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RESEARCH ARTICLE

Determining Success Criteria and Success Factors for International Construction Projects for Malaysian Contractors

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Abstract

The success of international construction projects is fraught with various challenges such as competitiveness, lack of resources, versatile global economy, and specific conditions in the host country. Malaysian contractors have been venturing into global construction market since early 1980s. However, their venturing was not successful all the time. The number of international projects awarded to Malaysian contractors has reduced drastically during the past decade. Taking advantage of this experience, this paper aims to identify the success criteria and success factors of international construction projects. The data was collected from 120 respondents using a questionnaire survey and analysed using principal component analysis and regression analysis. The results revealed three principal criteria of project success namely, Management Success, Functional Success, and Organisation Success. The main components of success factors include Team Power and Skills, Resource Availability, External Environment, Organisation Capability, Project Support, and Project Organisation. Further analysis emphasized the importance of strong financing capacity of contractors, project social environment, and competence of the project manager in achieving project success. The results of this paper can serve as a guideline for contractors and project managers to achieve success in this context. Future studies may provide in-depth analysis of success criteria and success factors specific for construction project type and host-country location.

Keywords

Global project success, factor analysis, project manager competence, financing capacity, host-country, Malaysia

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Introduction

International construction projects are distinct types of projects mainly because the performing organisation (i.e. contractor) is from another domicile or region. International contractors expand their business into the overseas market when the local market is stagnant, taking advantage of opportunities in other countries, or when they want to spread risk through diversification into new markets. Thus, the advantages of venturing into international market include greater profits, efficient resource utilization, growth and development, and competitive advantages over local contractors (Czinkota and Ronkainen, 2012; Isa et al., 2006; Zin, 1999).

However, achieving success of international construction projects is not easy. Contractors' competitiveness and capabilities are prerequisite conditions to complete projects successfully. Most importantly, achieving continuous project success is crucial to sustaining growth and development in this competitive market. There are several challenges facing international contractors including global market conditions, competition, lack of resources, lack of skilful team members, instability of the host country, and lack of support of the owner (Ahmed and Mohamad, 2016; Diall and Thuillier, 2005; Khang and Moe, 2008).

Malaysian contractors have been facing difficulties performing well in the international market. According to the data extracted from the Construction Industry Development Board (CIDB), the number of international construction projects undertaken by Malaysian contractors has reduced from over 70 projects in 2006 to only 7 projects in 2015 (CIDB, 2016). The estimated loss by this reduction is over 5 billion USD in project value. Recently, there have been some efforts to overcome this problem. The Construction Industry Transformation Programme (CITP) identified major steps to enhance the competitiveness and capabilities of the Malaysian construction firms to be leaders in the global market by 2020 (CIDB, 2015). Therefore, understanding how to measure the success of international projects and conditions affecting this success is critical to achieving this goal.

In line with the highlighted issue and the goal of CITP, this paper attempts to achieve two objectives. First, to identify the perception of Malaysian contractors toward success in the international market. Second, to identify the significant factors contributing to success in this context. A structured questionnaire survey, which was developed based on the abundant literature around project and construction management, is used to achieve these objectives. The survey targeted all international Malaysian contractors to provide a clear guideline of what constitute success for international construction projects. The following section provides an overview of success criteria and success factors from the literature.

Literature review

Previous studies on project success can be distinguished into two areas. The first includes studies concerned about understanding how project success can be perceived and measured. The second area includes studies that identify conditions or factors contributing to success. The two areas are covered in the following sections under project success criteria and project success factors.

