Routledge
Taylor & Francis Group

Construction Management and Economics

ISSN: 0144-6193 (Print) 1466-433X (Online) Journal homepage: https://www.tandfonline.com/loi/rcme20

# Critical success factors for Malaysian construction projects: an empirical assessment

Yee Cheong Yong & Nur Emma Mustaffa

**To cite this article:** Yee Cheong Yong & Nur Emma Mustaffa (2013) Critical success factors for Malaysian construction projects: an empirical assessment, Construction Management and Economics, 31:9, 959-978, DOI: 10.1080/01446193.2013.828843

**To link to this article:** https://doi.org/10.1080/01446193.2013.828843

*Construction Management and Economics*, 2013
Vol. 31, No. 9, 959–978, http://dx.doi.org/10.1080/01446193.2013.828843

Routledge
Taylor & Francis Group

# Critical success factors for Malaysian construction projects: an empirical assessment

YEE CHEONG YONG* and NUR EMMA MUSTAFFA

*Department of Quantity Surveying, Universiti Teknologi Malaysia, 81310 UTM, Skudai, Johor, Malaysia*

Received 11 May 2012; accepted 22 July 2013

Although extensive research has been undertaken on the critical success factors (CSFs) for construction projects, very little of this research contains information specific to the local context. While several local studies have been conducted within a similar research boundary, variables with growing importance in the literature, the human-related factors, have yet to garner much attention. Therefore, the main objective of this study was to gain a renewed understanding of the emerging trend of CSFs considered by various stakeholders in the local industry. This was achieved through a comparative study of 48 Malaysian construction stakeholders classified into three categories, namely, developers, consultants and contractors. The Kruskal-Wallis one-way analysis of variance (ANOVA) on 46 factors suggests that the stakeholders favour a more balanced approach to CSFs. Apart from the 'hard' factors, there is a strong consistency among the perception of project stakeholders in recognizing the significance of human-related 'soft' factors. The analysis further reveals that the high scoring factors are mostly related to three major aspects: (1) project personnel; (2) commitment and communication; and (3) site management and supervision. Implementation of human-related factors will help to stimulate an atmosphere of trust among stakeholders amidst a widespread adversarial attitude in the industry.

*Keywords:* Critical success factors, human-related factors, Malaysia, project success.

## Introduction

The construction industry is of vital importance for employment and the economic growth of Malaysia. It has contributed approximately 3.3% of the country's gross domestic product (GDP) value in 2012, with a forecasted 11.2% growth in the subsequent year (Department of Statistics Malaysia, 2012a). The labour force serving the construction industry also accounts for approximately 9.2% of the country's total labour force in 2011 (Department of Statistics Malaysia, 2012b). Moreover, the industry serves as a catalyst for growth in industries such as manufacturing, transportation, and financial services because of its extensive linkages with many other business sectors.

In 2011, the government announced several mega development projects under the Tenth Malaysian Plan (2011–15) and the Economic Transformation Programme (ETP), hoping that these projects will help to bring about long-term growth to the nation's economy. One such example is the Mass Rapid Transit (MRT) system, which costs over RM40 billion with an estimated demand for up to 130 000 construction workers of various trades. While these developments may provide abundant jobs for players in the construction industry, various concerns have been raised by the general public over the ability of the local industry to perform up to the time, cost and quality standards expected, in view of the inherent challenges in the industry.

The general perception of the Malaysian construction industry as a whole is that it is underachieving (Construction Industry Development Board Malaysia, 2006). It has often been characterized by opportunistic behaviours, poor communication, and

*Author for correspondence. E-mail: ycyong2@live.utm.my

adversarial attitude due to inefficient and ineffective construction practices. Payment defaults, construction delays, cost overruns and disputes are common challenges faced by the industry (Construction Industry Development Board Malaysia, 2006). Government organizations, researchers and practitioners at large have called for a change in attitudes, behaviours and procedures to address the challenges brought about by industry fragmentation.

The study of project success and critical success factors (CSFs) is therefore timely, as it is one of the essential ways to understand the core challenges to a particular industry at a particular time (Rockart and Bullen, 1981). It is also a way to improve the effectiveness of project delivery (Chan *et al.*, 2004). Takim *et al.* (2004) noted that one of the difficulties in managing a construction project, especially in the government sector, is due to the failure in determining relevant CSFs across project phases. Numerous studies have been conducted over the years to explore factors that are really critical to project success (Chan and Kumaraswamy, 1996; Cooke-Davies, 2002; Nicolini, 2002; Andersen *et al.*, 2006; Toor and Ogunlana, 2009), thus highlighting the importance of CSF study.

Although CSFs have been previously explored extensively outside the country, most of those studies were context specific: their implementations and implications are limited to the countries where they were conducted (Toor and Ogunlana, 2009). There has been little effort to contextualize the findings into a local context where the structure, culture and maturity of the concerned organizations are different. Moreover, many assumptions were made based on anecdotal evidence and hearsay without concrete empirical support from established research methodology.

Observation also indicated that most of the studies conducted on local industry were obsolete (Lim and Mohamed, 1999; Takim and Adnan, 2008; Al-Tmeemy *et al.*, 2011). The information was unable to reflect the latest developments in the industry especially with a growing need for a relationship-based approach in procurement (Construction Industry Development Board Malaysia, 2009). The aim of this paper is therefore to make up for the dearth of publications on the utilization of CSFs for project success. It departs from the traditional criteria of time, cost and quality, to explore the relative importance of other CSFs associated with construction project success, particularly the human-related factors that emerged from the literature review. This is vital in view of the widespread adversarial attitude within the local construction industry.

## Distinctions between project success measures and CSFs

Project success is an abstract concept and determining whether a project is successful is subjective and extremely complex (Parfitt and Sanvido, 1993; Chan *et al.*, 2002), therefore, two distinctions must be established at this stage before further discussion can be carried on. De Wit (1988), Atkinson (1999), Lim and Mohamed (1999), Cooke-Davies (2002), and Takim *et al.* (2004) have all distinguished project success into two separate components, namely project product success and project management success. Project product success focuses on the fulfilment of project objectives as well as the effects of the project's end product whereas project management success focuses on the project management processes.

