Soft skills of construction project management professionals and project success factors: a structural equation model

Structured Abstract

Purpose - The objectives of this study are: to identify the soft skills of construction project management; and to investigate the influence of these soft skills on project success factors in the Vietnamese construction industry.

Design/methodology/approach – A questionnaire survey was conducted with 108 project management professionals from the Vietnamese construction industry. Partial least square structural equation modelling was employed in data analysis.

Findings - Four-dimension structure of project success factors were confirmed in this study. Results also showed soft skills of project managers significantly contributed to project success factors and hence the project success.

Research limitations - There may be geographical limitation on the conclusions drawn from the findings. Similarly, the sample size was still small, despite a relatively high response rate. In addition, the majority of the respondents were contractors and clients as other project players were reluctant to respond to the survey.

Practical implications - This study provides an understanding of the relationship between soft skills and project success factors.

Originality/value – Although there have been studies focused on soft skills of project management and project success factors, few have attempted to analyze the effects of these soft skills on critical success factors. Thus, this study adds significantly to the existing research on both project management skills and project success factors.

Introduction

Managing construction projects is a challenging job. This is arguably due to the significant impacts of construction activities on the environment, economy, and surrounding community (Hwang *et al.*, 2015; Zuo and Zhao, 2014). It is the responsibility of project managers to minimize these impacts along the project life cycle. There are also a number of stakeholders the project manager has to manage apart from various resource constraints (Xie *et al.*, 2014; Zhao *et al.*, 2012). The project manager has to deal with all these challenges to achieve the project success.

The last decades have witnessed the revolution of the concept of project success. This is associated with the characteristics of successful projects recognized by the industry practitioners. There has been extensive debate on whether or not project success can be measured or quantified (De Wit, 1988). However, it is well recognized that successful projects share some common characteristics. Hence, these common characteristics can be used as "measures" for project success to a certain degree.

Traditional measures of project success are: time, cost, and quality. Known as iron triangles, these project success criteria have been adopted in a large number of projects (Atkinson, 1999). Pinto and Slevin (1988) added the client dimension by arguing that the ultimate goal of managing a project is to satisfying clients. Shrnhur *et al.* (1997) suggested that time horizon should be introduced when identifying successful projects. They added two new dimensions of project success, i.e. business success and future opportunities. Similarly, there are other emerging project success criteria such as functionality, health, safety, productivity, and environmental sustainability (Lam and Gale, 2014; Yong and Mustaffa, 2012; Zhang and Fan, 2013)

The other school of thought is on drivers to the project success. A large number of studies have been undertaken to identify most critical factors that can contribute toward project success. It is well recognized that there are many factors that may affect the project performance and project success. However, due to the resource constraints, it makes sense for project managers to focus on those most critical success factors. Via efforts on these critical success factors, it is likely to achieve the project success. This study places focuses on the project success factors and the potential impacts of construction project management professionals' soft skills.

Previous studies have shown that a main cause of project failure is the lack of competencies in soft skills from the project management professionals (Ling *et al.*, 2009; Muzio *et al.*, 2007). Thus, it is necessary to examine the influence of soft skills on those critical success factors, which in turn enhance the likelihood of project success.

Vast majority of existing studies related to project manager's soft skills were conducted in context of developed countries. This study focuses on a developing country, Vietnam. The Vietnamese construction industry is expected to maintain a nominal growth rate of 11.43% in 2014-2018 due to the government's focus on industrial and residential construction (Timetric, 2014). However, Vietnamese construction projects are suffering from various issues such as delays, cost overruns, and poor quality, which are detrimental to the project success. Long *et al.* (2008) found that incompetence of project management staff significantly contributed to time and cost overruns in Vietnam.

The specific objectives of this study are to: (1) identify the soft skills commonly used in construction project management; and (2) investigate the influence of these soft skills of project managers on project success factors in the Vietnamese construction industry. As few studies have attempted to investigate the relationship between soft skills of project management and project success factors, this study significantly contributes to the existing body of knowledge relating to project management. In addition, although this study focuses on the Vietnamese construction industry, the method can also be used in project management studies in context of other countries. Furthermore, the identification of the soft skills allows management professionals to customize their own project management guide book, thus contributing to the practices.

Literature Review

Project managers' skills as defined in project management guidelines

Project management concepts have been applied widely in various industries due to substantial benefits and strategic value to organisations. According to the Project Management Institute PMI (2013)**Error! Bookmark not defined.**, to ensure the effective project management, project management professionals are required to possess skills, general management expertise and other competencies. Hard project management skills help to manage the course of projects efficiently. However, as a result of globalisation and economy volatility, project management professionals are required to manage more complex projects and deal with people related issues. It might be more crucial to align the internal and external stakeholders than how the project is technically executed in order to achieve project success. It is imperative for project management professionals to understand the importance of solving people related issues among various stakeholders so that the mutual understanding can be achieved (Ruuska and Vartiainen, 2003). Thus, the roles of project management professionals have been broadened to include not only technical expertise but also the competencies for managing people.

The skill sets of project management professionals have changed dramatically. Pant and Baroudi (2008) highlighted the need for a more balanced approach between hard and soft skills within the project management education. In recent years, soft skill has attracted a growing level of attention from both academics and management professionals within the project management discipline. The PMBOK® Guide by the PMI (2013) addresses the need for project managers to grasp interpersonal skills including leadership, team building, motivation, communication, influencing, decision-making, political and cultural awareness, negotiation, trust building, and conflict management. These are similar to the competence

baseline proposed by the International Project Management Association (IPMA, 2006), which consists of technical, behavioural, contextual competencies and the people factors.

