmental perspectives and lessons learned system on project success is mediated by PMCR and, in turn, the influence of PMCR on business success is mediated by average project success. Overall, the empirical analysis fully supports the hypothesized framework.

Table 2
Correlations and descriptive statistics.

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<tr>
<td>(4) Qualification Opportunities</td>
<td>4.17</td>
<td>1.47</td>
<td>.76</td>
<td>.79</td>
<td>.56</td>
<td>.78</td>
<td>.58</td>
<td>.37</td>
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<tr>
<td>(5) Lessons learned system</td>
<td>3.86</td>
<td>1.31</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>.43</td>
<td>.33</td>
<td>.27</td>
<td>.47</td>
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<td>(6) Lessons learned capturing</td>
<td>4.12</td>
<td>1.33</td>
<td>.84</td>
<td>.84</td>
<td>.58</td>
<td>.39</td>
<td>.31</td>
<td>.24</td>
<td>.42</td>
<td>.93</td>
<td>.76</td>
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<tr>
<td>(7) Lessons learned sharing</td>
<td>3.59</td>
<td>1.46</td>
<td>.84</td>
<td>.84</td>
<td>.64</td>
<td>.41</td>
<td>.31</td>
<td>.27</td>
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<td>(8) PM competence retention</td>
<td>4.24</td>
<td>1.20</td>
<td>.89</td>
<td>.89</td>
<td>.63</td>
<td>.31</td>
<td>.29</td>
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<td>.79</td>
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<tr>
<td>(9) Average project success</td>
<td>4.84</td>
<td>.91</td>
<td>.74</td>
<td>.77</td>
<td>.46</td>
<td>.26</td>
<td>.27</td>
<td>.21</td>
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<td>.48</td>
<td>.68</td>
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<tr>
<td>(10) Business success</td>
<td>4.91</td>
<td>.92</td>
<td>.80</td>
<td>.81</td>
<td>.59</td>
<td>.16</td>
<td>.14</td>
<td>.11</td>
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<td>.18</td>
<td>.13</td>
<td>.33</td>
<td>.77</td>
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<td>(11) Project orientation</td>
<td>1.97</td>
<td>1.06</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>.18</td>
<td>.21</td>
<td>.07</td>
<td>.16</td>
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<td>.01</td>
<td>.09</td>
<td>.12</td>
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<tr>
<td>(12) Number of projects</td>
<td>4.05</td>
<td>1.22</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>-.03</td>
<td>.02</td>
<td>-.07</td>
<td>-.04</td>
<td>.11</td>
<td>.13</td>
<td>.08</td>
<td>-.03</td>
<td>.01</td>
<td>.07</td>
<td>-.40</td>
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<tr>
<td>(13) Firm size</td>
<td>6.68</td>
<td>1.95</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>.11</td>
<td>.14</td>
<td>.06</td>
<td>.07</td>
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<td>.05</td>
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Notes: n = 177; M = mean, SD = standard deviation, α = Cronbach’s alpha, AVE = average variance extracted, and CR = composite reliability. All correlations larger than .15 are significant at α = .05. Diagonal elements in parentheses are square roots of average variance extracted for constructs measured reflectively with multiple items.

Developmental perspectives were significantly and positively related to PMCR (.26, p < .01), which is in support of Hypothesis 1. Hypothesis 2 stated that the existence of a lessons learned system is positively related to PMCR. The results support this hypothesis because the relationship was positive and significant (.20, p < .05). PMCR was strongly and significantly related to average project success (.50, p < .01). The high coefficient may be affected by common method variance. However, an alternative model, in which PMCR was measured by the middle manager, also yielded a significant relationship (.39, p < .01). This finding supports Hypothesis 3. Average project success in turn was strongly related to business success (.56, p < .01), which is in support of Hypothesis 4. Similar as in Hypothesis 3, an alternative model, in which average project success was assessed by the middle manager, also yielded a significant relationship (.36, p < .01).