In addition to that, it is also important to make clear the distinction between success criteria and success factors. According to de Wit (1988) and Cooke-Davies (2002), success criteria often refer to the measures by which success or failure of a project will be judged. They are usually universal measures or criteria that are not affected by changing times. On another hand, success factors are those inputs to the management process that lead directly or indirectly to the success of the project. They are usually based on the current situation in the industry and may change when the working culture or the stakeholders' expectations change.

Project management success can be classified into two main categories, one being hard, objective, and measureable while the other is soft, subjective, and less measurable. As for the former, the success criteria of time, cost and quality were widely recognized but others such as environmental sustainability, or health and safety, are criteria with growing importance (Belassi and Tukel, 1996; Hatush and Skitmore, 1997; Shenhar *et al.*, 1997; Atkinson, 1999).

As for the latter, attainment of goals such as satisfaction, effective communication, relationship between project participants, and absence of conflicts have emerged as the critical factors to the success of the construction project resulting from a more challenging operating environment (Nicolini, 2002; Walker and Hampson, 2003; Chan *et al.*, 2004; Dainty *et al.*, 2005; Andersen *et al.*, 2006; Toor and Ogunlana, 2009).

Even though success criteria and success factors are different in nature, the two are interrelated. Understanding the distinction is essential for the formation of CSFs for construction projects and enables the researcher to have a clearer direction on the subject matter in order to avoid possible confusion. A

number of CSFs influencing project management success were identified following a thorough review of literature. A careful study of previous literature suggests that CSFs can be grouped into different categories depending on the evaluation dimension that the researchers are looking at.

## Critical success factors

Rockart (1982) was the first person to coin the term 'critical success factors' or CSFs. The term CSFs implies a number of 'truly' important matters on which industries should focus their limited resources in order to achieve success. The concept of CSFs has been applied extensively in various industries such as construction, information technology, medicine and production. Rockart (1982) emphasized that CSFs relate to specific characteristics of a particular industry. They differ from country to country depending on the operating environment. They often change with policy changes, the industry's environment changes, or when a particular problem or opportunity arises for that industry. In short, there is no standard set of measures that can be applied to all industries at all times. Identifying CSFs requires specific and diverse situational evaluations, many of which must be examined through soft and subjective information on a regular basis (Rockart and Bullen, 1981).

## Changing measure of CSFs

Over the last 20 years, various studies have been conducted on CSFs suggesting an intense interest in understanding the important elements that constitute project success. In the early 1990s, the successful implementation of a project was inherently tied to its performance measures, which were based on time, cost and project quality (Navarre and Schaan, 1990). Over the years, these criteria have become synonymous with project success. They have been discussed in almost every article on project success during the 1990s, such as in the works of de Wit (1988), Belassi and Tukel (1996), Hatush and Skitmore (1997), Shenhar *et al.* (1997) and Atkinson (1999).

Towards the beginning of the new millennium, the majority of the literature concerned with project success tended to shift from the usual time, cost and quality to a more comprehensive list of criteria needed in various construction stages. That list includes criteria such as safety, user satisfaction and long-term business impact. This is perhaps in response to the increased awareness of the end-users and the challenging nature of the operating environment in the construction industry amidst fierce global competition.

The review of the literature revealed an emerging trend in recent years in recognizing the importance of human-related factors to the success of construction projects apart from the traditional measures of time, cost and quality. The human-related factors are often associated with the 'soft' issues in a construction project, such as trust, commitment and effective communication among stakeholders. These factors usually refer to the fundamental attitude or mindset problems of the stakeholders involved. They consist of less tangible aspects that are much more subjective and difficult to measure as compared to the 'hard' issues in a project such as stakeholders' technical competency, project financing and quality of workmanship. Although they are subjective and difficult to measure, these factors deal with the root cause of the problems inherent in the construction industry by understanding and fostering long-term attitudinal change in people.

On a cross-cultural study on project success, Andersen *et al.* (2006) recognized that project success depends not only on the 'hard' features but also on the 'soft' features of project management. His studies on four different regions (the United Kingdom, France, Norway and China) imply that regardless of the cultural differences in these regions, the most important factors in improving project delivery consist of a combination of 'hard' features such as strong project monitoring through early stakeholder involvement as well as 'soft' features such as rich communication and greater quality of information sharing. He further emphasized that rich project communication plays a key role in trust building among project stakeholders, which eventually contributed to a healthy and sustainable working relationship.

In addition to that, Walker and Hampson (2003) realized that the form of procurement is mainly insignificant in improving project performance. They believed that the real issue is the procurement option itself: whether it encourages or inhibits team members from maximizing their constructive input to achieve project goals. According to them, the management style and approaches that are mainly concerned with attitude change, the process of facilitating team spirit and dynamics of team relationships are more important than the procurement choice itself.

On the other hand, Toor and Ogunlana (2008) identified four performance enhancement strategies for project success. Some of these strategies were identical to the human-related factors discussed in other literatures. They were called the critical 'COMs' of project success, which refer to comprehension, competence, commitment, and communication

respectively. Clients are expected to take the initiative to provide a clear requirement at the beginning of the project and accept the advice and solution proposed by the consultant. Apart from that, a competent team with knowledgeable, experienced and proficient individuals is essential for the success of the project. Commitment and dedication of all related parties in the project, especially the support from top management, as well as clear communication of mutual needs, issues, and solutions among the stakeholders will greatly improve the overall project performance.

On top of that, Nicolini (2002) and Dainty *et al.* (2005) proposed the notions of 'project chemistry' and 'project affinity' in response to the lack of necessary terms, framework and conceptual tools to put into practice all the 'soft' management factors. Their findings provide a deeper understanding of the relational dimensions and emotional attachment that may lead to successful project performance.

Fellows (2010) recognized that in order to 'inflict' a paradigm shift in the construction industry, it is crucial for the researcher to recognize that it will not be sufficient merely to adopt the usual findings, principles and tools adapted from various literatures available on construction management. In fact, it is the human factors: the 'soft' elements that are critical to the success of the industry alongside thorough cultural assimilation, understanding and support from top management.

