



# Contribution of project managers' capability to project ending performance under stressful conditions

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## ABSTRACT

Project ending phase is strategically important for organizations, but it has been largely neglected in previous research and practice. In this phase, the project manager is the executor of strategic moves and plays a paramount role in completing projects efficiently and other summarizing work, but the issues related to complicated work content, future career path, and work-family conflicts may rapidly increase the pressure on project managers at the same time. These stressors affect project managers psychologically, physiologically, and behaviorally and inhibit project managers' capability from functioning well. Under this scenario, the purpose of the study is to empirically figure out the impact of project managers' participation in project ending, and their capability's contribution to project ending performance under pressure. This research identified six factors of *project ending stressor*, namely skill discretion, decision authority, job demands, job insecurity, job readjustment, and family support. A sample of 214 experienced project managers from different industries was collected, and structural equation modeling (SEM) was used. The results show that project managers play as coordinators among stakeholders in completing product handover and accumulating knowledge asset, thus indirectly enhancing organizational strategic value integration in project ending. Completing product handover is more efficient in terms of strategic integration than accumulating knowledge assets. When the stressors begin to pile up, the contribution of project managers' capability will be hindered, but only the process of accumulating knowledge assets is affected. Thereby, project managers under pressure tend to first lose control of the task with less strategic importance. This study supplements insights to related theory in project management and human resource management fields and also provides practical suggestions for project management and personnel management in project-based organizations.

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## 1. Introduction

Projects always follow a predefined life cycle. Regardless of size and complexity, a single project passes through sequential phases from starting, planning, and preparing, carrying out the project work to project closing (PMBOK Guide 5th edition). Initiation of a new project is inspiring, while the cost, staffing, and enthusiasm at the end drop drastically (Atkinson, Crawford, & Ward, 2006; PMBOK Guide 5th edition). Because of the strict requirements of time, cost, and quality, several problems exist in the project ending phase but are frequently ignored, and only a small proportion of discussions in literature technically focus on the ending phase. They normally regard project ending as natural and uncomplicated.

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But the emphases on project ending include not only the procedural factors but also strategic and senior management (Atkinson et al., 2006; Havila, Medlin, & Salmi, 2013; Unger, Kock, Gemünden, & Jonas, 2012). In the project ending phase, proactive, holistic, and strategic moves create better outcomes (Havila et al., 2013). The project manager is a core professional who connects all participants in the project ending phase and has to collaborate with senior managers, communicate with clients, formulate and execute the strategy-related ending plan and contingency strategy, and collect and archive knowledge as organizational process assets. Their contributions to the project in the ending phase are paramount. Project managers face a large amount of stressful issues in the ending phase. Gällstedt (2003) demonstrated that work-related issues would easily convert to stressors in the project ending phase, and initially motivating and challenging issues might become a pointless burden if the project is about to shut down abruptly. Huemann, Keegan, and Turner (2007) emphasized that project

ending is the phase where core members are vulnerable to leaving the project, especially when they have no clue where to go afterwards and become more anxious. The implications from the research and practice are unanimous that stressors from the workplace will result in many stress reactions of employees, such as burnout and lower work satisfaction, and these reactions of individual psychological and physiological states can affect work performance significantly (Ganster & Schaubroeck, 1991; Sullivan & Bhagat, 1992).

Previous research has shed light on the influence of senior managers' involvement on project ending performance. For example, Unger et al. (2012) empirically demonstrated that senior management involvement positively affects project ending quality and the strategic fit of the portfolio, but they also demonstrated that as project managers are coordinators and executors of strategy implementation, the impacts of their involvement on project ending quality should also be evaluated. Therefore, this article is an extension of their research and aims to explore the impact of project managers' participation on the project ending phase, especially in the case that they are under pressure. By utilizing structural equation modeling (SEM) to empirically study the interaction effect between project managers' capability and project ending stressor on project performance, the conclusion supplements previous lack of empirical research on project managers' role in the project ending process and gives hints for practice on project managers' personnel management in project-based organization. The structure of the article proceeds as follows: Section 2 reviews the theories and knowledge related to the composition of project ending performance, and Section 3 puts forward eight hypotheses on the basis of literature review. Section 4 describes the measurement scale of the constructs and tests the reliability and validity of measurement model through a questionnaire survey. Section 5 establishes eight SEM models and tests six out of the eight hypotheses empirically; and the last two sections analyze the results and make conclusions for theory building and practical implications.

## 2. Project ending stressor on project managers

This study focuses on *project ending stressor*, which refers to the conditions that influence employees' psychological states, health conditions, and work performance. Stressors are conditions that cause strains; strains include anxiety, exhaustion, depression, and burnout (Jex, 1998). Stressors are the stimulating factors that cause individuals' subjective stress reactions. In other words, employees may have various reactions to identical stressors because of individual differences. Thus, we utilize *project ending stressor* as one of the model constructs to demonstrate the impacts of objective stressful work environment on outcome variables.

Project has a dual positioning, which is not only a venue for completing goals and stimulating innovation at a given time but also a temporary and dynamic workplace providing job opportunities and career planning for project employees (Palm & Lindahl, 2015; Turner, Huemann, & Keegan, 2008). Project managers can easily find themselves under pressure. Project managers are posited in a vulnerable situation: they have to bear with work-content-related stressors and well-being-related ones triggered by career development problems and work-life conflicts. For example, Bowen, Edwards, Lingard, and Cattell (2014) proved that under the South African construction project scenario, personal work-life imbalance and the need to prove oneself are significantly relevant to occupational stress; Asquin, Garel, and Picq (2010) concluded after interviews with several French project managers that they feel pressure caused by career development uncertainty.

In project-based organizations, employees always experience

the dynamic repetition of "assignment to project - employment on project - deployment from project" process (Huemann et al., 2007). Project managers are vulnerable to the fact of leaving project: on the one hand, project managers have to deal with plenty of tasks they are responsible for; on the other hand, deployment from project is accompanied with future job insecurity, career development uncertainty, job relocation, and work-family conflicts juxtaposing and might cause severe impacts on project managers and further on the projects themselves. Therefore, in terms of *project ending stressor*, two different sides, work content-related stressor and well-being-related stressor, are involved.

Previous studies regard work stressor as a multidimensional construct and include factors like career path, interpersonal relationship, and family problems (e.g., Parker & DeCotiis, 1983; Spector, Dwyer, & Jex, 1988). Similarly, after reviewing the literature on project management and human resource management fields, we identified six factors of *project ending stressor* on project managers, namely *skill discretion*, *decision authority*, *job demands*, *job insecurity*, *job readjustment*, and *family support*.