Soft and hard skills of project management

Existing studies on the construction industry have established the changing role of project management professionals and how they are required to perform functions outside the traditional scope of project management. Edum-Fotwe and McCaffer (2000) pointed out that the construction management professionals should acquire a broad range of knowledge and skill elements. Those skills can be broadly divided into specific skills and general skills. Specific skills refer to knowledge and lead directly to the construction projects while general skills provide much of the foundation for developing the project management skills including leading, communicating, negotiating, and problem-solving. From another perspective, Ahadzie *et al.* (2008) argued that behavioural measures can assist construction project management professionals in contributing more effectively to projects. Behavioural competencies can be grouped into two main types: task performance behaviours and contextual performance behaviours. Whilst the former contributes to the technical functions and are job-specific, the contextual behaviours refer to job-related acts that assist in organisational effectiveness.

Correspondingly, professional associations do pose an influence on the thinking of scholars and management professionals, such as through the Project Manager Competency Development Framework (PMI, 2008), the APM Competence Framework (APM, 2006), and the IPMA Competence Baseline for Project Management (IPMA, 2006). These frameworks provide detailed insights into developing the competency of project managers for both hard and soft skills. These guidelines have highlighted a common issue that insufficient interactions amongst project stakeholders are detrimental to project success. Hard skills might

be addressed by means of professional qualification. However, it remains unclear whether interpersonal skills are equally important for selecting project managers (Creasy and Anantatmula, 2013).

Soft skills from the perspective of behaviours

Soft skills can be examined from the perspective of human behaviours. Ahadzie *et al.* (2008) indicated that contextual performance behaviours were more critical than task-related performance behaviours. That is, contextual behaviours may have much influence on the organisational, social and psychological environment. Similarly, Fisher (2011) identified the most important skills an effective project manager as: understanding behavioural characteristics, leading others, influencing others, authentic behaviour, conflict management, and cultural awareness. Meanwhile, 15 behavioural competences of project personnel are identified in the IPMA competence Baseline (IPMA, 2006). In the Project Manager Competency Development Framework, project management professionals' competencies are also demonstrated by assessing their behaviours (PMI, 2008). These frameworks indicate that a mixture of hard and soft skills is required for project management.

Soft skills and emotional intelligence

Soft skills originate primarily from an underlying but interconnected emotional intelligence (Golemon *et al.*, 2004; Zhang *et al.*, 2013). Golemon *et al.* (2004) argued that emotional intelligence were twice as important as technical skills for jobs at all levels. Their emotional intelligence model is a mixture of personality traits and emotional competencies including self-awareness and social competencies that can be learned and could result in an outstanding performance in the workplace. In addition, Pant and Baroudi (2008) asserted that the tacit knowledge, such as subjective, cognitive and experiential learning, was closely linked to

emotional intelligence. Similarly, Boyatzis (2011) defined various dimensions of project managers' emotional competencies, i.e. emotional, social, and cognitive intelligence.

As shown in Table 1, teamwork, leadership, communication, conflict management, achievement motivation, and cognitive are highlighted as the most important soft skills in previous studies.

<Insert Table 1 here>

Project success factors

Boynton and Zmud (1984) argued that critical success factors (CSFs) were those few activities that must go well to ensure success for a manager and an organization. The distinction between success factors and success criteria should be noted. Success factors are the inputs to the management system that directly or indirectly contribute to the success of a project, while success criteria are the measures by which success of a project is judged (Nguyen *et al.*, 2004). Similarly, Creasy and Anantatmula (2013) suggested that project success should be a result of managing resources, especially human resources and team.

However, no explicit performance objectives of project managers' skill set have been identified as a contributor to project success. Similarly, Belassi and Tukel (1996) suggested project success factors should be related to a project, a project manager and team, an organization, and external environment, respectively.

In the construction industry, project success is highly dependent on the effectiveness of a project team, which can contribute their capabilities, knowledge and skills towards completing the project (Chen *et al.*, 2012). In Vietnam, Thi and Swierczek (2010) found that problem-solving, commitment, teamwork, communication, decision making, and negotiation were critical to construction project success. In addition, Nguyen *et al.* (2004) identified a

comprehensive list of success factors for large construction projects, and consequently categorized these factors into four groupings: comfort, commitment, competence, and communication. According to Nguyen *et al.* (2004), comfort indicates the alignment among resources, efforts and leadership; competence illustrates necessary experience and expertise; commitment describes the willingness of all stakeholders to achieve project success; and communication explains the effective information sharing and exchange amongst project stakeholders (Nguyen *et al.*, 2004). This four-dimension structure of project success was also verified by the executives from the Vietnamese construction industry. As this study focused on the Vietnamese construction industry, the framework of Nguyen *et al.* (2004) was adopted.

Research Methodology

Questionnaire survey technique has been widely employed in project management research (e.g., Deng *et al.*, 2014; Hwang *et al.*, 2014; Ning, 2014). Thus, a questionnaire survey was undertaken to collect the professional views on soft skills and project success. A comprehensive literature review was conducted to support the development of the questionnaire. As discussed in the previous section, soft skills of construction project managers are measured in six dimensions, i.e. communication, leadership, conflict management, achievement motivation, teamwork, and cognitive. A total of 31 variables were identified from the Project Manager Competency Development (PMCD) framework developed by PMI (2008). As for project success factors, a four-group framework with 15 variables, which was proposed by Nguyen *et al.* (2004), was adopted in this study.

The questionnaire consists of three sections. The first section aimed to profile the respondents and their companies. Sections 2 and 3 presented the 31 soft skill variables and 15 project success variables with the respective descriptions. According to the "seven plus or minus two" principle (Miller, 1956), the model adopts the scale of five, which makes it convenient

for users to judge. Respondents were asked to rate the importance of each variable according to a five-point Likert scale (1 = very unimportant; 2 = unimportant; 3 = neutral; 4 = important; and 5 = very important).

The population consisted of all the project management participants in the Vietnamese construction industry. Convenience sampling was used in this study (Ling *et al.*, 2015; Oladinrin and Ho, 2016). A total of 164 questionnaires were distributed and 108 valid responses were returned, with a response rate of 66.