In the case of Malaysia, many studies have been conducted to look into the possible ways of improving project performance (Abdul-Rahman *et al.*, 2006; Sambasivan and Soon, 2007; Takim and Adnan, 2008; Al-Tmeemy *et al.*, 2011). However, there has not yet been any widely published research that analysed the soft issues in relation to project success. Most studies have failed to look into the heart of the industry's problem: opportunism in the nature of the relationships among stakeholders especially between developer and contractor. Even though various dimensions of project success have been discussed, researchers have remained relatively silent on the subjects relating to opportunistic behaviour and the lack of trust among construction stakeholders in Malaysia.

The study on the Malaysian construction industry will add to the collective knowledge on the soft issues pertaining to the success of construction projects. It will help to enrich the overall understanding underpinning various dimensions of the human-related construct in project management such as project commitment, stakeholders' relationships and communication which may vary from one country to another due to cultural and mindset differences.

## Consolidated framework of CSFs for construction projects

The outcome of the literature review suggests that different success factors were hypothesized by different researchers. Understanding the significance of each success factor will facilitate the formulation of CSFs for construction projects in Malaysia. A consolidated framework of CSFs has therefore been proposed based on the analysis of the review.

The proposed framework incorporates the same analogy employed by Chan *et al.* (2004) in that it consists of five major groupings that represent different dimensions in project success. Chan *et al.*'s (2004) model was selected as the components in the framework were able to reflect the objective of this research, in establishing contingent relationship of the project CSFs to the procurement process. One of the distinctions between the proposed framework and Chan *et al.*'s (2004) model was, however, as regards the project implementation stage. It consists of project management and planning as well as project stakeholder categories. Greater emphasis was given to these two categories in view of the increasing importance of human-related 'soft' factors. On top of that, the project implementation stage is also the most effective period to adopt strategic measures to achieve project success (Li *et al.*, 2005). The framework in Figure 1 shows that the CSFs can be grouped into five major categories:

(1) Factors related to the project
(2) Factors related to procurement
(3) Factors related to project management and planning
(4) Factors related to project stakeholders
(5) Factors related to the external environment

The framework illustrates how each category is interrelated with the others, although they are different in nature. A factor in one group can influence a factor in another group, and a combination of several factors from various groups might lead to project failure. Through the groupings, it will be easier to identify whether the project success or failure is related to the procurement process, project stakeholders or external factors.

## Methodology

The paper is based on the partial findings of a much broader study that employed a balanced

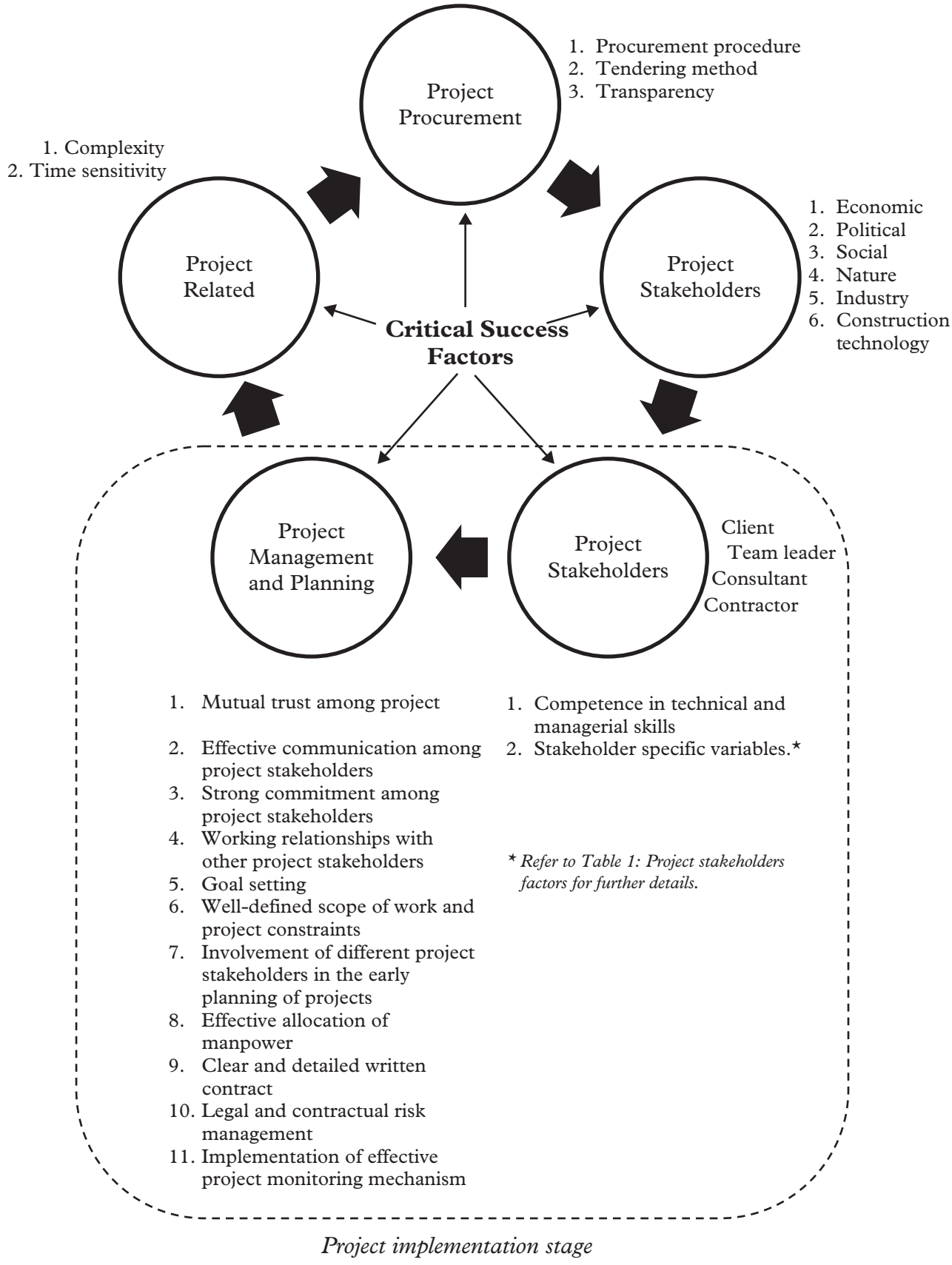



**Figure 1** Consolidated framework of critical success factors for construction projects in Malaysia

philosophical stance in terms of its research methods and data collection techniques. Both 'positivist' and 'interpretivist' approaches were adopted. It was exploratory in nature and fuelled by a strong desire to improve the working relationships among construction stakeholders in Malaysia. It was decided that a mixed method is best suited for the objectives of this research: a postal questionnaire survey sequentially followed by interviews and in-depth comparative analysis. The qualitative methods were used to confirm and clarify the quantitative data, and also to seek elaboration and understanding especially on the operations of the 'soft' issues within local industry. This is to satisfy the interpretivist nature of the research.