### 2.1. Work content-related stressors: job demands, skill discretion, and decision authority

Project managers handle many requirements and put more efforts and commitment, while they lack the authority to control project processes. Too many requirements and little control gradually convert into stressors related to project work content, which is mainly reflected in twofold.

First, projects rely highly on managers, and these demands sometimes even result in work overload. Project managers are required to reach the goal rapidly, which means they need to regulate and follow viable project operations and daily routines. They have no alternative but to commit to the project intellectually, socially, and emotionally and take responsibilities for the final consequences, which exaggerate the risk of aggregation of their perceived stress (Asquin et al., 2010). Then, this "countdown" stress will negatively affect the job satisfaction of project managers and project work completion quality (Nordqvist, 2004). For project-intensive organizations, projects even have additional expectations, like innovation and knowledge development, from project managers (Söderlund & Bredin, 2006). However, changes in the project happen during the whole life cycle, and project managers need to readjust strategic and operational movements. When changes happen in what project managers once devote to, rearranging priorities and shifting to new goals seem to be quite stressful (Gällstedt, 2003).

Second, project managers can easily lose control of projects because of the limited authorities delegated to them. Many project leaders claimed lacking enough control over their projects (Lindgren & Packendorff, 2007). Project work involves tight schedule, limited costs, constrained work force, and insufficient feedback (Palm & Lindahl, 2015). Project managers are in a position between a temporary project and a permanent organization instead of a formal and influential management niche. The temporary assignment characteristics of project managers would make the scope of responsibility exceed power and force project managers to face a set of challenges and problems irrelevant to their capability (Bredin & Söderlund, 2006). Furthermore, project managers have only little time to establish stable power structures for decision making against permanent organization (Palm & Lindahl, 2015). The stressors from lacking control would cause turnover tendency of project managers (Jensen, Patel, & Messersmith, 2013).

In the project ending phase, project managers encounter both high demand and low control situation. Project ending is more about strategic management rather than only process control

(Atkinson et al., 2006; Havila et al., 2013; Unger et al., 2012). In this phase, project managers need to participate in the planning and execution of strategic management of organization, which is beyond their authority. Karasek (1979) put forward the job-demand-control (JDC) model to study work stressors, and the theory reckons that the work conditions with high demands and low worker control will cause much pressure on employees and affect their well-being and work performance (Belkic, Landsbergis, Schnall, & Baker, 2004; De Lange, Taris, Kompier, Houtman, & Bongers, 2004). To better measure these work-content-related stressors, we utilized the Job Content Questionnaire (JCQ), a scale that stems from the JDC model (Karasek, 1979), to specifically measure the social and psychological characteristics of work (Karasek, 1985). The JDC model focuses on stressors in work, and our research borrows 11 indicators from three groups (*skill discretion*, *decision authority*, and *job demands*) of the questionnaire in the recommended format of JCQ to measure the level of stressors caused by project managers' high work demands and lack of control due to incompatible duty-power relationship in the project ending phase.

## 2.2. Well-being-related stressors: job insecurity, job readjustment, and family support

In recent years, researchers in the project management field have started to pay more attention to the topics of career path (e.g., Bredin & Söderlund, 2013; Hölzle, 2010) and work-life conflicts (e.g., Andres, Moelker, & Soeters, 2012; Liu & Low, 2011) of project managers, while only few associate them with the project ending phase.

Projects are seen as venues for production of value, also as workplaces for employment creation and individual career trajectories (Palm & Lindahl, 2015). Organizations should provide opportunities for career development on the basis of projects (Söderlund & Bredin, 2006). Project employees, especially core project managers, have high expectations about projects, not only as milestones in personal life but also as stepping stones for pursuing higher positions in the organization (Parker & Skitmore, 2005; Söderlund & Bredin, 2006). In fact, the occupational characteristics of project manager predestinate the instability of their career trajectories (Bredin & Söderlund, 2013; El-Sabaa, 2001). This becomes another stressor (Asquin et al., 2010). Projects do not contain career ladders like permanent organizations do, instead, the proliferation of projects creates another type of horizontal career trajectory (Asquin et al., 2010), leaving project managers trapped into the spinning wheel of projects, with fewer career paths for development compared to permanent organizations (Palm & Lindahl, 2015). In the project ending phase, project managers have a strong desire to be able to market themselves in order to develop competence and meet the requirements and challenges of new projects (Hölzle, 2010; Söderlund & Bredin, 2006). Project managers feel pressurized when their high expectations contradict with conditions of lacking career paths, especially in the ending phase. Besides, project managers spend more energy concentrating on personal job interests and taking actions to realize better promotion, and this behavior is detrimental to project outcomes (Palm & Lindahl, 2015).

Furthermore, both domains of work and life compete for individual's finite time and energy, thereby causing conflicts and stress (Korabik, Lero, & Whitehead, 2011; Netemeyer, 1996). Many researchers regard work-life conflicts and imbalance as one vital work stressor. Work-life relationship under projectized conditions has been studied as well (Andres et al., 2012; Liu & Low, 2011). Projects require a high level of energy and time and may need relocation for different projects. The time project managers spend

with family may dwindle because of fatigue or separation; thus, work-life conflicts are prominent. Temporary projects contain many uncertainties, while the "permanent factors" outside projects that refuge project managers, like organization, family, and interpersonal relationship, are consistent (Packendorff, 2002, pp. 39–58). Organizations should consider these factors and support an equitable balance between life quality and work performance for employees (Packendorff, 2002, pp. 39–58; Söderlund & Bredin, 2006). An important aspect of work-life conflicts in projects is job-induced family separations (Andres et al., 2012); however, only few researchers mentioned this topic (e.g., Andres et al., 2012). In the project ending phase, project managers have a high chance of reassignment to a new project, and the assignment may influence their family and social relationship, especially when accompanied with work location change. The project ending phase is strongly associated with this type of stressor, which has barely received attention in previous studies.

To measure the extent of *project ending stressor* relating to project managers' career trajectory, our research borrows the indicators from the *job insecurity* group in JCQ; furthermore, it combines the stressors under project environment reported by Asquin et al. (2010), thus forming a four-item scale. The scale reflects the stressors caused by uncertainty of new job's stability, promotion, well-being, and opportunity to perform. Few studies concentrate on the stressors relating to *work-life imbalance* in the project ending phase in the project management research field; thus, we consider the scale that measures stressors of job relocation in human resource management field. Previous studies indicated that stressors associated with job relocation can be categorized into two aspects: family-related issues and adjustment to new job and environment (Forster, 1991; Munton, 1990; Riemer, 2000). Therefore, we modify the questionnaire measuring job relocation stressors and design a four-item *job readjustment* scale and a three-item *family support* scale for measuring stressors in project domain. Indicators of *job adjustment* reflect the level that project managers are about to adjust to brand new job position, work environment, and interpersonal relationship, and *family support* indicators represent the possible influence of work reassignment on managers' spouses and children.