The profile of the respondents and their companies is shown in Table 2. Most respondents were from constructors (44.4%) and clients (41.7%). In addition, 48.1%, 20.4% and 11.1% were project team members, leaders and project managers, respectively. In terms of industry experience, 75.7% had over five years of experience.

<Insert Table 2 Here>

Data Analysis

Data analysis techniques

Based on the literature review, a hypothesis model was developed to investigate the relationships between soft skills in construction project management and project success factors in the Vietnamese construction sector, as shown in Figure 1. In this model, soft skill is deemed as a six-dimensional and second-order construct, which is composed of communication skill, leadership skill, conflict management skill, achievement motivation skill, teamwork skill, and cognitive skill. Project success factors are deemed as a four-dimensional and second-order construct, consisting of comfort, competence, commitment, and communication. It should be noted that the four first-order constructs are not aimed at measuring project success. The arrows between the first- and second-order constructs represent the inclusive relationships. In this study, it is hypothesized that the adoption of soft

skills in construction project management contributes to critical success factors. This in turn contributes to project success. To test this hypothesis model, structural equation modelling (SEM) was adopted in this study.

<Insert Figure 1 Here>

SEM model consists of two types of variables, i.e. observable variables and latent variables are used in SEM. Observable variables can be directly measured. On the contrary, latent variables are hypothetical or theoretical constructs inferred from the observable variables (Zhao *et al.*, 2013). A SEM consists of the measurement and structural models. For example, the measurement model provides the relationships between each specific soft skill (the observable variable) and its respective grouping (the latent variable), while the structural model presents the relationship among the soft skill groupings (the first-order latent variables). In this study, the hypothesis model is a second-order hierarchical model. Specifically, the second-order latent variable "soft skill" consists of six first-order latent variables, and the second-order latent variable "project success factors" consists of four first-order latent variables.

Generally there are two types of SEM, i.e. covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM) (Zhao *et al.*, 2013). CB-SEM involves constraints regarding the data distribution, sample size, and model complexity (Chin, 1998; Fornell and Bookstein, 1982). These constraints can be more formidable in the case of hierarchical models (Wetzels *et al.*, 2009). However, the use of PLS-SEM can entirely avoid such constraints because PLS-SEM can analyse complex problems with the data that does not satisfy the assumptions of normality and large sample size (Chin and Newsted, 1999; Fornell and Bookstein, 1982; Hair *et al.*, 2012). This advantage has contributed to the wide use of PLS-SEM in the recent

project management studies (e.g, Le *et al.*, 2014; Liu *et al.*, 2016; Zhao *et al.*, 2015). In this study, PLS-SEM was used to test the hypothesis hierarchical model.

In a single structural equation model, confirmatory factor analysis (CFA) and path modelling can be performed simultaneously (Lim *et al.*, 2011; Zhao *et al.*, 2013). CFA is to test the measurement model, namely the relationship between the observable variables and their respective latent variable. In this study, CFA was conducted to confirm the soft skill groupings and project success factors groupings. During this process, four types of reliability and validity of the measurement models should be assessed, i.e. (1) internal consistency reliability; (2) indicator reliability; (3) convergent validity; and (4) discriminating validity (Shan *et al.*, 2015).

As a measure for the internal consistency reliability, the value of Composite Reliability (CR) should be more than 0.70 (Hair *et al.*, 1998). The indicator reliability is evaluated via the loadings of observable variables on the corresponding latent variables (Shan et al. 2015). Those indicators with loadings of lower than 0.70 can be removed if the CR reaches the threshold as a consequence (Hair *et al.*, 2011). However, if their contributions to content validity is evident, these indicators could be retained despite low loadings (Hair *et al.*, 2011). In most studies using PLS-SEM, the actual threshold value of loadings was 0.40 (Comrey, 1973; Matsunaga, 2010; Ning, 2014). The average variance extracted (AVE) is used to evaluate the convergent validity, and the threshold value is 0.50 (Fornell and Larcker, 1981). Similarly, the square root of the AVE of each latent construct should be higher than the inter-construct correlation and a measurement item's loading on its respective grouping should be higher than the cross loadings (Chin, 1998; Fornell and Larcker, 1981). These are two key measures for discriminant validity.

PLS path modelling can analyse a hierarchical model through the repeated use of observable variables (Guinot *et al.*, 2001; Tenenhaus *et al.*, 2005; Wetzels *et al.*, 2009). Specifically, a second-order latent variable can be created by making this latent variable to represent all the observable variables of its underlying first-order latent variables. As a result, the observable variables are used for both the first-order latent variable and the second-order latent variable (Wetzels *et al.*, 2009).

Consequently, the bootstrapping technique (Davison and Hinkley, 1997; Efron, 1987) was applied to estimate the significance of path coefficients and evaluate the structural model. In this study, the number of bootstrap samples was 5,000, as recommended by Hair *et al.* (2011), and the number of cases was equal to the number of responses (i.e. 108). The critical t-value for a two-tailed test is 1.96 (significance level = 0.05) (Zhao *et al.*, 2013).

Analysis and results

Tables 3, 4 and 5 show the evaluation results of measurement models. Three communication skills (CommuSk3, CommuSk4, and CommuSk5) received loadings below 0.40, and were removed. As shown in Table 3, the other obsearvable variables obtained loadings ranging from 0.405 to 0.847, indicating the acceptable indicator reliability. All the CR values were over 0.70, suggesting a satisfactory level of internal consistency reliability. In addition, the AVE of each construct was higher than 0.50, showing an acceptable level of construct convergent validity.

Table 4 indicates that the square root of the AVE value of each construct is higher than its correlation with any other construct. Table 5 shows that each observable variable has the highest loading on the corresponding construct. These results indicate the high discriminate validity of the constructs. Thus, the measurement model was reliable and valid for the

structural path modeling, and the soft skills groupings and project success factors groupings were confirmed.