Nevertheless, the current phase of the research was aimed at satisfying the positivist nature of the issues in question through an investigation of the critical success factors by means of a postal questionnaire survey. It is useful as the current study tried to determine 'what' really matters to the success of local construction project to satisfy the 'why' and 'how' in later phases of the research. Therefore, it is beyond the scope of this paper to discuss any tangible findings from the qualitative enquiry.

Use of a questionnaire survey remains the most viable approach to obtain quantitative data based on the limited time frame, budget and manpower that the researchers are facing. In addition to that, past studies on CSFs and construction management (Naoum, 2003; Fellows and Liu, 2005) favoured the questionnaire survey approach to obtain responses to 'hard' data despite the methodological issues inherent in this method.

The weaknesses in the questionnaire survey will be compensated for by the proposed qualitative inquiry in the later part of the research. The mixed method has been promoted for its ability to complement the strengths and weaknesses of other research methods and to establish construct validity through convergence in findings from triangulation (Dainty, 2008). Besides that, the choice of methodology is sound in view of the transition of research focus from 'site operations based' to 'business operations and human system' (McCaffer and Edum-Fotwe, 1999) in recent years.

Various strategies as suggested by Root and Blismas (2003) have been employed to address the limitations of the postal questionnaire. These include pilot study, incentives, layout convenience as well as vigorous follow-up with the respondents. A detailed explanation will be provided in the following section.

## Method

### Pilot test and variable rationale

The distributed questionnaires were based on past literature and a pilot test (Yong and Mustaffa, 2012). In order to develop a comprehensive questionnaire, a thorough literature review was carried out resulting in the identification of an initial 75 CSFs for construction projects in Malaysia. Distinctions between success criteria and success factors were identified during the review process, to enable a clear direction and to avoid possible confusion over the variables examined.

As part of a broader study on relationship-based procurement in Malaysia, emphasis has been given to factors that affect the management system leading to the success of the project. It can be classified into two main categories, one being hard, objective, tangible and measureable while the other is soft, subjective, intangible, and less measurable (Andersen and Jessen, 2000; Chan *et al.*, 2004; Andersen *et al.*, 2006). As for the former, the criteria of time, cost and quality were widely recognized, but other criteria such as health and safety, environmental sustainability, technical performance are factors with growing importance (Belassi and Tukel, 1996; Hatush and Skitmore, 1997; Shenhar *et al.*, 1997; Atkinson, 1999). As for the latter, attainment of goals such as satisfaction, effective communication, relationship between project participants, and absence of conflicts are considered a sign of project success as stated in the works of Nicolini (2002), Walker and Hampson (2003), Andersen *et al.* (2006) and Toor and Ogunlana (2009).

The literature review provided the basis for the formulation of the preliminary questionnaire as well as the proposed consolidated framework. In order to refine the items in the preliminary questionnaire, a pilot test (Yong and Mustaffa, 2012) was carried out where 14 individuals were approached to complete and comment about the questionnaire. This resulted in a few modifications on the initial list of CSFs. Some items were deleted because of repetition in other forms and inappropriateness while others were combined for better understanding of the participants. Apart from that, additional items were included from recommendations received during pilot testing.

As a result of this exercise, a list of 46 CSFs was finalized to be included in the final version of the questionnaire. The CSFs were also reflected in the proposed consolidated framework shown in Figure 1. Moreover, it can be seen from Table 1 that these CSFs have been widely mentioned in previous works on similar subjects and therefore carried a robust literature backing.

**Table 1** List of critical success factors developed from the literature

| No. | Description of critical success factor | Relevant literature |
|---|---|---|
| | **Project related factors** | Walker (1995), Songer and Molenaar (1997), Chua *et al.* (1999) |
| 1 | *Complexity of the project* | Dissanayaka and Kumaraswamy (1999), Kumaraswamy and Chan (1999) |
| 2 | *Urgency in meeting project deadline* | |
| | **Project planning and management factors** | |
| 3 | Mutual trust among project stakeholders | Mayer *et al.* (1995), Munns (1995), Hartman (2002), Cheung *et al.* (2003), Walker and Hampson (2003), Kadefors (2004), Nguyen *et al.* (2004) and Pinto *et al.* (2009) |
| 4 | Effective communication among project stakeholders | Pinto and Slevin (1988), Chua *et al.* (1999), Cooke-Davies (2002), Nicolini (2002), Walker and Hampson (2003), Nguyen *et al.* (2004), Andersen *et al.* (2006), Fortune and White (2006) and Sambasivan and Soon (2007) |
| 5 | Strong commitment among project stakeholders | Belassi and Tukel (1996), Walker and Hampson (2003), Andersen *et al.* (2006) and Toor and Ogunlana (2008) |
| 6 | Working relationships with other project stakeholders | Sanvido *et al.* (1992), Nicolini (2002), Nguyen *et al.* (2004) and Meng (2012) |
| 7 | Goal setting | Pinto and Slevin (1988), Songer and Molenaar (1997), Lim and Mohamed (1999), Nicolini (2002), Nguyen *et al.* (2004), Fortune and White (2006) and Toor and Ogunlana (2009) |
| 8 | Well-defined scope of work and project constraints | Chua *et al.* (1999), Nicolini (2002) and Andersen *et al.* (2006) |
| 9 | Involvement of different project stakeholders in the early planning of projects | Andersen *et al.* (2006), Kong and Jason (2006), Sambasivan and Soon (2007) and Toor and Ogunlana (2009) |
| 10 | Effective allocation of manpower | Chua *et al.* (1999) |
| 11 | Clear and detailed written contract | Sanvido *et al.* (1992), Chua *et al.* (1999) and Nguyen *et al.* (2004) |
| 12 | Legal and contractual risk management | Chua *et al.* (1999), Walker and Hampson (2003), Takim *et al.* (2004) and Toor and Ogunlana (2009) |
| 13 | Implementation of effective project monitoring mechanism | Belassi and Tukel (1996), Nicolini (2002), Cooke-Davies (2002), Nguyen *et al.* (2004), Fortune and White (2006) and Toor and Ogunlana (2009) |
| | **Project stakeholders factors: client** | |
| 14 | Project financing (cash flow) | Lim (2005), Sambasivan and Soon (2007) |
| 15 | Client's confidence in construction team | Walker (1995) |
| 16 | Client's experience of construction project organization and management | Sanvido *et al.* (1992), Chan and Kumaraswamy (1996), Songer and Molenaar (1997), Dissanayaka and Kumaraswamy (1999) |
| 17 | Client's responsiveness to the needs of the other stakeholders | Songer and Molenaar (1997), Fortune and White (2006), Low and Chuan (2006) and Toor and Ogunlana (2009) |
| 18 | Demand and variation | Kong and Jason (2006) |
| 19 | Top management support from client organization | Pinto and Slevin (1988), Belassi and Tukel (1996), Chua *et al.* (1999), Nicolini (2002), Nguyen *et al.* (2004), Dainty *et al.* (2005), Andersen *et al.* (2006), Fortune and White (2006) and Toor and Ogunlana (2009) |
| 20 | Awarding bids to the right designers/ contractors | Songer and Molenaar (1997), Nguyen *et al.* (2004), and Toor and Ogunlana (2009) |
| 21 | Nature of client whether he is privately or publicly funded | Takim *et al.* (2004) |