PROJECT SUCCESS CRITERIA

The measurement of construction project success has been refined to include elements other than the 'iron triangle' of time, cost, and quality (Atkinson, 1999). Success should be measured based on different stakeholders such as project owner, users, contractors, and managerial team. Project stakeholders perceive success differently. For example, the project manager may view success based on project completion according to predetermined time, cost, and quality (Lim and Mohamed, 1999). Users may regard success based on functionality of the product (i.e. the building). Therefore, success has been expanded to include product success, in addition to project success (Baccarini, 1999). From contractors' perspectives, success can be measured based on profit from the project, completion on time, safety, number of claims, and commercial performance (Sanvido et al., 1992; Williams, 2016). Construction management literature has abundant lists of success criteria (Ahadzie, Proverbs and P.O., 2008; Al-Tmeemy, Abdul-Rahman and Harun, 2011; Chan and Chan, 2004; Collins and Baccarini, 2004; Hughes, Tippet and Thomas, 2004; Sanvido et al., 1992). These studies provide comprehensive measurement of construction success including the project and product measures at short, medium, and long terms. However, most of these studies focused on construction project in local context as shown in Table 1. This study tests the success criteria in the context of international construction projects relevant to contractors. Two dimensions are used for this purpose, namely project success (comprises of time, cost, quality, safety, scope, profit, satisfaction of customer, benefit to stakeholders, and fulfilling customer needs) and product success (comprises of functional requirements, competitive advantages of the performing organisation, reputation of the performing organisation, and market share).

PROJECT SUCCESS FACTORS

Lim and Mohamed (1999, p.243) defined project success factors as "the set of circumstances, facts, or influences which contribute to the project outcome". While success criteria provide the principles or standards to judge the success of projects, success factors facilitate achieving success. In the literature, there are numerous studies about success factors in construction projects. Previous studies can be classified as studies that focused on identifying a list of single factors (e.g. Nguyen, Ogunlana and Lan, 2004), a group of factors such as human-related factors (e.g. Chan, Scott and Chan, 2004), or critical success factors (e.g. Chua, Kog and Loh, 1999).

In general, the success factors of construction projects include support of client and top management, careful project initiation and planning, competency of team and project manager, effective leadership, commitment, adequate funding, adequate resources, and effective project monitoring and control (Ahmed and Mohamad, 2016; Belassi and Tukel, 1996; Cserháti and Szabó, 2014; Jiang et al., 1996). Success factors from contractors' perspective, according to Nguyen, Ogunlana and Lan (2004), include competency of project manager and team, adequate project funding, availability of resources, and commitment to the project from various stakeholders.

There are limited studies about success factors of international construction projects. In international development projects, some factors are highlighted, namely trust, communication, project environment, consultation, adequate resources, adequate support,

Table 1 Mapping success criteria of construction projects and gap in literature

Success criteria Reference Context - Type	Cost	Time	Quality	Functionality	Safety	Scope	Technical performance	Fulfilling needs	Satisfaction	Benefits to stakeholders	Profitability	Market share/new market	Reputation	Competitive advantages	Others (sustainability, productivity, zero defects, and fewer disputes)
Sanvido et al. (1992) <i>Local-Building projects</i>	✓	✓	✓	✓	✓			✓							
Baccarini (1999) <i>Not specified</i>	✓	✓	✓					✓	✓						
Shenhar, Levy and Dvir (1997) <i>Local-Different projects</i>	✓	✓					✓	✓	✓		✓	✓			
Shenhar et al. (2001) <i>Local-Different projects</i>	✓	✓		✓			✓	✓	✓	✓	✓	✓			
Chan, Scott and Lam (2002) <i>Local-Design/build projects</i>	✓	✓	✓	✓	✓		✓		✓		✓				✓
Collins and Baccarini (2004) <i>Local-Different projects</i>	✓	✓	✓		✓	✓		✓	✓	✓					
Chan and Chan (2004) <i>Local-Building projects</i>	✓	✓	✓	✓	✓			✓	✓						
Hughes, Tippet and Thomas (2004) <i>Local-Construction projects</i>	✓	✓	✓		✓		✓								✓
Ahadzie, Proverbs and P.O. (2008) <i>Local-Mass house building projects</i>	✓	✓	✓		✓				✓						
Takim and Adnan (2009) <i>Local-Construction projects</i>				✓				✓	✓	✓	✓	✓	✓		✓

Table 1 continues on the next page

Table 1 (Continued)

Success criteria Reference Context - Type	Cost	Time	Quality	Functionality	Safety	Scope	Technical performance	Fulfilling needs	Satisfaction	Benefits to stakeholders	Profitability	Market share/new market	Reputation	Competitive advantages	Others (sustainability, productivity, zero defects, and fewer disputes)
Al-Tmeemy, Abdul-Rahman and Harun (2011) <i>Local-Building projects</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
Pinter and Pšunder (2013) <i>Local-Construction projects</i>	✓	✓	✓		✓										
Williams (2016) <i>Local-Construction programs</i>	✓	✓			✓	✓			✓						✓

motivation, and competency of the project manager (Diall and Thuillier, 2005; Khang and Moe, 2008). Other success factors include effective communication among project key players, project manager's authority and empowerment, procurement method, risk management, and government support (Chi et al., 2011; Lian, Song and Wang, 2011; Liu, Zhou and Wang, 2010).