<Insert Tables 3, 4 and 5 Here>

Table 6 shows that all path coefficients for hierarchical models are significant at the 0.05 level, with t-values higher than 1.96. This result confirmed the six dimensions of soft skills and the four dimensions of project success factors in the hypothesis model. The CR values of the second-order construct "soft skill" and "project success factors" were 0.916 and 0.898, respectively, suggesting a satisfactory level of reliability of the first-order constructs with the corresponding second-order construct. The path coefficient between "soft skill" and "project success factors" was 0.767 with a t-value of 15.73, suggesting the path was significant at the 0.05 level. Thus, the hypothesis that the adoption of soft skills in construction project management contributes to project success factors was supported. Figure 2 shows the test results of the hypothesis model.

<Insert Table 6 Here>

<Insert Figure 2 Here>

Discussion

In previous studies, soft skills have been recognized as critical competences of project management professionals. However, most of these studies are conceptual in nature which provided little empirical data. This study offers empirical evidence that project managers' soft skills contribute toward the critical project success factors (the path coefficient is 0.767). The path analysis results showed that there was statistically significant causal relationship between project managers' soft skills and critical success factors, which in turn helps to achieve the project success. All path coefficients were more than 0.6. Conflict management was the soft skill which received the highest path coefficient, i.e. 0.861.

A large number of stakeholders are involved in a typical construction project. It is not unusual that these stakeholders do not share the same vision and have different goals to achieve. Such conflict has been recognized as a critical barrier to achieve high efficiency and optimal performance in construction projects (Rajeh *et al.*, 2015). To manage these conflicts properly, it is imperative to establish trust-based relationship among project stakeholders and to distribute resources fairly (Al-Sibaie *et al.*, 2014). The common approach to manage conflicts varies in different cultures. Therefore, cultural factors need to be taken into account when developing conflict management strategies. In Asian culture, face-saving places a crucial role in conflict management as it has significant impacts on business relationships (Yiu and Chung, 2014). In the context of Vietnam, there is empirical evidence that effective conflict resolution leads to higher level of trust between project stakeholders (Ling and Tran, 2012).

Teamwork skills received the second highest path coefficient (0.840). Aiming for collaborating with others towards the shared goal, teamwork has attracted a wide attention in project management research and practice. However, there have been some debates as shown in recent studies. Zhang *et al.* (2013) classified teamwork as one component of emotional intelligence. Their survey with project managers in the Chinese construction industry showed that there is no statistical significant relationship between teamwork and project performance. Suprapto *et al.* (2015) argued that teamwork played a mediating role in the impacts of rational factors on the project performance. Yang *et al.* (2011) suggested that the relationship between teamwork and project success was moderated by the project type. It is interesting to note that previous studies in the context of Vietnam have highlighted the teamwork related issues. Nguyen et al. (2007) asserted that one of critical challenges to project teams in Vietnam was ineffective teamwork. This was echoed by Vo and Hannif (2012) who noted that Vietnamese managers did not tend to value collaboration-related behaviours, such as

sharing power and delegation, which was a source of conflict and detrimental to the project success.

Achievement motivation skills also received a high path coefficient (0.818). It has been well recognized that motivation plays a crucial role in achieving project success. Therefore, project managers should recognise the need to motivate and support other team members to cope with project challenges. Schmid and Adams (2008) argued that three common sources of de-motivation in the context of project management were: lack of top management support, personnel conflicts amongst project team members, and change of project scope. A number of approaches are available for project motivation, such as economic approach, social approach, and psychological approach. Kim *et al.* (2015)'s study showed that achievement was one of critical psychological factors that motivate foreign labours to perform in the Korean construction industry. However, it is worth noting that formal monetary motivation is still widely used in the construction industry. Kim *et al.* (2015) revealed that economic factors (e.g. salary, incentives, welfare) were more influential than social and psychological factors in terms of project motivation. By contrast, this study suggested that attention needs to be paid to the achievement motivation skills, i.e. competent project management professionals are driven by competition, achievement and success. Indeed, current achievement and future opportunities could provide more motivations to project team members (Seiler *et al.*, 2012).

Cognitive skill is also a vital competence of project managers. According to Huang *et al.* (2015), specific cognitive skills moderated the relationship between exploitation learning and project efficiency. However, Ahadzie *et al.* (2008) argued that the cognitive skills did not have direct impacts on the job performance of project managers. Rather, such influence is mediated by job knowledge (Ahadzie *et al.*, 2008). Decision-making and problem-solving

skills, which build on cognitive skill, were regarded as the second and third most important skill of project management professionals respectively in the context of Vietnam (Thi and Swierczek, 2010). One of critical issues associated with managing construction projects in Vietnam is the ineffectiveness of decision-making. The decision-making process is not only dependent on the project team but also achieved through the involvement of senior management. Excessive changes in orders, slow decision-making processes, and interference have been frequently cited in the project failure (Nguyen et al., 2004).

Leadership skill and communication skills received slightly lower path coefficient, i.e. 0.671 and 0.604 respectively. Geoghegan and Dulewicz (2008) suggested that leadership competency of project managers made certain contribution to the project success. They further highlighted critical dimensions of leadership such as: managing resources, self-awareness, critical analysis, and sensitivity. However, Yang *et al.* (2011) argued that teamwork had moderating effect on the association between leadership competency and project success. Vo and Hannif (2012) pointed out that Vietnamese managers had acquired some forms of shared leadership behaviours, such as being people-oriented. These leadership behaviours, thus, would create shared values and minimise differences in the multidisciplinary and multicultural project environment. The project manager who is accountable for project delivery will have a positive and significant impact on project outcomes (Thi and Swierczek, 2010).