(*Continued*)

**Table 1** (*Continued*)

| No. | Description of critical success factor | Relevant literature |
|---|---|---|
| | **Project stakeholders factors: project team leader (architect/PM)** | |
| 22 | Competence (technical and managerial skills) | Pinto and Slevin (1988), Sanvido *et al.* (1992), Belassi and Tukel (1996), Munns and Bjeirmi (1996), Chua *et al.* (1999), Nicolini (2002), Nguyen *et al.* (2004), Fortune and White (2006) and Toor and Ogunlana (2008) |
| 23 | Adaptability to amendment in project plan | Munns (1995), Walker and Hampson (2003) and Toor and Ogunlana (2009) |
| 24 | Leadership and authority | Nicolini (2002), Walker and Hampson (2003), Toor and Ogunlana (2006) and Toor and Ofori (2008) |
| 25 | Early and continuous involvement in the project development | Walker and Hampson (2003) and Toor and Ogunlana (2009) |
| | **Project stakeholders factors: project consultant** | |
| 26 | Competence (technical and managerial skills) | Pinto and Slevin (1988), Sanvido *et al.* (1992), Chua *et al.* (1999), Belassi and Tukel (1996), Nicolini (2002), Nguyen *et al.* (2004), Belout and Gauvreau (2004), Fortune and White (2006) and Toor and Ogunlana (2009) |
| 27 | Providing adequate design details and specifications | Sanvido *et al.* (1992) |
| 28 | Cooperation in solving problems among project stakeholders | Cheung *et al.* (2003), Walker and Hampson (2003) |
| 29 | Involvement to monitor project progress | Belassi and Tukel (1996), Chan and Kumaraswamy (1996), Lim and Mohamed (1999), Akintoye (2000), Alaghbari *et al.* (2007) and Sambasivan and Soon (2007) |
| | **Contractors** | |
| 30 | Contractor's competence and experience | Sanvido *et al.* (1992), Belassi and Tukel (1996), Chua *et al.* (1999), Sambasivan and Soon (2007) and Toor and Ogunlana (2009) |
| 31 | Implementing an effective safety programme such as SHASSIC | Construction Industry Development Board Malaysia (2006) |
| 32 | Implementing an effective quality assurance programme such as QLASSIC | Construction Industry Development Board Malaysia (2006) |
| 33 | Supervision of subcontractors' works | Sambasivan and Soon (2007) |
| 34 | Skilful workers | Narayanan and Lai (2005), Sambasivan and Soon (2007) |
| 35 | Emphasis on high quality workmanship instead of low and quick construction | Takim *et al.* (2004) |
| 36 | Effective project budget monitoring | Alaghbari *et al.* (2007) and Sambasivan and Soon (2007) |
| 37 | Site management and supervision | Belassi and Tukel (1996), Chan and Kumaraswamy (1996), Lim and Mohamed (1999), Akintoye (2000), Alaghbari *et al.* (2007) and Sambasivan and Soon (2007) |
| | **Project procurement** | |
| 38 | Competitive procurement | Walker (1997), Kumaraswamy and Chan (1999), Walker and Hampson (2003) and Eriksson (2006) |
| 39 | Transparency in the procurement process | Walker and Hampson (2003) and Eriksson (2006) |
| 40 | Tendering method | Dissanayaka and Kumaraswamy (1999), Walker and Hampson (2003), Eriksson (2006) and Abdul Rahman *et al.* (2010) |

(*Continued*)

**Table 1** (*Continued*)

| No. | Description of critical success factor | Relevant literature |
|---|---|---|
| | **External environment** | Belassi and Tukel (1996), Songer and Molenaar (1997); Chua *et al.* (1999), Takim *et al.* (2004), Sambasivan and Soon (2007) |
| 41 | *Economic (stable economy and sound economic policy)* | |
| 42 | *Social (public acceptance towards the project)* | |
| 43 | *Political* | |
| 44 | *Nature (weather conditions)* | |
| 45 | *Industry-related issues (availability of resources)* | |
| 46 | *Construction technology (IBS, IT and online platform, new construction method, etc.)* | |

## Population and sampling

The questionnaires were sent to three principal target groups in the Malaysian construction industry (developers, consultants and contractors). A purposive stratified random sampling method was used. The samples were selected based on the listing provided by the relevant professional institution. In the first stage of sampling, samples of population were selected from the states of Selangor and Kuala Lumpur. Both states were chosen because of their standing as the country's commercial and industry heartland. In fact, 31.7% of the construction projects or equivalent to 39.1% of the total project values in the country were awarded to these areas in year 2011 (Construction Industry Development Board Malaysia, 2011). In addition to that, both states have the largest groups of professionals and contractors registered.