## 2.3. Impacts of work stressors on work performance

Previous research results indicate that work stressors are correlated with work performance, while the sign of coefficient is not consistent, and several explanations co-exist. LePine, Podsakoff, and LePine (2005) thought that stressors have different types and summarized a two-dimensional stressor model by meta-analysis. The model differentiated stressors as challenge stressors (such as job complexity and job demands), which are positively associated with work performance, and hindrance stressors (such as role ambiguity and role conflict), which are negatively associated with work performance. Some other researchers thought that the positive or negative effects of stressors are determined by whether project managers see them as positive or negative stimuli. Project managers with various personal traits may have various strategies and responses to identical stressors, thus causing beneficial or harmful impacts on work performance (Gallagher, Mazur, & Ashkanasy, 2015; Gällstedt, 2003). In most studies, because the measurement focuses on negative characteristics, stressors are seen to negatively correlate with work performance (e.g., Sullivan & Bhagat, 1992; Tubre & Collins, 2000).

From the perspective of influential mechanism, stressors affect performance through personal stress reactions. Stress is the reaction to objective stressors and is seen as a special interaction between human beings and environment. When the level of stressors

surpasses personal bearing limits, stress-related responses would appear psychologically (e.g., anxiety, hostility, or depression), physiologically (e.g., hypertension or tachypnea), and behaviorally (e.g., lack of attention or slow in response) (Beehr 1995; Motowidlo, Packard, & Manning, 1986). These stress reactions would consume time and energy project managers possess, impair or restrict the potential contribution of personal capability to projects (Noblet, Maharee-Lawler, & Rodwell, 2012), and make it even harder to complete job tasks, particularly in the project ending phase.

In general, in terms of *project ending stressor*, issues directly associated with work content and future uncertainty after projects should both be included, and the boundary of these two types of stressors becomes blurred in the ending phase (Aitken & Crawford, 2007). The stressors' influence on employees is blended and accumulates rapidly in a relatively short time period and thus becomes unneglectable. *Project ending stressor* may influence the working states of project managers who are the vital participants in project ending, and the instability of their working states may directly affect the project ending performance. In other words, the level of *project ending stressor* may influence project managers' contribution to the project ending processes. Studying this influence is of practical significance to enhance the project ending performance and is one purpose of our research.

### 3. Hypothesis

Project managers should embark on several tasks in the project ending phase. According to previous research, handover is the primary task to be completed (Turner, 1999). The managers need to allocate time to the multiple activities in relation to product delivery, like adequate testing, training, managing stakeholder expectations, and re-deployment of team members and materials, and the future trust of customers might be at stake without right timing (Ward & Chapman, 2003; Havila et al., 2013). To successfully complete projects, researchers recommended managers to follow standard administrative procedures (Lock, 2003).

Summarizing the knowledge of the whole life cycle is also important in the project ending phase. Actually, the re-use of earlier knowledge and organizational learning in project context is lacking (Atkinson et al., 2006). Successful project management depends on the base of accumulated knowledge. The accumulation and storage of organizational knowledge should be given more attention (Kasvi, Vartiainen, & Hailikari, 2003). For certain types of projects like research and information technology projects, because of their high level of newness, the information base is notoriously incomplete, making this process difficult to be handled. (Schmidt & Calantone, 1998). Ward and Chapman (2003) also identified capturing corporate knowledge and learning key lessons as one of the key uncertain project management issues in the ending phase.

Project managers are regarded as recipients of project tasks and risks; naturally, they are responsible for both handover and knowledge review process. As Havila et al. (2013) pointed out that project managers need to finish planned tasks, reassign resources, and act as coordinators between senior managers and team members in this phase and that their role in project ending is paramount. Because of this, we plan to quantitatively analyze the impact of project managers' involvement on the project ending quality.

Considering the importance of project managers' role in the project ending phase, the behaviors and features of this microlevel professional will have profound influence on mesolevel projects. Furthermore, the level of capability of project managers may influence the project ending performance. According to the AMO (ability, motivation, opportunity) model proposed by Appelbaum, Bailey, Berg, and Kalleberg (2000), employees' ability, motivation,

and opportunity will be enhanced by human resource management, and high-level personal capability will directly enhance outcome variables like performance. We consider two major tasks in the phase project ending phase: closing project efficiently and accumulation of knowledge assets. Thus, we put forward [Hypothesis 1a and 1b](#).

**Hypothesis 1a (H1a).** Project managers' project ending capability is positively related to project ending efficiency.

**Hypothesis 1b (H1b).** Project managers' project ending capability is positively related to knowledge asset accumulation.

Project ending is entitled with organizational strategic value integration for several reasons. First, conflicts of resources are reduced because of high-quality project ending efficiency. Freed resources will be allocated to other appropriate projects immediately, thus enhancing the strategic fit and realization of project portfolio and organization (Chao, Kavadias, & Gaimon, 2009). Second, the knowledge, experience, and techniques that are accumulated, summarized, and archived in the ending phase can enrich organizational process assets, and this organizational "repertoire" can be utilized in upcoming projects of similar size, characteristics, and processes. Furthermore, a more efficient project ending management process, like product delivery, will give the external stakeholders positive impressions of project team and may facilitate future collaboration (Havila et al., 2013). Unger et al. (2012) empirically proved that a better project termination quality can improve the strategic fit of project portfolio. For similar reasons, we propose [Hypothesis 2a and 2b](#).

**Hypothesis 2a (H2a).** Project closing efficiency is positively related to organizational strategic value integration.

**Hypothesis 2b (H2b).** Knowledge asset accumulation is positively related to organizational strategic value integration.

Furthermore, project managers are under plenty of stressors in the ending phase, and they have to deal with massive work demands, responsibility, and little authority and are forced to carefully consider the impacts of current work on future job trajectory and work-life relationship. From the psychological perspective, stressors would cause personal stress reactions rather than directly relating to work performance. Individual stress reactions would impair or hinder the expression and contribution of project managers' capability to project ending performance (Noblet et al., 2012). Another research echoed this proposal: Khedhaouria, Montani, and Thurik (2017) proved empirically that time pressure has negative moderation effect on the relationship between team members' capability and performance in R&D projects. Many factors, including individual factors (like gender, emotional intelligence, and psychological capital), project or organizational factors (like organizational strategy, culture, or climate), and social factors (like laws and regulations), may moderate the relationship between employee's capability and performance (Combs, Liu, Hall, & Ketchen, 2006; Tan, Li, & Tian, 2015). Stressor is considered as a factor that affects work performance by affecting individual's psychological and physical states. Only a few previous studies focused on project ending (Havila et al., 2013), and the human resource management in the project ending phase has not received much attention (Huemann et al., 2007). Thereby, this research has theoretical and practical significance. Therefore, we put forward the following [Hypothesis 3a and 3b](#).