The general classification of success factors includes the following factors:

- **Project team factors:** commitment, communication, competency, coordination, trust, and project manager's power (Belassi and Tukel, 1996; Chi et al., 2011; Diall and Thuillier, 2005; Hung et al., 2002; Liu, Zhou and Wang, 2010; Nguyen, Ogunlana and Lan, 2004).
- **Project-related factors:** project size and value, clear objectives and scope, sub-contractors' competency, contracting method, proper planning and control, and project organisation (Belassi and Tukel, 1996; Chan, Scott and Chan, 2004; Cooke-Davies, 2002; Khang and Moe, 2008).
- **Project support:** top management support, client support, government support, sufficient project funding, effective consultation, and project champion (Khang and Moe, 2008; Nguyen, Ogunlana and Lan, 2004).
- **Resource-related factors:** availability of labour, availability of materials, and availability of machinery and equipment (Khang and Moe, 2008; Nguyen, Ogunlana and Lan, 2004).
- **Contractor-related factors:** availability of strategic plan, strong financing capacity, competition, maturity, and strong management orientation (Cooke-Davies, 2002; Nguyen, Ogunlana and Lan, 2004).

- **Environmental factors:** political environment, economic environment, technological environment, and project social environment (Belassi and Tukel, 1996; Chan, Scott and Chan, 2004).

This study tests success criteria and success factors in the context of international construction projects to develop a new perspective of project success. Consequently, this would bridge the gap in the literature which shows a small number of studies focused on understanding how to measure success, and the conditions that contribute to success, based on contractors' perspective. Understanding the success of international construction projects would contribute to the sustainability and competition development of international contractors. The following section shows the method of data collection using questionnaire survey, which was developed based on the items identified in this review.

Research method

QUESTIONNAIRE SURVEY

A quantitative research strategy using structured questionnaire survey was used to identify success criteria and factors of international construction projects. Questionnaire surveys are useful to obtain reliable data and facilitate generalizing the findings (Naoum, 2012). Previous studies used questionnaire surveys to identify success factors of large construction projects (Nguyen, Ogunlana and Lan, 2004), success criteria based on project managers' perspective (Collins and Baccarini, 2004), success factors of international development projects (Diall and Thuillier, 2005), success criteria of mass house building projects (Ahadzie, Proverbs and P.O., 2008), success criteria and factors through the life cycle of international development projects (Khang and Moe, 2008), success criteria of building projects (Al-Tmeemy, Abdul-Rahman and Harun, 2011), and influence of top management support on project success (Ahmed and Mohamad, 2016).

The questionnaire of this study consisted of three parts. The first part includes demographic information of the respondents. The first question in this part asked whether the respondent has experience in overseas construction projects. The second question asked about the majority of construction projects and the location of the projects that the respondent had been involved in. Other questions asked about the respondent's total years of experience (both in local and international projects), age, highest education level, background, and position. The second section of the questionnaire consisted of 12 items to measure success criteria, namely adherence to time, adherence to cost, adherence to quality, safety in site, achieving scope, achieving customer satisfaction, fulfilling customer needs, benefits to the stakeholders, functionality of the product, market share of the product, project add competitive advantages, and project add reputation to the contractor. The respondents were asked to rate the successful completion of their projects based on a 5-point Likert scale of 1 = totally disagree, 2 = disagree, 3 = neutral/do not know, 4 = agree, and 5 = totally agree with the denoted items. The last section contained 25 items of project success factors, which adapted from previous studies as highlighted in the general classification of success factors in the previous section. The role of each item of success factors was measured based on the agreement of the respondents on the contribution of the items to project success. Similarly, the agreement level was measured using a 5-point Likert scale (1 = totally disagree to 5 = totally agree).