During the second stage of sampling, the target population for the contractors was further stratified based on companies that are registered with the Construction Industry Development Board (CIDB) under the class G7 categories (projects greater than RM10 million). Class G7 was selected as this group of contractors occupied 73.5% of the total project value in year 2011 (Construction Industry Development Board Malaysia, 2011).

The initial sample size based on Yamane sampling methodology on a 95% confidence level was 1043 samples. However, owing to time and budget constraints, the sample size was reduced to a manageable level of 488 samples. The reduction is in line with the findings of Krejcie and Morgan (1970) and Roscoe (1975) on the importance of appropriate sample size. Based on their findings, a sample size of more than 30 and fewer than 500 is appropriate for most research.

Despite adopting the mixed method research design which enabled a fuller picture to be obtained, the fairly small sample population renders the quantitative observations indicative rather than representative.

## Response rate

A total of 488 questionnaires were sent to different target groups. Apart from that, formal cover letters with the university letterhead and returned envelopes were sent to provide details of the research and to persuade the respondents of the importance of their response. The respondents were informed that their findings would be published and a brief report would be sent to them upon request. Forty-eight (48) questionnaires were returned within three months of being sent out, making the total response rate 9.83%. This response level was finally achieved after numerous efforts were made in terms of follow-up phone calls, e-mails and letters.

The response rate of 9.83% is not uncommon. It is in accordance with the findings of Dulaimi *et al.* (2003). They reported a 5.91% response rate for their research survey because of the lack of participation from the construction industry. According to Dulaimi *et al.* (2003), one of the main reasons for the lack of participation was the general industry's 'fatigue' regarding the copious requests to complete research surveys from different institutions on a regular basis. On the other hand, Abdul-Rahman *et al.* (2010) and Abdul-Aziz (2012) also reported a low response rate: 7.4% and 10.3% respectively, for their research on the Malaysian construction industry. They attributed the low response rate to the apathy towards research on the local construction industry. Some respondents were just too busy handling daily routine due to their hectic schedule and the bad economic climate.

## Respondent background

Table 2 and Table 3 show the designation and the construction experience of the respondents, respectively. They represent a wide range of professions, and include the clients themselves, their project managers, architects, engineers, quantity surveyors,

**Table 2** Designation of the respondents

| Positions | Developers | Consultants | Contractors | Total | % |
|---|---|---|---|---|---|
| Managing directors[a] | 4 | 3 | 5 | 12 | 25.0 |
| Directors[a] | – | 8 | 3 | 11 | 23.0 |
| Senior managers[a] | 3 | 6 | 3 | 12 | 25.0 |
| Managers | 1 | 4 | 1 | 6 | 12.5 |
| Executives | 3 | 3 | 1 | 7 | 14.5 |
| Total | 11 | 24 | 13 | 48 | 100.0 |

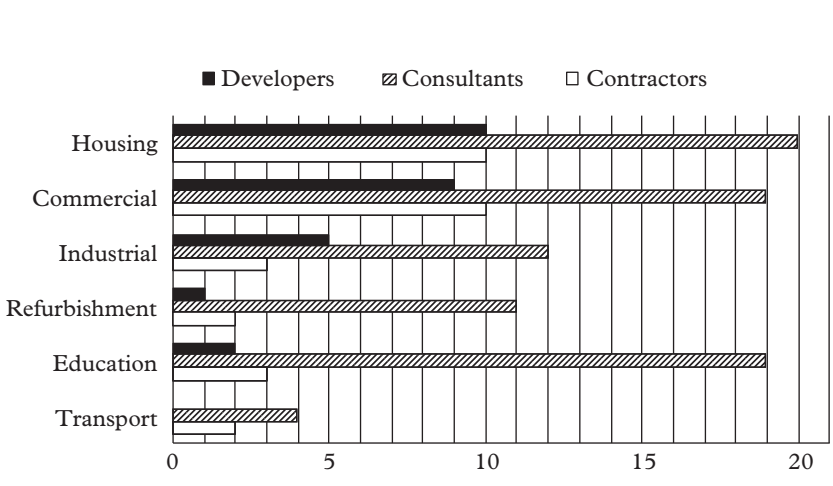
*Notes*: [a] Denotes senior management level. Managing directors include general manager, executive director, chief operating officer, regional manager, principal; directors include company director; senior managers include senior project managers, associates, head of unit; managers include quantity surveyors, senior contract executives, contract managers, project managers; executives include project executives and site supervisor.

**Table 3** Construction experiences of the respondents

| Years | Developers | Consultants | Contractors | Total |
|---|---|---|---|---|
| Less than 2 years | – | 2 | 1 | 3 |
| 2–6 years | 3 | 5 | 1 | 9 |
| 6–15 years | 2 | 4 | 2 | 8 |
| Over 15 years | 6 | 13 | 9 | 28 |
| Total | 11 | 24 | 13 | 48 |

contract managers and contractors. More than 70% or 35 respondents are positioned at the senior management level, with an average construction experience of over 15 years.

The project types as well as the procurement methods undertaken by the respondents' organizations were tabulated to provide information on the nature of their businesses. Each company had undertaken more than one type of project. Figure 2 indicates that housing projects (83%) and commercial projects (79%) are among the most common project types. On the other hand, the traditional design-bid-build method (75%) remained




**Project type:**

| | | |
|---|---|---|
| **Housing** | **40** | **83%** |
| Commercial | 38 | 79% |
| Industrial | 20 | 42% |
| Refurbishment | 14 | 29% |
| Education | 24 | 50% |
| Transport | 6 | 13% |

**Procurement method:**

| | |
|---|---|
| **Traditional** | **75%** |
| Design & build | 42% |
| Management contracting | 13% |
| Construction management | 13% |

*People may select more than one answer, so percentages may add up to more than 100%

**Figure 2** Types of projects with which the respondents' organizations have been involved

the most prevalent choice of procurement among the respondents' organizations. The samples were reflective of the local construction industry as most of the building projects in Malaysia consist mainly of residential and commercial developments with more than 95% of them being procured by traditional method (Construction Industry Development Board Malaysia, 2012). The breadth of information presented implied that the data collected were reliable and credible.