**Hypothesis 3a (H3a).** Project ending stressor has a negative moderating effect on the relationship between project ending capability and project closing efficiency.



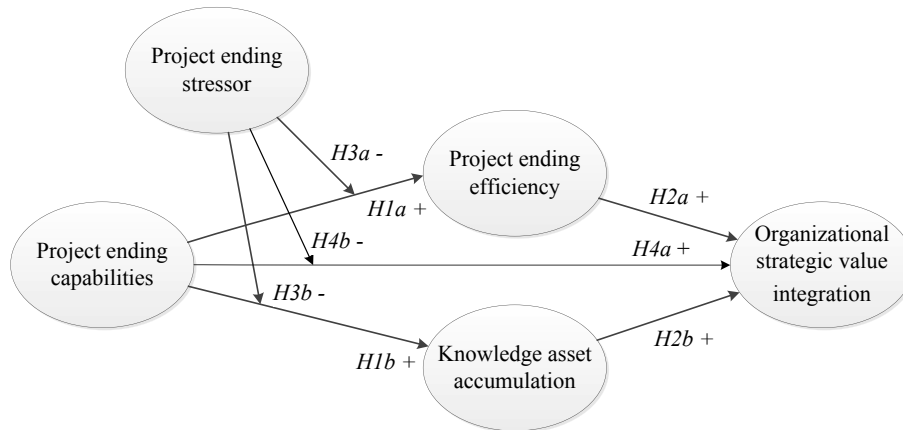


Fig. 1. Conceptual model.

**Hypothesis 3b (H3b).** Project ending stressor has a negative moderating effect on the relationship between project ending capability and knowledge asset accumulation.

In the project ending phase, project managers are important in strategic implementation. They need to follow senior managers' instructions, which are strategically important for portfolios or organizations. According to previous hypotheses, project managers' capability and the hindrance effects of stressors could affect the behavioral quality of project ending, i.e., the performance of two tasks, namely closing project efficiently and accumulating knowledge assets. Furthermore, the realization of strategic value depends on the performance of project ending routines. In sum, we put forward the hypotheses that project managers are crucial in organizational strategic value integration, while the completion of two tasks mediates the relationship of project managers and strategic value integration. Thus, we propose **Hypothesis 4a and 4b**. The conceptual model is shown in Fig. 1.

**Hypothesis 4a (H4a).** Project managers' ending capability is positively related to organizational strategic integration. The relationship of project managers' ending capability and organizational strategic integration is mediated by project closing efficiency and knowledge asset accumulation.

**Hypothesis 4b (H4b).** Project ending stressor has a negative moderating effect on the relationship between project ending capability and organizational strategic integration. The relationship of interaction effect (stressor $\times$ capability) and organizational strategic value integration is mediated by project closing efficiency and knowledge asset accumulation.

## 4. Methods

### 4.1. Construct scales

This research contains the measurements of five constructs: *project manager ending capability* (PEC), *project ending stressor* (PES), *project ending efficiency* (PEE), *knowledge asset accumulation* (KAA), and *organizational strategic value integration* (SVI). The scales of constructs are shown in Table 1. A total of 46 indicators are involved. The questionnaire is presented in a five-level Likert scale. We also combined feedbacks on items from one experienced professor, and then, two PhD candidates in the project management field tested whether the questionnaire is understandable before formal survey.

The scales of PEC include 4 factors and 14 indicators borrowed

**Table 1**  
Sources of questionnaire scale design.

Constructs (Latent Variables)	Factors	Source
Project ending capability (14 indicators)	Knowledge and skills (4 indicators) External stakeholder management (3 indicators) Leadership in project team (3 indicators) Obtaining organizational support (4 indicators)	Ahsan et al. (2013) Havila et al. (2013) Havila et al. (2013) Unger et al. (2012)
Project ending stressor (22 indicators)	Skill discretion (4 indicators) Decision authority (3 indicators) Job demands (4 indicators) Job insecurity (4 indicators)  Job readjustment (4 indicators)	Karasek (1985) Karasek (1985) Karasek (1985) Karasek (1985) Asquin et al. (2010) Forster (1991) Riemer (2000) Munton (1990) De (2001)
Project ending efficiency (3 indicators)	Family support (3 indicators) Closed in time (1 indicator) Closed within budget (1 indicator) Closed with good quality (1 indicator)	Joslin and Müller (2016)
Knowledge asset accumulation (3 indicators)	Enrich organizational knowledge base (1 indicator) Improve team members' skills (1 indicator) Manage similar future projects efficiently (1 indicator)	Joslin and Müller (2016)
Organizational strategic value integration (3 indicators)	Realize organizational strategic fit of project (1 indicator) Key external stakeholders are satisfied (1 indicator) Facilitate strategic collaboration with key external stakeholders (1 indicator)	Unger et al. (2012) Havila et al. (2013)

**Table 2**  
Descriptive statistics of respondents.

	Frequency	Percent (%)
<b>Years of working</b>		
No more than 1 year	13	6.1
2 to 3 years	45	21.0
4 to 5 years	32	15.0
6 to 9 years	55	25.7
No less than 10 years	60	28.0
Missing data	9	4.2
<b>Familiarity of project management knowledge</b>		
Entitled with PMP	71	33.2
Mastered	40	18.7
Familiar	70	32.7
Comprehended	19	8.9
Unfamiliar	5	2.3
Missing data	9	4.2
<b>Industry type</b>		
Construction	41	19.2
Information technology	100	46.7
Manufacturing	33	15.4
Others	34	15.9
Missing data	8	3.7

from previous studies relating to the project managers' capabilities required in the project ending phase: the basic knowledge and skills of project management (Ahsan, Ho, & Khan, 2013), the ability to manage external stakeholders (Havila et al., 2013) and obtain internal organization's support (Unger et al., 2012), and leadership in project team (Havila et al., 2013). Project ending stressor (PES) is a newly introduced construct in this study, as mentioned in Section 2, according to the literature review, PES is composed of six factors, and we follow the JCQ of Karasek (1985) and stressor questionnaires in other previous studies (e.g., Munton, 1990) to measure it. The measuring items of PES used in this study are provided in Appendix. The scale of project ending efficiency (PEE) includes 3 indicators that measure the time, cost, and quality performance of project ending (De, 2001). The scale of *knowledge asset accumulation* (KAA) includes 3 indicators measuring to what extent the experience and knowledge are accumulated (Joslin & Müller, 2016), like "By summarizing experience, organization can manage similar projects efficiently in the future." The 4-indicator scale of *organizational strategic value integration* (SVI) measures whether the strategic value of projects is realized in the ending phase (Havila et al., 2013; Unger et al., 2012), like "Facilitate strategic collaboration with key external stakeholders."