SAMPLING

This study targeted global Malaysian contractors registered in the CIDB International Project database (CIDB, 2016). This database includes a list of 112 contractors who have been doing different construction projects between 1980 and 2015. The database did not include contractors who are inactive in the international market so they could be eliminated from the study. Therefore, the study targeted all the listed contractors in the population, using purposive sampling. About three questionnaire forms were sent out to each company. It was expected that more than one employee would have the capability and experience to answer the questionnaire (e.g. directors, project managers, and engineers). The total number of distributed questionnaire forms was about 300.

Methods of data analysis

As shown in the previous section, there are several variables of success criteria and success factors that can be reduced to a number of components. The Principal Component Analysis (PCA) is a method of factor analysis, which aims to identify components or factors from a set of intercorrelated variables (Hair et al., 2006). The rotated component matrix can be used to enhance the result of PCA and discover the best pattern of loadings in a manner that is simpler to interpret (Reinard, 2006). A recommended approach which is known as the Varimax was used to improve the results by maximizing the loading of each variable on one of the extracted components whilst minimizing its loading on all the other components (Broadhead, Pflug and Field, 2000). Prior to analysing the data, it is important to check the reliability of measurement scale of the questionnaire and the appropriateness of factor analysis. The reliability of scale can be assessed using Cronbach's Alpha. In this method, the average correlations among items is similar to an existing test and hypothetical test (Nunnally, 1975), which provides an accurate estimation of internal consistency. The appropriateness of factor analysis can be assessed by using Kaiser–Meyer–Olkin (KMO) Sampling Adequacy Test and Bartlett's Test of Sphericity to test whether the correlation matrix is an identity matrix (Field, 2013). These tests are conducted to check statistical requirements of factor analysis (Hair et al., 2006), notwithstanding the sampling method used in this study. Besides factor analysis, the stepwise multiple regression analysis was conducted to determine significant variables, among success factors, that influence the success of international construction projects.

Result of analysis

RESPONSE RATE, DESCRIPTIVE ANALYSIS AND RELIABILITY

The total number of valid questionnaire forms received was 120; about 40% response rate. The demographic information of the respondents is shown in Table 2. Other demographic questions asked about what construction projects the respondents were mainly involved with, and the location/country of those projects. Most international projects are infrastructure (24.2%) followed by mixed development (22.5%). Residential building projects represent 14.2%, followed by non-residential building (10%), and social amenities (9.2%). Most of the international construction projects are in the

Table 2 Profile of respondents

Category	Variable	Frequency	Percentage
Experience	1-10 years	42	35.0
	11-20 years	42	35.0
	21-30 years	29	24.2
	31-40 years	7	5.8
Age	20-30 years	14	11.7
	31-40 years	39	32.5
	41-50 years	39	32.5
	51 and above years	28	23.3
Highest Education	Others	4	3.3
	Bachelor's degree	82	68.3
	Master's degree	31	25.8
	PhD	3	2.5
Profession	Architecture	16	13.3
	Engineering	59	49.2
	Mechanical Engineering	3	2.5
	Quantity Surveying	40	33.3
	Others	2	1.7
Position	Project Manager	27	22.5
	Manager Assistant	19	15.8
	Project Consultant	29	24.2
	Engineer	29	24.2
	Architect	5	4.2
	Others (including Project Director, QS, & Financial Analyst)	11	9.2

Middle East (25.9%), India (9.2%), China (7.5%), Thailand (7.5%), Indonesia (6.7%), Vietnam (5.8%), Singapore (5%), and other countries (11.6%) including the UK and other ASEAN countries.

Initial analysis of the data using SPSS (version 23) covered reliability of measurement scale, appropriateness of factor analysis, and normality test. First, the reliability of the measurement instruments was evaluated using Cronbach's Alpha as stated before. The Cronbach's Alpha of success criteria and success factor is 0.86 and 0.87 respectively, indicating good measurements reliability (Sekaran, 2006).

Second, the results of KMO of success criteria and success factors are 0.82 and 0.77, which are above the recommended threshold (Hair et al., 2006). This means the correlation pattern between variables is compact. The results of Bartlett's Test are 600.90 and 1575.53 with associated p-value equal to 0.000 for both success criteria and success factors. This indicates that the correlation matrixes of variables are not identity matrixes. Thus, the data of this study is appropriate for PCA.