## Questionnaire design and Likert scale

The questionnaire was divided into different parts, namely:

- Part 1: General section concerning the respondent's background.
- Part 2: Critical success factors of construction projects in Malaysia.
- Part 3: Comparisons of different procurement procedures adopted in Malaysia.
- Part 4: Further comments by the respondent.

Personal information of the respondents included working experience in the construction industry, job status as well as designation in the company. Most of the questions were of closed type and were designed to elicit qualitative information.

The respondents identified factors that they perceived as being likely to contribute to the success of the construction project by responding on a scale from 1 (strongly disagree) to 5 (strongly agree). The five-point Likert rating scale was 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree.

## Data analysis and results

As suggested by Lay and Khoo (2009), a non-parametric technique would be suitable for the analysis of this study as data were qualitative in nature. Statistical analyses undertaken include Kruskal-Wallis one-way analysis of variance (ANOVA).

The Kruskal-Wallis test is a non-parametric alternative test for one-way analysis of variance (ANOVA). It was used to examine whether there are any significant differences of opinions among developers, contractors and consultants. In addition to that, the Mann-Whitney U test was carried out to further examine whether these differences are statistically significant between independent stakeholders. The Cronbach's alpha reliability is 0.939, indicating that the data collected from the survey were interrelated and the five-point Likert scale used for measuring the factors critical to project success is reliable.

## Analysis and ranking of critical success factors

An analysis of the sample results, shown in Table 4, suggests that with the exception of supervision of subcontractor works that is significant at 5% level, there are no statistically significant differences among the opinions of stakeholders regarding the rest of the variables. This suggests that construction stakeholders, irrespective of their profession, generally have similar opinions regarding the factors influencing project success. This result was further tested with Mann-Whitney U tests on a pairwise comparison among three groups of stakeholders. Based on the test results, there is a significant difference of opinion on supervision of subcontractor work between developers and contractors. The probability value obtained (0.017) is the same as the predetermined alpha value (0.05/3 = 0.017); thus the stated null hypothesis was rejected. On the other hand, there are no significant differences between developers and consultants or consultants and contractors as their probability values are larger than the predetermined alpha values, which are 0.604 and 0.024 respectively. These conclusions are made at 95% confidence level. In addition to that, the level of criticality and the reference to 'hard' and 'soft' features of each respective factor were also included in Table 4.

The top five critical success factors for construction projects are contractor's competence and experience, project financing, team leader's competence, project consultant's competence as well as site management and supervision. Most of these factors relate to the capability of the project stakeholders to deliver their promises, which directly affects the overall project performance. Inadequate clients' finance and delayed payments for completed work, inadequate technical and managerial skills of the consultants and poor site management of the contractor have often been identified as the main challenges in the local industry by various researchers (Alaghbari *et al.*, 2007; Sambasivan and Soon, 2007; Al-Tmeemy *et al.*, 2011). It is not surprising that these factors ranked among the highest as the most critical factors in project success.

Strong commitment and effective communication among project stakeholders are ranked 6th and 8th respectively. The respondents acknowledged that lack of commitment to project goals and ineffective communication are among the significant shortcom-

**Table 4** Critical success factors for construction projects

| Critical success factors | Developer (N = 11) | | | Consultant (N = 24) | | | Contractor (N = 13) | | | Total | Total | Kruskal-Wallis Asymp. Sig. | C** | F*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | | | |
| Contractor's competence and experience | 4.64 | 7 | 0.51 | 4.71 | 1 | 0.55 | 4.54 | 2 | 0.52 | 4.65 | 1 | 0.495 | V. C | H |
| Project financing | 4.64 | 4 | 0.51 | 4.63 | 2 | 0.50 | 4.62 | 1 | 0.51 | 4.62 | 2 | 0.995 | V. C | H |
| Team leader's competence | 4.64 | 5 | 0.51 | 4.63 | 3 | 0.50 | 4.46 | 5 | 0.52 | 4.58 | 3 | 0.586 | V. C | H |
| Project consultant's competence | 4.64 | 6 | 0.51 | 4.54 | 7 | 0.59 | 4.54 | 3 | 0.52 | 4.56 | 4 | 0.891 | V. C | H |
| Site management and supervision | 4.73 | 2 | 0.47 | 4.58 | 4 | 0.50 | 4.38 | 8 | 0.51 | 4.56 | 5 | 0.239 | V. C | H |
| Strong commitment among project stakeholders | 4.64 | 3 | 0.51 | 4.54 | 6 | 0.51 | 4.46 | 6 | 0.52 | 4.54 | 6 | 0.698 | V. C | S |
| Providing adequate design details and specifications | 4.73 | 1 | 0.47 | 4.46 | 10 | 0.59 | 4.54 | 4 | 0.52 | 4.54 | 7 | 0.422 | V. C | S |
| Effective communication among project stakeholders | 4.55 | 10 | 0.52 | 4.46 | 11 | 0.59 | 4.46 | 7 | 0.52 | 4.48 | 8 | 0.916 | V. C | S |
| Skilful workers | 4.64 | 9 | 0.51 | 4.54 | 9 | 0.51 | 4.23 | 15 | 0.44 | 4.48 | 9 | 0.101 | V. C | H |
| Supervision of subcontractors' works | 4.64 | 8 | 0.51 | 4.54 | 8 | 0.51 | 4.15 | 19 | 0.38 | 4.46 | 10 | 0.034 * | V. C | H |
| Emphasis on high quality workmanship instead of low and quick construction | 4.55 | 14 | 0.52 | 4.58 | 5 | 0.58 | 4.15 | 18 | 0.69 | 4.46 | 11 | 0.133 | V. C | S |
| Well-defined scope of work and project constraints | 4.55 | 11 | 0.69 | 4.46 | 12 | 0.66 | 4.31 | 10 | 0.63 | 4.44 | 12 | 0.558 | V. C | S |
| Team leader's leadership and authority | 4.45 | 19 | 0.52 | 4.46 | 13 | 0.51 | 4.31 | 11 | 0.63 | 4.42 | 13 | 0.786 | V. C | S |
| Team leader's early and continuous involvement in the project development | 4.45 | 20 | 0.52 | 4.33 | 21 | 0.57 | 4.38 | 9 | 0.51 | 4.38 | 14 | 0.853 | V. C | S |
| Effective allocation of manpower | 4.55 | 12 | 0.69 | 4.38 | 17 | 0.50 | 4.15 | 21 | 0.56 | 4.35 | 15 | 0.189 | V. C | H |
| Team leader's adaptability to amendment in project plan | 4.45 | 18 | 0.52 | 4.42 | 14 | 0.50 | 4.15 | 20 | 0.38 | 4.35 | 16 | 0.211 | V. C | S |