We furthermore modeled the direct paths from developmental perspectives and lessons learned system on average project success, as well as from PMCR to business success. As expected, all paths were non-significant. This supports the implicit mediation assumption of the framework. The influence of developmental perspectives and lessons learned system on project success is mediated by PMCR and, in turn, the influence of PMCR on business success is mediated by average project success. Overall, the empirical analysis fully supports the hypothesized framework.

Fig. 2. Results of structural equation modeling.
5. Discussion

The objective of this study was to investigate the determinants and consequences of project management competence retention (PMCR). Combining literatures from HRM, knowledge management, and project management we developed and empirically tested a framework that is the first to (1) investigate the consequences of PMCR for project and business success, and to (2) identify antecedents to PMCR.

First of all, our results support the notion that developmental perspectives for project managers are positively related to the retention of project management competences. This result is consistent with turnover theory and research (e.g., Allen et al., 2003, 2010). Project managers who are provided with the opportunity to ascend in the hierarchy in project management and thereby to be confronted with more challenging and interesting tasks and endowed with more financial and staff responsibilities are less likely developing turnover cognitions and ultimately more likely to stay in their positions. In turn, this may facilitate the accumulation of important experiences and increase the availability of important project management competences in the future (Zollo and Winter, 2002). Project management is a discipline which is strongly relying on experience and on the job learning (Kotnour and Vergopia, 2005) and measures aimed to retain project managers as the key personnel in project management may yield specifically strong associations with PMCR through its potentially positive impact on the professionalization of this management discipline. Moreover, Hausknecht et al. (2009) found that advancement opportunities as a reason to stay is more important for high-performing employees than for their counterparts, what may as well explain the positive association with PMCR, since high performers are the kind of employees who are “most likely to possess the knowledge, skills, and experiences necessary to contribute to the overall success of the organization” (Hausknecht et al., 2009, p. 270).

Second, our results also showed that the establishment of a formal lessons learned system in project-oriented organizations potentially leads to an increased PMCR. On the one hand, project managers appear to stay more likely in environments, in which they are constantly able to learn and thereby to further develop their project management skills. This finding is in accordance with prior findings on competence retention (Smith et al., 2011) as well as with studies on the relationship of similar HRM practices and turnover (Guthrie, 2001; Huselid, 1995). On the other hand, a formal lessons learned system may support the continuous development of new competences and thereby may positively influence the availability of project management competences. This finding is consistent with Nonaka’s (1994) theory of knowledge creation and Zollo and Winter’s (2002) model for deliberate learning mechanisms, which propose that capturing, codifying, and sharing experiences and knowledge are important mechanisms to realize the creation of new knowledge. This is ultimately leading to the continuous development of organization-level knowledge and results in the development and retention of a healthy level of organizational capabilities, such as advanced project management.

Third, our study results suggest that PMCR is positively related to average project success. This finding is consistent with results from turnover research, which show a mainly negative relationship between employee turnover and organizational performance. However, we pointed to major differences between the measures of competence retention and turnover, and suggest that competence retention may yield additional influences on performance and success variables. The measure of competence retention includes the notion that it is important to retain the key employees with the important competences, and that not all turnover (e.g., that of low performers) is detrimental for success. One may consider the observation that project managers in general tend to remain shorter in organizations (“project nomads”, Huemann et al., 2004). To the best of our knowledge, no study so far empirically tested what this means for organizations, especially for organizations with a strong project orientation. Due to the strong relationship between turnover and competence retention, our results suggest that it is of utmost importance to counteract this phenomena. The main contribution of the present study is the confirmation of PMCR as an important success factor.

Finally, our results show that average project success is positively associated with overall business success of project-oriented companies. Although this finding does not appear very surprising, very few studies empirically tested and confirmed this relationship.