Lastly, the normality check of data was conducted using Shapiro-Wilk to ensure data is homogenous (Shapiro and Francia, 1972) and appropriate for regression analysis of the influence of success factors on success criteria. The result of the test, which is not shown here for the sake of brevity, showed significant level ($p < 0.000$) of Shapiro-Wilk of all variables indicating normal distribution of the data.

PRINCIPAL COMPONENT ANALYSIS RESULTS

The results of PCA of both success criteria and success factors are shown below. First, PCA results of international project success criteria indicated three components based on eigenvalues greater than 1, as shown in Table 3. The sum percentage of variance explained by the three components is 64.3%, which is good (Hair et al., 2006). The communalities of all variables are above 0.50, except for the variable benefit to stakeholders, which is 0.32 only.

Table 3 PCA results of success criteria of international construction projects

Component	Eigenvalue	Variance %	Variable	Communality	Factor Loading
1. Management Success	4.80	39.99	Quality	0.67	0.75
			Time	0.67	0.73
			Revenue and profit	0.58	0.66
			Safety	0.62	0.64
			Cost	0.61	0.61
			Reputation	0.56	0.56
			Benefit to stakeholders	0.32	0.56
2. Functional Success	1.64	13.67	Functional requirement	0.78	0.87
			Customer satisfaction	0.80	0.84
			Scope	0.72	0.72
3. Organisation Success	1.28	10.65	Competitive advantages	0.73	0.84
			Market share	0.67	0.77

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization (rotation converged in 8 iterations)

Similarly, factor loading extracted from the rotated component matrix of all variables is greater than 0.50.

The first extracted component contains the basic success criteria that are important for managerial team and contractor. This component can be called 'Management Success' and it explains about 40% of the total variance of success criteria. Quality has the highest factor loading on this component indicating the importance of this variable. Time was prioritized second followed by revenue and profit of contractors. The second extracted component can be called 'Functional Success' as it contains the following variables functional requirements, customer satisfaction, and completing the project based on scope. This component contributes about 14% to project success criteria. The last component includes variables related to product success through the performing organisation (i.e. contractor organisation). This component can be called 'Organisation Success', which contributes about 11% of the variance of project success criteria.

Second, PCA result of success factors showed that the commonalities of the extracted variables are in general above 0.5, except for top management support, which scored border value (0.49). As shown in Table 4, the total number of components extracted based on the eigenvalue is six components, making a 65.41% variance of the total cumulative variance.

The first component contains the technical and nontechnical interpersonal skills and capabilities of the project manager and team members. This component can be called 'Team Power and Skills' and is contributing about 26% of the total variance to success factors. The second component can be called 'Resource Availability' as it comprises three variables related to labour, materials, and machinery. This component contributes 16.6% of the total variance of success factors. The third component can be called 'External Environment' as it contains variables about external factors affecting the project such as political and economic factors in the host country. The fourth component can be called 'Organisation Capability' as it contains variables measuring contractor's financial capabilities and other capabilities such as strategic orientation. The fifth component can be called 'Project Support' as it contains variables relevant to this meaning such as project champion and client support. The last component is a single-variable component that contains project organisation structure and, therefore, can be called 'Project Organisation'. This component alone contributes 4.3% of the variance of success factors.

REGRESSION ANALYSIS RESULTS

Further analysis was carried out using regression analysis to determine the influence of success factors on the three components of project success. Table 5 shows the significant factors influencing Management Success including, project manager power, strong financing capacity of the contractor, coordination among project team, contractor competition, and competence of project manager. The results also identified significant factors contributing to Functional Success including competence of project manager, strong financing capacity, and troubleshooting skills of the team. The results showed three significant factors influencing Organisation Success, namely project size and value, social project environment, and strong financing capacity. Lastly, the results showed three factors that influence overall project success criteria, namely, strong financing capacity, project social environment, and competence of the project manager.