#### 4.2. Study sample

To realize the research goals, we conducted a questionnaire survey over project managers and organization managers who attended the Project Management Institute (PMI, China) Annual Conference held in Beijing from October 23rd to 24th, 2016. PMI is the world's largest non-profit international institute that contributes to the research, standard formulation, and qualification certification (which is Project Management Professional, PMP) of project management. The 2016 annual conference was open to all project managers, especially certificated with PMP from all industries in China, and attracted more than 2000 attendees, which could represent the overall working project managers in China.

The questionnaire was presented in both printed and electronic forms. Managers were asked to recall the ending process of the latest project the project managers (themselves or their subordinates) had participated in and evaluate the level of the ending performance, manager capability, and environmental stressors. We considered the sample of organization managers for the following

reasons. First, organization managers are more qualified than project managers in evaluating the project ending performance, especially in terms of strategic value integration, and they can evaluate the performance from a higher-level perspective. Furthermore, in evaluating the capability of project managers, organization managers' scores are more objective. Second, the study used stressor instead of perceived stress as a predictor to represent objective facts rather than subjective feelings. Thus, organization managers can evaluate the stressor level of project ending by his observation, even if he is not one of the project team members. Finally, PMI conference is open to all PMP-certificated managers, thus meaning that these organization managers are also experienced in project scenario and are qualified to participate in this survey.

A total of 245 samples were collected: 52 completed questionnaires in printed version and 93 in electronic version. We excluded 31 samples with incomplete data, leaving 214 ones used for the following analyses. For SEM, the sample size should be more than 200 or 5 to 10 times of labeled estimated parameters (Bentler & Chou, 1987), which is no more than 23 in our models as presented in the next section; thus, from the perspective of SEM standard, the sample size is adequate. Among these respondents, 68.7% had more than 5 years of working experience, and 28.0% had more than 10 years of working experience; one third were entitled with PMP qualification, and almost all the respondents were familiar with project management knowledge to a certain extent. Respondents were engaged in different industries like construction, information technology, and manufacturing. The largest proportion of 46.7% occupied the technology industry. Detailed descriptive statistics of respondents are shown in Table 2. The managers who participated in our research were experienced at work and rooted in various industries, and they also acquainted with project management knowledge. Thus, the quality and diversity of survey samples are guaranteed.

#### 4.3. Measures

Before performing SEM, the reliability and validity of the measurement model should be tested first; therefore, a confirmatory factor analysis was performed. Because the standardized coefficient of the construct *organizational strategic value integration* on its second item was less than 0.5, indicating poor quality of the item (Hair, Anderson, Babin, & Black, 2010), it was removed from the model before reliability test, leaving 45 items as shown in Tables 1 and 3.

The reliability test is a test of the consistency and reliability of the measurement model. The result of Cronbach's  $\alpha$  coefficient and composite reliability (C.R.) can be used to assess the internal consistency of the factors of the three constructs (See Table 3). Hair et al. (2010) suggested that the reliability level is good when the Cronbach's  $\alpha$  coefficient should be greater than 0.7; C.R. should be greater than 0.6, and 0.7 in good condition. Three constructs' Cronbach's  $\alpha$  coefficients and C.R. satisfy the criterion, indicating the good reliability of measurement model.

The validity reflects the correctness of the scale measuring the variables, including convergence validity and discriminant validity. This study was conducted according to the validity testing methods proposed by Hair et al. (2010). Convergence validity means the highly correlated relationship between the indicators that measure the same construct (latent variable). Indices like factor loading and average variance extracted (AVE) were used in this study. The criteria were as follows: the standardized factor loading should be significantly higher than 0.5, and in an ideal condition higher than 0.7; AVE should be greater than 0.5, meaning the latent variable can explain over 50% of the variance of its factors. The results are

**Table 3**  
Reliability and validity test results.

Constructs	Factors/indicators	Standardized factor loading	Cronbach's $\alpha$	C.R.	AVE
Project ending capability (PEC)	Knowledge and skills	0.938***	0.922	0.944	0.809
	External stakeholder management	0.892***			
	Leadership in project team	0.894***			
	Obtaining organizational support	0.873***			
Project ending stressor (PES)	Skill discretion	0.749***	0.928	0.878	0.549
	Decision authority	0.770***			
	Job demands	0.622***			
	Job insecurity	0.773***			
	Job readjustment	0.845***			
	Family support	0.663***			
Project ending efficiency (PEE)	Closed in time	0.759***	0.817	0.817	0.599
	Closed within budget	0.789***			
	Closed with good quality	0.773***			
Knowledge asset accumulation (KAA)	Enrich organizational knowledge base	0.822***	0.907	0.912	0.776
	Improve team members' skills	0.920***			
	Manage similar future projects efficiently	0.897***			
	Realize organizational strategic fit of project	0.688***			
Organizational strategic value integration (SVI)	Key external stakeholders are satisfied	0.718***	0.725	0.754	0.506
	Facilitate strategic collaboration with key external stakeholders	0.727***			

Note: \*\*\* $p < .001$ .

presented in Table 3. All the standardized factor loadings were significantly greater than 0.5, most over 0.7; three AVE indices were over 0.5. In all the cases, the convergence validity of measurement was good. Discriminant validity means significant difference or low correlation between indicators that measure different constructs, which implies that an indicator belongs to one latent construct only. Hair et al. (2010) proposed a testing method based on the chi-square difference. We calculated the chi-square indices of two models: one with a correlation coefficient of 1.0 between two constructs and the other without any constraint. If the difference between the two chi-square indices is significantly greater than 3.84 ( $\Delta\chi^2(1) > 3.84, p < .05$ ;  $\Delta\chi^2(1) > 10.827, p < .001$ ), we consider that the discriminant validity is good. The test results are shown in Table 4. After 10 pairwise comparisons, all the chi-square difference indices reached the significant level of 0.001, indicating trustable discriminant validity of the measurement between these five constructs.

All the scores are self-reported from a single source, using the same instrument at the same time. Therefore, a common method bias (CMB) may exist and induce systematic errors (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Harman's single factor test indicated that when all the items are included in an exploratory factor analysis (EFA), more than one factor emerges, and the first factor explains 25.4% of the variance (less than 50%). This result indicates little suspicion of CMB in the data collected.