Similarly, effective and efficient communication plays a critical role in project management. A large amount of information is generated in a typical construction project. This is especially the case in complex projects. Therefore, it is a challenge to communicate this information amongst various project stakeholders timely and accurately. Henderson (2008) argued that the communication competency of project managers had significant impact on the

project team's productivity and satisfaction. Effective communication helps to achieve team cohesiveness, mutual understanding and a sense of ownership in the project (Yang *et al.*, 2011). Luu *et al.* (2008) stated that the poor performance of Vietnamese project teams resulted from a lack of communication and subsequent slow decision-making. Thus, effective communication skill is of great importance to project success.

Conclusions and Recommendations

This study aims to identify the soft skills commonly used in the management of construction projects and to investigate the influence of these soft skills of project managers on the project success factors in the Vietnamese construction industry. Through PLS-SEM, the 28 soft skills under six categories and the 15 project success factors under four categories were confirmed with empirical evidence, and three soft skills were excluded from the hypothesis model. In addition, the quantitative effect of soft skills on project success factors was statistically significant. Therefore, with the empirical evidence, this study confirmed that soft skills of project managers significantly contributed to the project success factors in the Vietnamese construction industry. Soft skills of project management professionals are necessary for a good use of these critical success factors. This in turn helps to achieve the project success.

Despite the achievement of the objectives, this study, unavoidably, has some limitations. First, because of difficulty in constructing a probability sample, a non-probability sample was used in this study. In spite of inherent limitation, this sampling method is appropriate when the respondents are not randomly selected from the entire population, but are selected based on their willingness to participate into the study (Wilkins, 2011). Second, the soft skills and the project success factors used in this study are not exhaustive. To reduce the length of the questionnaire and increase the response rate, only the most frequently cited soft skills were further examined in this study. Third, the linguistic terms used in the Likert scale, such as

'neutral', may lead to some biases in the subjective judgments of the respondents. Additionally, the findings of this study are interpreted in the context of Vietnam, which may be different from the context of other countries.

Despite these limitations, this study provides an understanding of the soft skills for project management in the Vietnamese construction industry and their quantitative effect on project success factors. First, through CFA, this study confirmed the 28 soft skills from the PMCD framework developed by PMI (2008) and the 15 project success factors proposed by Nguyen *et al.* (2004), excluding three soft skills from the preliminary hypothesis model. Second, few studies have attempted to investigate the relationship between soft skills of project management and project success factors. This study significantly contributes to the literature relating to project management, through empirically testing the quantitative effect of soft skills on project success factors. In addition, PLS-SEM was used to analyse the hierarchical model with first-order and second-order variables. Although this study focuses on the Vietnamese construction industry, the method can also be used in the context of other countries. From the practical perspective, this study highlighted a list of critical soft skills that project management professionals need to grasp. Consequently, industry practitioners can customize their own project management guide book in a bid to enhance the likelihood of project success. For instance, more trainings and resources could be made available for developing project management professionals' conflict management skills due to its highest path coefficient with project success factors.

Future research opportunities exist to investigate the influence of moderating factors, such as project size and complexity, and project governance with reference to the link between soft skills and project success factors. In addition, future research could be undertaken to examine

the quantitative effect of specific soft skill categories on specific project success factors, through the use of PLS-SEM.

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Table 1
Critical soft skills for project management professionals

Soft skills	Literatures												N
	1	2	3	4	5	6	7	8	9	10	11	12	
Teamwork and collaboration	√	√		√	√	√	√	√	√	√	√	√	11
Leadership	√	√			√	√			√	√	√		8
Effective communication	√	√				√	√	√	√	√	√	√	9
Conflict management	√	√	√	√	√					√	√	√	8
Achievement motivation	√	√				√		√	√	√	√	√	8
Cognitive skills	√	√	√	√		√	√	√	√		√	√	10
Adaptability		√	√	√	√	√							5
Self-control		√		√	√		√			√			5
Negotiation	√	√							√			√	4
Social awareness	√			√	√		√						4
Building trust		√			√				√				3
Influencing		√		√						√			3
Cultural awareness		√								√			2
Empathy		√		√	√								3
Coordination		√										√	2
Delegation		√										√	2
Perceived role and responsibilities		√										√	2

Literatures: 1. PMI (2008); 2. IPMA (2006); 3. Ahadzie *et al.* (2008); 4. Boyatzis (2011); 5. Golemon *et al.* (2004); 6. Dainty *et al.* (2004); 7. Zaharim *et al.* (2012); 8. Musa *et al.* (2012); 9. Edum-Fotwe and McCaffer (2000); 10. Fisher (2011); 11. Hyväri (2006); 12. Belassi and Tukel (1996)

Table 2
Profile of companies and respondents

Characteristics			N	%
Companies		Client	45	41.7%
		Constructor	48	44.4%
		Supplier	5	4.6%
		Consultant	10	9.3%
Respondents	Designation	Middle manager	21	19.4%
		Project team leader	22	20.4%
		Project manager	12	11.1%
		Project team member	52	48.1%
	Years of experience	< 5	37	34.3%
		6-10	39	36.1%
		10-15	17	15.7%
		15-20	6	5.6%
		> 20	9	8.3%