Table 4 PCA results of success factors of international construction projects

Component	Eigenvalue	Variance %	Variable	Communality	Factor Loading
1. Team Power and Skills	6.52	26.09	Power of project manager	0.74	0.79
			Competence of project manager	0.74	0.78
			Technical background of project team members	0.65	0.78
			Commitment of the project team	0.63	0.77
			Communication skills of project team members	0.75	0.77
			Coordination among project team	0.66	0.73
			Delegation of work	0.55	0.68
			Troubleshooting skills of project team members	0.55	0.55
2. Resource Availability	4.15	16.62	Availability of labour	0.85	0.89
			Availability of materials	0.83	0.88
			Availability of machinery and equipment	0.82	0.84
3. External Environment	1.94	7.76	Political environment	0.77	0.84
			Economic environment	0.73	0.81
			Technological environment	0.68	0.70
			Social environment	0.71	0.68
4. Organisation Capability	1.50	6.02	Strong financing capacity	0.69	0.75
			Project size and value	0.65	0.74
			Long-term and strong management strategic orientation/objectives	0.58	0.63
			Top management support	0.49	0.55

Table 4 continues on the next page

Table 4 (Continued)

Component	Eigenvalue	Variance %	Variable	Communality	Factor Loading
5. Project Support	1.15	4.60	Project champion	0.64	0.72
			Client support	0.54	0.60
			Sub-contractors' competence	0.66	0.59
			Contractor competition	0.53	0.54
6. Project Organisation	1.08	4.32	Project organisational structure	0.59	0.68

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization (rotation converged in 6 iterations).

Discussion

SUCCESS CRITERIA

The success of international construction projects can be measured using three criteria. Management Success is the first component and includes seven success criteria, which are the core responsibility of the managerial team. Management Success is a significant measure of international project success as it indicates the highest component variance in project success compared with the other two components. During construction stage, project managers and their subordinates must ensure that the project is to be completed based on the triple constraints of time, cost, and quality. Among these three constraints, quality seems to be the most important criterion followed by time and then cost. Beside these basic criteria, the managerial team must adhere to the other requirements of the project including safety on site, profit via cost cutting, and maintaining the good reputation of the performing organisation (i.e. the contractor). The managerial team should also ensure that the project is beneficial to the stakeholders, so the project can achieve its main goals. The new component explored in this study expands the definition of project management success as provided by some scholars (e.g. Al-Tmeemy, Abdul-Rahman and Harun, 2011; Baccarini, 1999) and includes some variables that are required for the success of contractors, including revenue and profit. Overseas contractors believe that the role of the managerial team is not restricted to the 'iron triangle' criteria, but must focus also on adhering to other basic criteria as highlighted.

The second component that contributes to project success is Functional Success, which comprises three criteria, namely functional requirements, customer satisfaction, and achieving scope. International contractors realize the importance of this component to satisfy the client and complete the project within the scope, and ensure functionality of the product. The last component, Organisation Success, contributes about 11% to the success criteria of international construction projects. This component includes criteria to measure the success of project outcome, and benefits contractors gain because of this success. These criteria, which include competitive advantages and market share, are considered outside the boundary of the project. This new measurement of project success provides advantages to contractors after completion of the project, in terms of reputation and competitiveness.

Table 5 Results of regression analysis

Dependent Variable	Predictors	Coefficients				Model Summary			
		B	Std. Error	Beta	Sig.	R Square	Adjusted R Square	Std. Error	Sig. F Change
Management Success	Power of project manager	0.14	0.08	0.17	0.084	0.40	0.37	0.38	0.019
	Strong financing capacity	0.21	0.06	0.25	0.001				
	Coordination among project team	0.15	0.07	0.20	0.032				
	Contractor competition	0.15	0.06	0.18	0.014				
	Competence of project manager	0.19	0.08	0.23	0.019				
Functional Success	Competence of project manager	0.43	0.10	0.37	0.000	0.28	0.26	0.57	0.030
	Strong financing capacity	0.20	0.09	0.18	0.030				
	Troubleshooting skills of project team	0.20	0.09	0.19	0.030				
Organisation Success	Project size and value	0.19	0.09	0.21	0.026	0.24	0.22	0.55	0.028
	Social environment	0.25	0.08	0.28	0.002				
	Strong financing capacity	0.21	0.10	0.20	0.028				
Project Success (all criteria)	Strong financing capacity	0.26	0.07	0.35	0.000	0.34	0.31	0.33	0.002
	Social environment	0.18	0.05	0.30	0.001				
	Competence of project manager	0.21	0.07	0.29	0.002				