## 5. Results

Before SEM can be performed, items that measure single factor are parceled, and the mean value of the parceled item scores is regarded as the new indicator of each factor. This is a common data processing measure adopted in several studies, and several prerequisites are satisfied in our study, like item parceling can only be used in testing structural relations instead of measurement model, and parceled items should measure the same factor (Bandalos, 2002; Little, Cunningham, Shahar, & Widaman, 2002). Item parceling will ensure the data distribution to be closer to the normal distribution (Marsh, Hau, Balla, & Grayson, 1998) as well as a better model fit (Rogers & Schmitt, 2004).

To test the hypotheses, we used eight SEM models in Mplus 7.4 software. To verify moderation effects of latent variables (*H3a*, *H3b*, and *H4b*), the latent moderated structural equation (LMS) models

were established. Compared to the traditional method of product indicators in exploring moderation effect of latent variables, the LMS model can avoid the problems of inconsistent parameter estimation caused by the construction of artificial product indicators and biased estimation due to the non-normal distribution of product indicators (Kelava et al., 2011; Klein & Moosbrugger, 2000); thus, the estimation of parameters is more reliable. The results are shown in Tables 5, 6 and Fig. 2.

- *H1a* was proved in Model 1, while *H1b* was proved in Model 4. In both models, we used PEC as independent variable to see whether it will affect the ending performance quality (PEE and KAA). The degrees of model fit were both fair (RMSEA < 0.08, CFI > 0.95, SRMR < 0.05), and the standardized path coefficients were 0.793 ( $p < .001$ ) and 0.756 ( $p < .001$ ) separately.
- *H2a* and *H2b* were proved in Model 7. We used SVI as dependent variable and both PEE and KAA as predictors. The degree of model fit was fair, and the standardized path coefficients were 0.622 ( $p < .001$ ) and 0.249 ( $p < .001$ ) separately.

**Table 4**  
Discriminant validity test.

	Constrained Model			Unconstrained Model			$\Delta\chi^2$	$\Delta df$
	Corr	df	$\chi^2$	Corr	df	$\chi^2$		
PEC-PES	1.00	35	560.946	0.13	34	126.407	434.539***	1
PEC-PEE	1.00	14	66.975	0.79	13	11.470	55.505***	1
PEC-KAA	1.00	14	166.557	0.76	13	26.837	139.72***	1
PEC-SVI	1.00	14	57.348	0.79	13	33.950	23.398***	1
PES-PEE	1.00	27	314.282	0.18	26	100.636	213.646***	1
PES-KAA	1.00	27	532.626	0.22	26	110.591	422.035***	1
PES-SVI	1.00	27	216.723	0.04	26	93.701	123.022***	1
PEE-KAA	1.00	9	106.451	0.70	8	7.713	98.738***	1
PEE-SVI	1.00	9	45.115	0.78	8	24.952	20.163***	1
KAA-SVI	1.00	9	92.677	0.66	8	49.761	42.916***	1

Note: PEC = Project ending capability.

PES = Project ending stressor.

PEE = Project ending efficiency.

KAA = Knowledge asset accumulation.

SVI = Organizational strategic value integration.

\*\*\* $p < .001$ .

**Table 5**  
Coefficient estimation results (standardized coefficients).

Model	1	2	3	4	5	6	7	8
Hypothesis	H1a	H3a		H1b	H3b		H2a,H2b	H4a,H4b
D.V	PEE			KAA			SVI	
PEC	0.793***	0.783***	0.776***	0.756***	0.740***	0.731***		0.791***
PES		0.076	0.103		0.120 <sup>+</sup>	0.162*		−0.044
PEC×PES			−0.068			−0.109*		0.008
PEE							0.622***	
KAA							0.249*	
Model fit	RMSEA = .000 CFI = 1.000 SRMR = .019	AIC = 5804.0 BIC = 5812.2	AIC = 5804.7 BIC = 5813.2	RMSEA = .071 CFI = .986 SRMR = .029	AIC = 5723.2 BIC = 5731.5	AIC = 5721.7 BIC = 5730.2	RMSEA = .079 CFI = .955 SRMR = .046	AIC = 5897.02 BIC = 5905.50

Note: PEE= Project ending efficiency, KAA= Knowledge asset accumulation.

PEC= Project ending capability, PES= Project ending stressor.

SVI= Organizational strategic value integration.

+p < .1, \*p < .05, \*\*\*p < .001.

- Model 2 and Model 3 were used for testing *H3a* and Model 5 and Model 6 for testing *H3b*. We used LMS models. The LMS model in Mplus 7.4 software did not report model fit indices (e.g., RMSEA, CFI, and SRMR); therefore, we report standardized coefficients and information criteria (AIC and BIC) in Table 5. By comparison of the information criteria, we analyzed the overall model fit: the model with less AIC and BIC was seen to have a better fit with the samples (Klein & Moosbrugger, 2000; Vrieze, 2012). A product indicator (PEC×PES) was included as a predictor in Model 3. Because the coefficient of PEC×PES was insignificant and both AIC and BIC increased from Model 2 to 3, the introduction of the moderation model was invalid. *H3a* was not proved empirically. But for Model 6, the coefficient of PEC×PES was significantly negative, and the AIC and BIC indices decreased from Model 5, proving a better fit of the LMS model with our survey data. *H3b* was proved. The coefficient of KAC on PEC×PES was −0.109 ( $p < .05$ ), meaning that the existence of PES will exert inhibiting effects on the contribution of project

managers' capability to knowledge asset accumulating process instead of project ending efficiency.

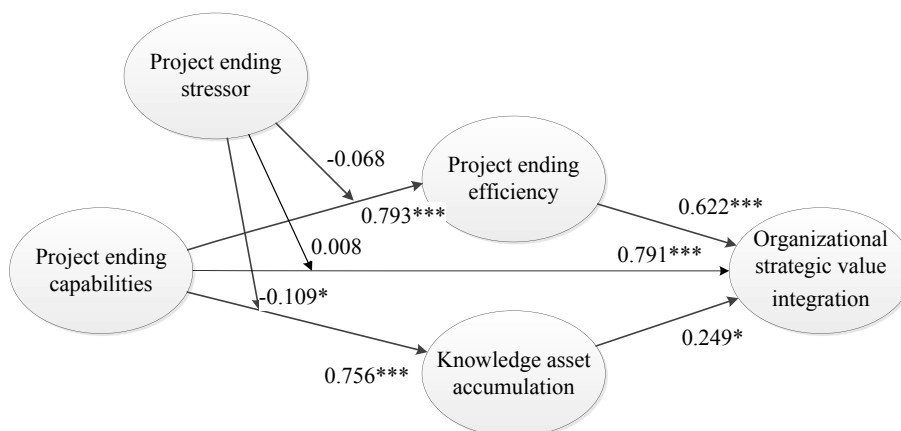
- To test the mediation effects (*H4a* and *H4b*), we first set up Model 8 to test the direct effects of PEC and PEC×PES on SVI, and the results indicated that the PEC was significantly correlated with strategic value integration, while project ending stressor had little influence on strategic value integration; thus, *H4b* was not verified empirically. Furthermore, possibly existed mediation effects between PEC and SVI; therefore, we tested the indirect effects of both mediated paths. The results are shown in Table 6, only the indirect effect through PEC-PEE-SVI path was significant, proving that project managers' capability influences strategic integration partly by completing product handover efficiently. In other words, *H4a* is partially proved.