Table 3
Evaluation of measurement models

Construct	Variable	Description	Loading	AVE	CR
Communication skill (CommuSk)	CommSk1	Project practitioner understands explicitly the content of communication.	0.839	0.501	0.745
	CommSk2	Project practitioner maintains effective formal lines of communication in the project.	0.565		
	CommSk3	Project practitioner maintains effective informal lines of communication involved in the project.	0.098*		
	CommSk4	Project practitioner uses appropriate information sources to solve the project works.	0.017*		
	CommSk5	Project practitioner aligns the information in an appropriate situation to the audience.	0.009*		
	CommSk6	Project practitioner constantly seeks opportunities to communicate the project status and directions.	0.689		
Leadership skill (LeadSk)	LeadSk1	Project practitioner performs high performance with positive expectations.	0.791	0.554	0.804
	LeadSk2	Project practitioner makes a contribution to building effective relationships with stakeholders.	0.565		
	LeadSk3	Project practitioner establishes mentoring relationships for team members' development.	0.616		
	LeadSk4	Project practitioner takes accountability for delivering the project tasks.	0.748		
	LeadSk5	Project practitioner uses influencing skills to stakeholders when required.	0.622		
Conflict management skill (ConfSk)	ConfSk1	Project practitioner is aware of team rules when delivering project tasks.	0.404	0.531	0.784
	ConfSk2	Project practitioner recognises conflict occurring within the project.	0.810		
	ConfSk3	Project practitioner seeks to avoid possible conflict of interests to all stakeholders.	0.584		
	ConfSk4	Project practitioner resolves the conflict with a satisfactory solution.	0.712		
	ConfSk5	Project practitioner maintains self-control in all situations.	0.701		
Achievement motivation skill (AchSk)	AchSk1	Project practitioner adapts flexibly towards project changes.	0.685	0.504	0.829
	AchSk2	Project practitioner responds positively upon the issues important to others.	0.659		
	AchSk3	Project practitioner uses assertiveness when necessary.	0.726		
	AchSk4	Project practitioner actively listens to other members or stakeholders.	0.792		
	AchSk5	Project practitioner makes sacrifices where necessary despite the challenges.	0.642		
Teamwork skill (TeamSk)	TeamSk1	Project practitioner maintains effective relationships among team members.	0.635	0.507	0.830
	TeamSk2	Project practitioner understands the roles of team members to the project.	0.751		
	TeamSk3	Project practitioner works with others to clearly identify the project plan.	0.780		
	TeamSk4	Project practitioner shares the expertise with others involved in the project.	0.725		
	TeamSk5	Project practitioner attempts to build consensus for making team decisions.	0.619		
Cognitive skill (CogSk)	CogSk1	Project practitioner takes a holistic view of project.	0.763	0.525	0.815
	CogSk2	Project practitioner applies complex concepts when needed to solve problems.	0.513		

	CogSk3	Project practitioner applies lessons learned to resolve current project issues.	0.634		
	CogSk4	Project practitioner aggregates multiple related issues to understand the complete picture of project problems.	0.717		
	CogSk5	Project practitioner seeks opportunities to improve project outcomes.	0.782		
Comfort (Comf)	Comf1	Adequate funding throughout the project	0.788	0.557	0.801
	Comf2	Comprehensive contract documentation	0.733		
	Comf3	Availability of resources	0.476		
	Comf4	Continuing involvement of stakeholders	0.521		
	Comf5	Competent project managers	0.743		
Competence (Comp)	Comp1	Up-to-date technology utilization	0.732	0.535	0.821
	Comp2	Proper emphasis on past experience	0.792		
	Comp3	Competent project team	0.674		
	Comp4	Award bids to the right designer/ contractor	0.723		
Commitment (Commit)	Commit1	Commitment to project	0.784	0.659	0.853
	Commit2	Clear project objectives	0.847		
	Commit3	Top management support	0.704		
Communication (Commu)	Commu1	Community involvement	0.783	0.588	0.809
	Commu2	Clear communications channels	0.841		
	Commu3	Frequent progress meeting	0.666		

* CommuSk3, CommuSk4, and CommuSk5 receive loadings below 0.4 and are removed.

Table 4
Discriminant validity

Construct	CommuSk	LeadSk	ConfSk	AchSk	TeamSk	CogSk	Comf	Comp	Commit	Commu
CommuSk	**0.708**									
LeadSk	0.552	**0.744**								
ConfSk	0.448	0.473	**0.729**							
AchSk	0.329	0.391	0.670	**0.710**						
TeamSk	0.395	0.432	0.690	0.644	**0.712**					
CogSk	0.392	0.428	0.637	0.619	0.604	**0.724**				
Comf	0.551	0.327	0.640	0.497	0.583	0.530	**0.746**			
Comp	0.465	0.524	0.416	0.407	0.460	0.392	0.615	**0.731**		
Commit	0.479	0.492	0.716	0.628	0.649	0.581	0.730	0.674	**0.812**	
Commu	0.375	0.506	0.409	0.336	0.421	0.472	0.418	0.573	0.513	**0.767**