SUCCESS FACTORS

To achieve the success of international projects, six components are identified as important in this study. The first and most significant component is Power and Skills of the Project Team, which contributes to about 26% of the total variance of success criteria. To increase the chances of success of international construction projects, the project team must have the basic skills and competencies that enable them to perform well during project execution. These basic skills and competencies include communication, coordination, problem troubleshooting, and strong technical backgrounds. As a team leader, the project manager should possess both technical and managerial competencies as well as authority (power) to manage and lead the project successfully. Moreover, the project manager shall practice work delegation to develop the competencies of his/her team and manage work accordingly. These factors are important for international construction projects, which are usually complex and involve different participants from various backgrounds and cultures.

The second significant component contributing to project success is Resource Availability. It seems that Malaysian contractors have been facing difficulties finding sufficient resources, including labour and materials, necessary to the execution of overseas projects. The success of international projects can be attained by analysing the availability of resources in the host country and conducting careful planning for alternative resources. While analysing resource alternatives, the contractors should realize the internal factors affecting resources, such as top management support, and negotiation skills of the project manager.

Project external environment seems to have some influence on project success (contribution is about 8% of the total variance of success factors). The contractors shall pay attention to different environments surrounding a global-context project. For instance, they should anticipate and identify risk relevant to the political, social, and economic environments in the host country and determine how they influence the success of projects. In addition, contractors shall pay attention to global external forces such as technology advancement. Thus, market analysis prior to undertaking any international construction project, is important to provide a better understanding of the host country, and external conditions and risks that may influence project success.

Other components that influence project success, but with a low percentage of variance, include Organisation Capability (6%), Project Support (5%), and Project Organisation (4%). Financial capacity, project champion, client support, and appropriate project organisation are important variables that should be considered in international construction projects. Contractors can increase their financial capacity using different alternative financial models such as joint venture, which can also support resource sharing and risk mitigation (Agarwal and Ramaswami, 1992; Idris and Seng Tey, 2011). The selection of the appropriate project size and value is important in this situation. In addition, the contractors need support by different means to complete the project successfully, such as client support (by being an effective communicator and provide necessary information on time), contractor competition, project champion (to oversees the overall project performance), and sub-contractors' competence. Lastly, project organisation, which is a single-component variable, is a unique variable as it has no intercorrelation with other variables of success. Choosing the appropriate project organisation is important for international project success, to support team empowerment and communication. Figure 1 presents a model of the influence of success factors on success criteria. The model provides a summary of the findings discussed in this section. The following section focuses on the role of three significant variables that influence all aspects of

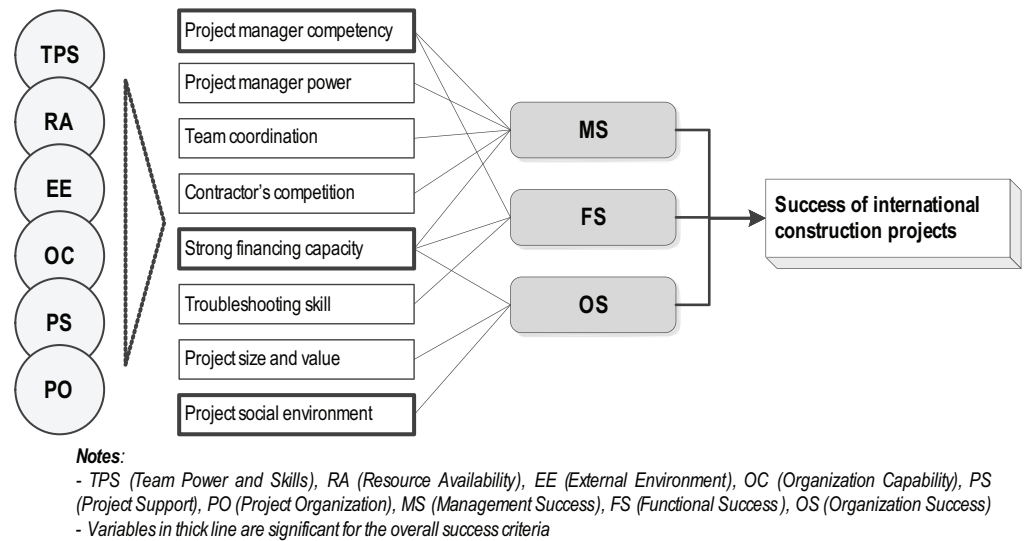


Figure 1 Model of success of international construction projects

success criteria, namely strong financing capacity of the contractor, competence of the project manager, and project social environment.