5.1. Managerial implications

Our findings provide practitioners with important managerial implications. We recommend concrete management practices in order to retain the necessary level of project management competence. Indeed, turnover research suggests that “individuals with high turnover propensities can be identified prior to organizational entry” (Barrick and Zimmerman, 2009; Griffith et al., 2000, p. 485). However, results on more distal antecedents from the work environment such as ours show that withdrawal decisions can be influenced by management practices as well (Griffith et al., 2000).

The positive relationship with the applied success measures provides practitioners with arguments for the implementation of such measures in a project and project portfolio environment. Of course, we need to point out that the implementation of such practices includes investments and will implicate additional (operating) costs. Capturing and sharing lessons learned requires time, efforts, and resources. Project team members need to meet, discuss, and document all the information gathered throughout the processes, which is inducing direct as well as opportunity costs deriving from the loss of time for eventually more urgent tasks (Zollo and Winter, 2002). The return on investments of such capability building practices may therefore strongly depend on certain contingencies. Zollo and Winter (2002) proposed that less deliberate learning efforts such as experience accumulation are especially beneficial for organizations in turbulent environments, whereas knowledge articulation and codification may be associated with to strong organizational inertia in such an environment. Contrary, explicit learning processes such as codification may be more valuable in multidivisional or strongly
“projectified” organizations where otherwise all the knowledge would remain localized in the dispersed units (Zollo and Winter, 2002). The return on investment of such practices is as well dependent on project type or task features, such as the importance of the project type for the overall organization (which justifies a higher investment in the continuous improvement of the respective procedures), the frequency with which this project type is executed (which may enhance the relative efficiency of tacit experience accumulation processes), and the novelty of this project type (which may increase the efficiency of deliberate and explicit learning mechanisms by positively influencing the possibility to make inferences from past projects) (Zollo and Winter, 2002). Such organizational and project contingencies need to be considered before deciding on the implementation of appropriate practices to enhance the level of project management competence.

Finally, the positive relationships between PMCR and average project success as well as average project success and overall business success demonstrate the importance of project management in general and provide project management practitioners with arguments for the high relevance of this management discipline, which still appears to be often underestimated in modern organizations.

5.2. Theoretical implications

Our findings have major theoretical implications. First, we apply and analyze the relatively new and less researched construct of competence retention in a specific context. In order to derive potential antecedents of this construct, we integrated research and theories form three different realms: project management, HRM (turnover), and knowledge management (learning). The integration of these different backgrounds and theories appears to be challenging but as well fruitful in order to grasp the different aspects of competence retention. We show that competence retention is predicted by two main aspects: the retention of key personnel and learning mechanisms. This has not been shown in prior studies. For example, numerous qualitative studies suggest that lessons learned capturing and sharing are essential in a project environment. However, studies quantitatively confirming the relevance of these measures are very rare. Therefore, our study expands research on how this variable may be influenced and how this variable is connected to important success measures.

Our study advances project management research by the application of established theories from the realms of turnover and learning in order to analyze the success of project-oriented organizations. Moreover, project management research may benefit from this study because it integrates a new construct as potential important predictor of project success. The notion that competences are important for success is not new. However, our study is one of the first to empirically show that project success is positively influenced by the existence of a relatively stable pool of project management experts and their opportunity to constantly further develop the specific project management competences.

5.3. Limitations and avenues for future research

We need to point out some limitations regarding the interpretation of our results which open avenues for future research. Without doubt, the prevalence of turnover cognitions among employees is dependent on cultural aspects. Most of turnover research has been conducted in the US. However, few studies in other societal cultures provided partly different results (Holton et al., 2008). In future studies, it may be beneficial to integrate cultural practices in turnover models (or related constructs such as competence retention), e.g., as moderators in relationships between antecedents and turnover (Holton et al., 2008).