## 6. Discussion

The study aims to explore the project managers' importance in the project ending phase, given the facts that they are under stressful environment. We first introduced SEM including five constructs and then put forward eight hypotheses, among which six were empirically proved by our samples. We can draw some interesting findings from the results shown above.

**Table 6**  
Indirect effects of mediation paths.

Path	Standardized indirect effect	S.E.	p Value
PEC-PEE-SVI	0.306*	0.142	0.031
PEC-KAA-SVI	0.070	0.094	0.458



**Fig. 2.** Path analysis results (\* $p < .05$ , \*\*\* $p < .001$ ).



### 6.1. Project manager: multifacet coordinator in the ending phase

The positive correlation between *project ending capability* and both *project ending efficiency* and *knowledge asset accumulation* confirms the importance of project managers in the project ending phase, just as De (2001) mentioned that their role in project ending is paramount. This result means that the success of both product handover and reviewing project knowledge calls on project managers' capability. The higher the level of capability, the better is the performance the project would end up with. As indicated above, to complete these two tasks, project team members, organizational senior managers, and other external stakeholders are involved. Project managers are considered as the intersection of communication paths between these participants. Furthermore, the concept of *project ending capability* in the study includes the project managers' ability to deal with the project errands, manage internal and external stakeholders, and obtain organizational support. This connotation coincides with project managers' role as multifacet coordinators in the project ending phase; thus, their capability of coordination makes a difference in the performance.

### 6.2. Strategic value integration: two tasks involved in the ending phase

Our results show that, in terms of the strategic value integration of the project ending phase, both ending efficiency and knowledge asset accumulation matter significantly. Project ending is endowed with strategic meanings, because it often comes with the re-allocation of released resources among other projects and maintaining collaboration with key external stakeholders (Chao et al., 2009; Havila et al., 2013). On the basis of previous conclusion drawn by Unger et al. (2012), a systematic and effective project termination can positively affect the level of project's congruence to organizational strategy. According to the resource-based view, the efficiency of project ending will reduce the conflicts of resources, and because the value and uncertainty of the tasks decrease in the project ending phase (PMBOK, 5th edition), it is strategically reasonable to allocate resources to other projects with more added value. Furthermore, for organizations, the knowledge assets are also strategically important, and standardized supporting processes and execution guidance are categorized as part of organizational enablers for project management (Wen & Qiang, 2016). For project-based organizations, the success of consistent project management is driven by organizational enablers to achieve strategic goals (Müller, Pemsel, & Shao, 2014; PMBOK, 5th edition). Hence, collecting and archiving knowledge assets are necessary and strategic in the project ending phase.

The positive correlation between *project ending capability* and *organizational strategic value integration* empirically verified project managers as important executors in strategic implementation in project ending, and part of the relationship is mediated by completing product handover efficiently. Because *project ending efficiency* significantly mediates the contribution of project managers' capability to strategic value integration, while *knowledge assets accumulation* does not, the results tell the differences between these two tasks. Product handover has powerful and direct influence on strategic implementation, especially when we consider "making stakeholders satisfied" and "facilitating collaboration with external stakeholders" as two of the three strategy's measurements. Project managers devoting the same effort on this task will receive more and quick payoffs in terms of strategic implementation.

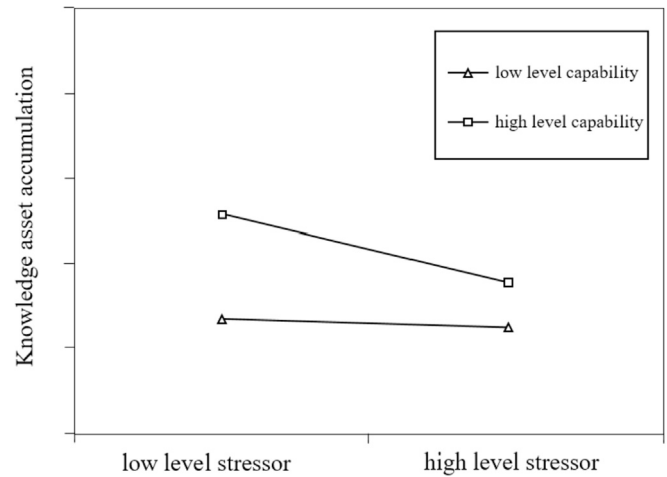


Fig. 3. Inhibiting effect of project ending stressor to the project ending manager capability on knowledge asset accumulation.

### 6.3. Project ending stressor: selective effects on the project ending performance

We constructed the six-factor measurement scale of *project ending stressor*, and the results empirically proved that project managers' capability would be inhibited because of the stressors. When project managers are under stressful environment, their managerial ability, which is useful to project performance, will be significantly suppressed. This conclusion corresponds to the psychological mechanism of work stressors that influence work performance. But the results also show that the effects are only on the process of knowledge gathering and that the product handover would not be affected significantly. One possible reason is that poor closing efficiency would have a powerful flow-back effect from external stakeholders (Havila et al., 2013, our result of H4a also proves the correlation). Project manager is a convenient choice to bear project uncertainty and unwillingly serves as a scape-goat if the project ending fails to turn out smoothly. Thus even if project managers are under pressure, product handover is still their primary task that they cannot slack off on. But conditions are different with knowledge gathering process, the accumulation and storage of newly created knowledge seem "unsystematic" (Kasvi et al., 2003) and need several work, and the beneficial effect of the knowledge base would not occur until future similar projects are carried on. Therefore, when the stressors begin to pile up, like the time is limited or future assignment is uncertain, project managers would be affected and rashly finish the task and without being punished. Another interesting finding is that combining the effects of capability and stressor, project managers with higher capability are more vulnerable to the accumulation of stressors (See Fig. 3). Veteran project managers are sensitive to the ending stressor and likely to reassign time and efforts on other main tasks, thus lowering their performance of knowledge asset accumulation than that of managers with low-level capability. This is the other aspect of selective effect of project ending stressor.