SIGNIFICANT FACTORS OF SUCCESS

Financing capacity of contractors is significant to the success of international projects. Similar to this finding, Tan and Ghazali (2011) identified contractor's cash flow as one of the top success factors of international construction projects. Strong financial capability supports contractors' competitiveness and risk management strategies in such volatile environments. The second factor influencing project success is competence of the project manager, which includes both technical and managerial skills. Tan and Ghazali (2011) also highlighted the following variables pertaining to management and project manager's competencies, namely decision-making effectiveness, project manager and team's experience, overall managerial action, project team monitoring, and project manager's ability to make and carry out decisions. A strong management capability, including an experienced and skilful project manager, is no doubt an important factor in international project success. The last factor is project social environment. The ability of the team to establish links with local entities in the host country is critical to the success of international projects. Projects do not exist in isolation of their external environment. Thus, international contractors shall establish a strong link between the project (internal team and stakeholders) with the surrounding local environment via building communication links and networking. In this regard, localization has been described as a significant strategy that contractors implement to achieve high performance. Localization is referred to the organisation's ability to access and use processes, services, and resources in the host country (Wailerdsak and Suehiro, 2002). Many studies affirmed the importance of localization in the host country as one of the contractor's strategies to achieve success in the global market (Jung et al., 2011; Neves and Bugalho, 2008).

LIMITATIONS OF THE STUDY

A limitation of this study is the lack of in-depth analysis of the success criteria and success factors based on respondents' profile (such as profession and background), project location (e.g. ASEAN, the Middle East, etc.), and project type (e.g. infrastructure projects,

residential projects, mixed development, etc.). Therefore, future studies may determine if success criteria and success factors vary based on these variables, to provide a refined guideline relevant for different types and locations of international projects. Such analysis can be useful to refine the success criteria and success factors identified in this study.

Conclusion

The purpose of this paper was to identify success criteria and success factors of international construction projects conducted by Malaysian contractors. Based on the findings, international construction projects can be regarded as successful projects when three components are met, namely management success, functional requirements, and organisation success. Among the three measurements, management success is the most significant component, which comprises the basic criteria of success; quality, time, profit, safety, cost, reputation, and benefit to stakeholders. Other criteria like functional requirements, customer satisfaction, and achieving scope are also important to judge the success of international construction projects. Competitive advantages and market share are also important criteria. Thus, the success of international construction projects is measured against the traditional and non-traditional criteria. Contractors should focus on achieving success equally at three levels; project success (completion based on requirements), product success (functionality, client satisfaction, and scope), and organisation success resulting from project success (competitive advantages and market share). The success factors of international construction projects include three main components, namely team power and skills, availability of resources, and external environment. Other components that influence international project success but to a limited extent include organisation capability, project support, and project organisation. This study highlighted the role of three significant variables contributing to success, which are competence of the project manager, financial capacity of the contractor, and project social environment.

The performance of Malaysian international contractors has been unsatisfactory, as highlighted in the introduction of this paper. Malaysian contractors are facing great challenges to achieve good project performance and sustain business in the international market due to economic downturns, limited experience and skills of the managerial team, limited resources, and social and political risks in the host countries. Therefore, the success factors identified in this paper, as well the significant variables of success, provide a clear guideline for contractors to achieve project success. The Malaysian contractors, especially those new in the global market, can set expectations and plans for success before venturing into the international market. To conclude, the general definition and theory of project success in construction includes three levels of success at the project, the product, and the market levels. The result of this paper is in general aligned with this theory. Thus, construction project success seems to be a general phenomenon regardless of the context in which the project exists. Lastly, the main success factors emphasised the soft skills, rather than the technical skills of the team members.

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