Note: Bold values are the square roots of the AVE value of constructs

Table 5
Cross loadings of observable variables

Code	CommuSk	LeadSk	ConfSk	AchSk	TeamSk	CogSk	Comf	Comp	Commit	Commu
CommSk1	**0.839**	0.495	0.471	0.288	0.374	0.372	0.438	0.367	0.438	0.276
CommSk2	**0.565**	0.112	0.162	0.267	0.156	0.254	0.338	0.237	0.257	0.218
CommSk6	**0.689**	0.487	0.237	0.147	0.262	0.180	0.394	0.373	0.287	0.311
LeadSk1	0.646	**0.791**	0.461	0.303	0.403	0.365	0.381	0.475	0.472	0.447
LeadSk2	0.193	**0.565**	0.129	0.166	0.265	0.147	0.128	0.367	0.222	0.211
LeadSk3	0.324	**0.616**	0.159	0.290	0.150	0.279	0.071	0.256	0.239	0.220
LeadSk4	0.420	**0.748**	0.417	0.248	0.339	0.278	0.303	0.380	0.396	0.329
LeadSk5	0.134	**0.622**	0.309	0.304	0.246	0.335	0.111	0.260	0.251	0.441
ConfSk1	0.034	0.288	**0.404**	0.332	0.409	0.350	0.230	0.061	0.288	0.108
ConfSk2	0.527	0.377	**0.809**	0.565	0.564	0.608	0.596	0.390	0.621	0.362
ConfSk3	0.041	0.145	**0.584**	0.424	0.392	0.423	0.296	0.247	0.379	0.258
ConfSk4	0.360	0.276	**0.712**	0.411	0.429	0.329	0.494	0.286	0.537	0.226
ConfSk5	0.347	0.432	**0.701**	0.432	0.454	0.338	0.395	0.305	0.455	0.334
AchSk1	0.086	0.188	0.402	**0.685**	0.448	0.347	0.289	0.218	0.386	0.077
AchSk2	0.316	0.346	0.400	**0.659**	0.420	0.463	0.290	0.256	0.362	0.270
AchSk3	0.013	0.079	0.485	**0.726**	0.451	0.428	0.323	0.186	0.407	0.133
AchSk4	0.297	0.321	0.514	**0.792**	0.591	0.472	0.411	0.412	0.510	0.386
AchSk5	0.389	0.401	0.536	**0.642**	0.337	0.450	0.412	0.318	0.516	0.260
TeamSk1	0.194	0.295	0.278	0.385	**0.635**	0.390	0.164	0.360	0.293	0.181
TeamSk2	0.236	0.375	0.581	0.491	**0.751**	0.417	0.453	0.310	0.537	0.359
TeamSk3	0.404	0.279	0.634	0.523	**0.780**	0.435	0.608	0.470	0.670	0.383
TeamSk4	0.225	0.270	0.505	0.471	**0.725**	0.470	0.366	0.213	0.414	0.262
TeamSk5	0.316	0.309	0.372	0.382	**0.619**	0.421	0.401	0.260	0.305	0.268
CogSk1	0.590	0.484	0.511	0.444	0.486	**0.763**	0.544	0.433	0.523	0.442
CogSk2	0.048	0.122	0.264	0.384	0.384	**0.513**	0.239	0.139	0.290	0.129
CogSk3	0.060	0.312	0.439	0.372	0.378	**0.634**	0.319	0.322	0.397	0.417
CogSk4	0.233	0.175	0.447	0.475	0.430	**0.717**	0.294	0.167	0.406	0.310
CogSk5	0.272	0.307	0.488	0.461	0.399	**0.782**	0.367	0.235	0.352	0.278
Comf1	0.463	0.363	0.596	0.441	0.508	0.395	**0.788**	0.505	0.640	0.327
Comf2	0.361	0.134	0.440	0.365	0.457	0.456	**0.783**	0.430	0.547	0.311
Comf3	0.209	-0.020	0.275	0.272	0.310	0.332	**0.476**	0.173	0.295	0.144
Comf4	0.206	-0.026	0.244	0.335	0.312	0.314	**0.521**	0.221	0.336	0.190
Comf5	0.517	0.446	0.504	0.282	0.364	0.317	**0.743**	0.599	0.552	0.370
Comp1	0.322	0.393	0.230	0.292	0.360	0.356	0.397	**0.732**	0.396	0.432
Comp2	0.371	0.303	0.307	0.369	0.468	0.351	0.519	**0.792**	0.577	0.499
Comp3	0.446	0.453	0.291	0.227	0.239	0.185	0.447	**0.674**	0.432	0.401
Comp4	0.223	0.404	0.386	0.290	0.257	0.244	0.426	**0.723**	0.550	0.337
Commit1	0.231	0.331	0.548	0.545	0.561	0.461	0.529	0.516	**0.784**	0.467
Commit2	0.523	0.472	0.616	0.503	0.565	0.590	0.633	0.551	**0.847**	0.452
Commit3	0.401	0.391	0.577	0.482	0.453	0.356	0.612	0.575	**0.802**	0.331
Commu1	0.348	0.472	0.289	0.198	0.344	0.316	0.371	0.521	0.394	**0.783**
Commu2	0.309	0.429	0.302	0.234	0.316	0.410	0.264	0.468	0.362	**0.841**
Commu3	0.193	0.242	0.355	0.356	0.305	0.364	0.321	0.310	0.428	**0.666**

Table 6
Evaluation results of hierarchical models

Path	Path coefficient	T-value	CR
SS -> CommuSk	0.604	7.080	0.916
SS -> LeadSk	0.671	7.600	
SS -> ConfSk	0.861	31.660	
SS -> AchSk	0.818	23.590	
SS -> TeamSk	0.840	32.790	
SS -> CogSk	0.812	23.230	
PS -> Comf	0.855	29.460	0.898
PS -> Comp	0.707	13.380	
PS -> Commit	0.890	45.960	
PS -> Commu	0.864	26.650	
SS -> PS	0.767	15.730	