## 7. Conclusion

Project ending is regarded as an important phase for its strategic significance in project-based organizations (Havila et al., 2013). In our study, the project ending performance is considered twofold: the quality of *project ending efficiency* and *knowledge*

*asset accumulation* represent the behavioral level of project ending performance, while *organizational strategic value integration* is the strategic aspect. Overall, the performance is related to future consistent project management. In other words, the purpose of this study was to find methods of supporting consistent and mature organizational project management.

In this study, we concentrated on the scenario that project managers are trapped in multiple stressors and are “out of form” in the project ending phase. We identified two tasks in the ending phase that have strategic meaning for organizations, reviewed the literature on relevant project management and human resource management fields, and constructed a six-factor scale for *project ending stressor* and tested its reliability and validity. The scale can be used in follow-up studies on stressful environment in the project ending phase. Structural equation modeling performed in the study proved that project managers play as coordinators among stakeholders in two tasks that are strategically important for organizations. Completing product handover is strategically more efficient than accumulating knowledge assets. When the stressors begin to pile up, the contribution of project managers' capability will be hindered, but only the process of accumulating knowledge assets is affected. The power of the stressor is selective and limited, and it seems that project managers under pressure tend to first lose control of the task with less importance. This coping mechanism is reasonable but detrimental to the quality of summarizing knowledge assets.

### 7.1. Implications for theory and practice

The conclusions of the research are meaningful theoretically and practically. From the perspective of theory building, project ending seems to be unimportant in most project management guidelines but is strategically important according to the literature. Previous research has shed light on the impacts of senior management on the project ending performance (Havila et al., 2013; Unger et al., 2012). Unger et al. (2012) also stated that further research could concentrate on the effect of middle managers, especially in the context of strategy implementation. Project managers are the essential participants who execute the project ending tasks; however, their involvement has rarely been discovered. Our study fills the gap. By introducing the stressors emerged in the ending phase, the study provides an originative perspective of the authentic surrounding project managers face in the ending phase of projects. Furthermore, the method of combining the project managers' capability and environmental stressor can more clearly elicit the mechanism of how stress affects performance, which is also innovative for theory building. Practically, the results provide inspirations for both project and organizational human resource management. For project management practices, the research involves two tasks that require project managers' capability and efforts, and in terms of organizational strategic value integration, they are both important. However, our results show that the process of knowledge asset accumulation is vulnerable to the existence of project ending stressor. Because their influence on strategic implementation is weak, project managers tend to ignore it under stressful conditions. Given that the process of accumulating knowledge asset is unsystematic, it deserves more attention by organizational senior managers. For human resource management in project-based organizations, the study implies the importance to take care of the well-being of project managers in the project ending phase. Because part of the stressors come from future job uncertainty and work-life imbalance, and the stressors have negative influence on performance, measures like sharing or diverting project managers'

ending pressure might be helpful. Actually, in project-based organizations, human resource management by and large provides organizations with competent people instead of caring for employees' well-being. The main reason is that dealing with well-being problems requires management resources and is usually a threat to profitability (Turner et al., 2008). But our study empirically demonstrated that the well-being is also important and can be beneficial for organizational profits. Project-based organizations should also pay more attention on human resource management strategies concerning the project ending phase. Organizations could try to relieve the pressure of project managers by methods like offering long-term career plan, giving support for new assignment, and caring about probable family separations when new project comes with inevitable relocation of project managers.

### 7.2. Limitations and future research

Limitations of this study should also be noted. First, this study focused on the objective stressors, while several variables associated with project managers' psychological states (like perceived stress, burnout, and job satisfaction) may mediate the relationship between environmental stressors and work performance, and others associated with personal traits (like gender, psychological capital, and emotional intelligence) moderate the same relationship. Future research efforts should be made to study these intermediate mechanisms. Second, the emphasis on aspects of *project ending stressor* might also vary in different industries. For information technology projects, project duration is relatively short, and project proliferation is fast; hence, project managers might deal with massive workload before deadline. However, the relatively fixed workplace location of information technology projects will not cause additional pressure. By contrast, for construction projects, especially if work relocation or long-term business trip is frequent, *family support* and *job readjustment* will be significant. Our study did not distinguish among different industries but drew general conclusions. Besides, the sample size of the study is adequate for SEM but relatively low for analyzing phenomena for different industries. On the basis of the conclusions, follow-up studies can explore the content and influence of industry-specific *project ending stressor* based on larger sample size and higher-level moderation effects involving personal traits (like emotional intelligence) or organizational factors (like organizational enablers).

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### Appendix. Scale for project ending stressor

A 5-level Likert scale with 22 items and six dimensions; 1 = the level of stressors is low, 5 = the level of stressors is high.

The statements below describe the project stressors a project manager might encounter in the project ending phase, please rate how serious these statements might cause his/her pressure in ending phase of his/her latest participated project.

**Table 7**  
Measurement scale for project ending stressor.

Factor	Items	Scale
Skill Discretion	1. Learn new things and skills.	1 2 3 4 5
	2. Lots of repetitive work is involved.	1 2 3 4 5
	3. Project requires high skill level.	1 2 3 4 5
	4. Variety of tasks are involved.	1 2 3 4 5
Decision Authority	5. Project allows his/her own decisions.	1 2 3 4 5
	6. Project offers little decision freedom.	1 2 3 4 5
	7. Project requires his/her influential opinions.	1 2 3 4 5
Job Demands	8. Hard work is involved.	1 2 3 4 5
	9. Project involves excessive work.	1 2 3 4 5
	10. Lack enough time.	1 2 3 4 5
	11. Conflicting demands are involved.	1 2 3 4 5
Job Insecurity	12. Unsure about steady new project assignment.	1 2 3 4 5
	13. Unsure about promotion in follow-up assignment.	1 2 3 4 5
	14. Unsure about wellbeing in follow-up assignment.	1 2 3 4 5
	15. Unsure his/her skills are valuable in follow-up assignment.	1 2 3 4 5
Job Readjustment	16. Position and power will change after current project.	1 2 3 4 5
	17. Adjust to new work content soon.	1 2 3 4 5
	18. Adjust to new environment, regulations and culture.	1 2 3 4 5
	19. Build new interpersonal relationships in new assignment.	1 2 3 4 5
Family Support	20. New workplace may be located elsewhere.	1 2 3 4 5
	21. New project induced resettlement or separation will influence spouse.	1 2 3 4 5
	22. New project induced resettlement or separation will influence children.	1 2 3 4 5

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