Second, we cannot prove causality between the different variables in our framework with cross-sectional data. One may argue that a pool of more experienced and competent project managers may more strongly demand supportive practices from the organization, such as the provision of long-term career perspectives. Moreover, low turnover rates may positively influence the creation of strong ties between project managers and in turn potentially increases the willingness to share knowledge. However, we tried to substantiate our predictions with established theories. Moreover, existing studies with longitudinal data suggest that HRM practices influence organizational outcomes, and not the other way around (Koys, 2001). Nevertheless, we recommend future researchers to develop longitudinal studies in order to investigate predictors and outcomes of competence retention.

Third, our choice on influential factors is limited to two specific practices related to project management. However, turnover research provides multiple potential influential factors on withdrawal cognitions from the organizational environment (e.g., labor market conditions), the organizational level (e.g., justice), the unit or team level (e.g., supervisor behavior), and the individual level (e.g., job satisfaction) (Griffeth et al., 2000; Holton et al., 2008). Such variables potentially yield additional associations with competence retention and deserve further investigation.

To conclude, PMCR appears to be a pivotal aspect in explaining project success and overall business success of project-oriented organizations. It seems to be fruitful to apply established theories from the realms of HRM and knowledge management in order to predict success measures in a project management context. This opens multiple avenues for future research in project management.

Conflict of interest

The authors declare that there are no conflicts of interest regarding this paper.

Appendix A. Measurement

Developmental Perspectives (second-order construct, middle manager assessment)

Career Path (second order loading \( \lambda = .96 \))

There are clear career paths for project managers in our company.

With increasing experience of project managers, they are assigned to more challenging and complex projects.
There are distinct “job titles” for project managers (e.g., project manager to senior project manager or project director) in our company, reflecting experience and competences. In higher career levels project managers have more budget and staff responsibility.

Career Path Quality ($\lambda = .75$)

The average stay of project managers on a certain career level is comparable to that of managers in the line organization. Project managers have comparable salary levels as managers in line organization. The project manager career path is an adequate alternative to the career path in line organization.

Qualification Opportunities ($\lambda = .77$)

Our project managers regularly make use of special training for project management. The training courses for project managers are aligned with their career stage. Our project managers receive certifications in the training courses.

**Lessons Learned System (second-order construct, middle manager assessment)**

Lessons Learned Capturing ($\lambda = .94$)

Lessons learned are recorded and documented in the course of the project. Lessons learned are classified and processed systematically. Lessons learned are discussed in project meetings at certain milestones. The project team is allowed sufficient time for capturing lessons learned.

Lessons Learned Sharing ($\lambda = .97$)

Lessons learned are distributed after project completion across divisions. Important lessons learned are regularly transferred to standards and / or routines. At the beginning of a project, lessons learned from past projects are provided to the project team.

**Project Management Competence Retention (Smith et al., 2011) (senior manager assessment)**

The available project management competence in our company is sufficient to achieve our long-term objectives. We are compromised by a lack of project management skills. Retaining project management skills is not seen as a problem in our organization. Our organization is constrained by our inability to retain project management skills. We have continuous access to all project management skills we need.

**Average Project Success (Teller et al., 2012) (senior manager assessment)**

On average our projects achieve a high schedule adherence. On average our projects achieve a high budget adherence. On average our projects fulfill the defined specifications. On average our projects are completed with a high degree of customer satisfaction.

**Business Success (Teller et al., 2014) (senior manager assessment)**

How do you evaluate the success of your organization/business unit compared to your competitors regarding the overall business success.

How do you evaluate the success of your organization/business unit compared to your competitors regarding the market share.

How do you evaluate the success of your organization/business unit compared to your competitors regarding the revenue growth.

**Controls**

Project-orientation

How high is the percentage of employees actively involved in projects?

$1 = < 25\%$ $2 = 25–50\%$ $3 = 50–75\%$ $4 = > 75\%$ (middle manager assessment)

Firm Size

How high were revenues in your company/business unit in the last year (in Mio.€)? (senior manager assessment, logarithm)

Number of Project

How high is the average number of projects per year? (middle manager assessment, logarithm)

**References**