SS = Soft skill; PS = Project success factors

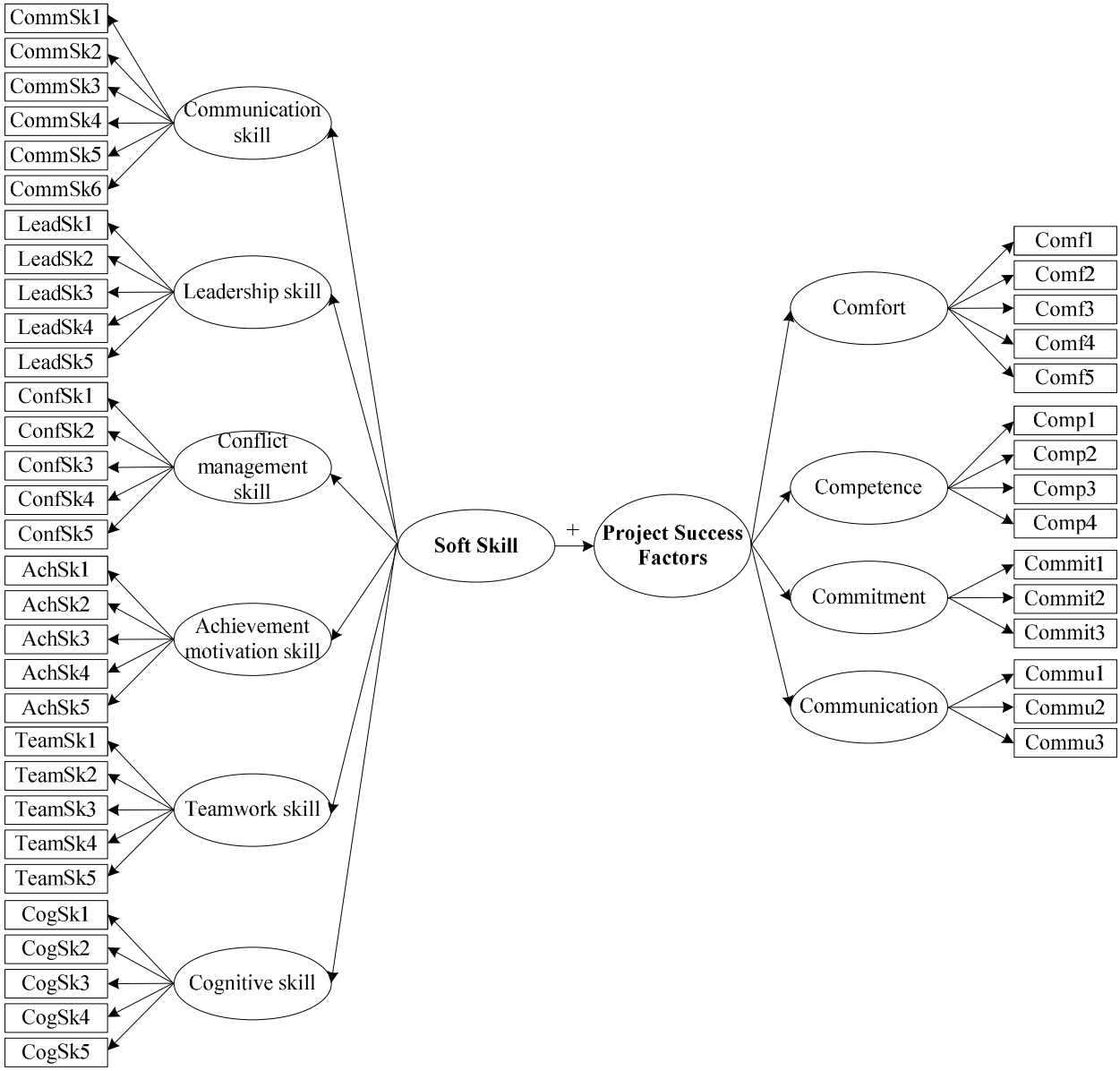

Figure 1. Hypothesis model

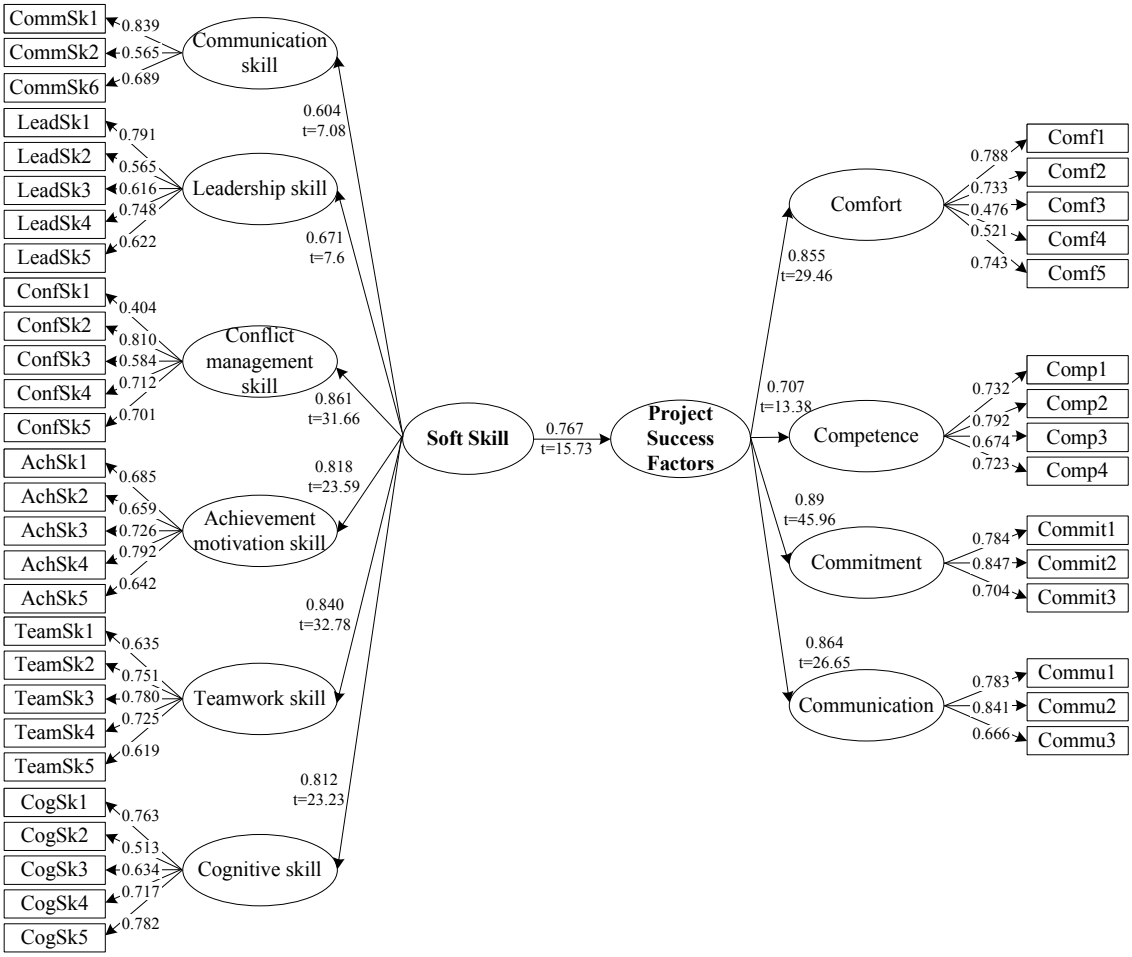

Figure 2. Testing results of the hypothesis model