(*Continued*)

**Table 4** (*Continued*)

| Critical success factors | Developer (N = 11) | | | Consultant (N = 24) | | | Contractor (N = 13) | | | Total | Total | Kruskal-Wallis Asymp. Sig. | C** | F*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | | | |
| Cooperation in solving problems among project stakeholders | 4.36 | 24 | 0.51 | 4.42 | 15 | 0.50 | 4.23 | 16 | 0.44 | 4.35 | 17 | 0.534 | V. C | S |
| Clear and detailed written contract | 4.18 | 30 | 1.08 | 4.42 | 16 | 0.58 | 4.31 | 12 | 0.48 | 4.33 | 18 | 0.813 | V. C | H |
| Client's responsiveness to the needs of the other stakeholders | 4.55 | 13 | 0.69 | 4.33 | 19 | 0.82 | 4.15 | 23 | 0.56 | 4.33 | 19 | 0.245 | V. C | S |
| Effective project budget monitoring | 4.45 | 21 | 0.52 | 4.25 | 25 | 0.61 | 4.31 | 13 | 0.63 | 4.31 | 20 | 0.673 | V. C | H |
| Implementation of effective project monitoring mechanism | 4.45 | 15 | 0.82 | 4.25 | 24 | 0.61 | 4.23 | 17 | 0.60 | 4.29 | 21 | 0.478 | V. C | H |
| Awarding bids to the right designers/ contractors | 4.45 | 17 | 0.69 | 4.33 | 20 | 0.70 | 4.08 | 30 | 0.49 | 4.29 | 22 | 0.240 | V. C | S |
| Mutual trust among project stakeholders | 4.27 | 26 | 0.47 | 4.33 | 22 | 0.57 | 4.15 | 24 | 0.38 | 4.27 | 23 | 0.513 | V. C | S |
| Goal setting | 4.36 | 22 | 0.67 | 4.21 | 27 | 0.66 | 4.31 | 14 | 0.63 | 4.27 | 24 | 0.776 | V. C | H |
| Client's confidence in construction team | 4.27 | 28 | 0.65 | 4.33 | 23 | 0.64 | 4.15 | 25 | 0.69 | 4.27 | 25 | 0.734 | V. C | S |
| Involvement to monitor project progress | 4.18 | 32 | 0.75 | 4.37 | 18 | 0.50 | 4.15 | 22 | 0.56 | 4.27 | 26 | 0.520 | V. C | S |
| Working relationships with other project stakeholders | 4.27 | 27 | 0.65 | 4.21 | 29 | 0.59 | 4.15 | 26 | 0.56 | 4.21 | 27 | 0.861 | V. C | S |
| Demand and variation | 4.36 | 23 | 0.67 | 4.21 | 28 | 0.72 | 4.08 | 31 | 0.64 | 4.21 | 28 | 0.566 | V. C | H |
| Top management support from client organization | 4.45 | 16 | 0.69 | 4.08 | 32 | 0.78 | 4.08 | 32 | 0.49 | 4.17 | 29 | 0.268 | V. C | S |
| Client's experience of construction project organization and management | 4.27 | 29 | 0.65 | 4.04 | 34 | 0.81 | 4.15 | 28 | 0.56 | 4.12 | 30 | 0.736 | V. C | H |
| Stable and sound economy policy | 3.91 | 41 | 0.83 | 4.21 | 30 | 0.66 | 4.15 | 27 | 0.69 | 4.12 | 31 | 0.542 | V. C | H |

(*Continued*)

**Table 4** (*Continued*)

| Critical success factors | Developer (N = 11) | | | Consultant (N = 24) | | | Contractor (N = 13) | | | Total | Total | Kruskal-Wallis Asymp. Sig. | C** | F*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | Std. dev. | Mean | Rank | | | |
| Implementing an effective quality assurance programme such as QLASSIC | 4.09 | 35 | 0.70 | 4.25 | 26 | 0.61 | 3.85 | 38 | 0.56 | 4.10 | 32 | 0.17 | V. C | H |
| Transparency in the procurement process | 4.18 | 33 | 0.75 | 4.00 | 36 | 0.83 | 4.08 | 33 | 0.64 | 4.06 | 33 | 0.846 | V. C | S |
| Legal and contractual risk management | 4.18 | 31 | 0.98 | 3.96 | 37 | 0.62 | 4.00 | 34 | 0.58 | 4.02 | 34 | 0.438 | V. C | S |
| Tendering method | 4.00 | 39 | 0.78 | 4.08 | 33 | 0.65 | 3.92 | 37 | 0.64 | 4.02 | 35 | 0.779 | V. C | H |
| Implementing an effective safety program such as SHASSIC | 3.91 | 40 | 0.70 | 4.13 | 31 | 0.54 | 3.85 | 39 | 0.69 | 4.00 | 36 | 0.364 | V. C | H |
| Involvement of different project stakeholders in the early planning of project | 4.09 | 34 | 0.83 | 4.04 | 35 | 0.75 | 3.77 | 40 | 0.44 | 3.98 | 37 | 0.452 | C | S |
| Urgency in meeting project deadline | 4.27 | 25 | 0.65 | 3.75 | 39 | 0.79 | 4.00 | 36 | 0.41 | 3.94 | 38 | 0.123 | C | H |
| Industry related issue | 4.09 | 36 | 0.54 | 3.75 | 40 | 0.74 | 4.15 | 29 | 0.69 | 3.94 | 39 | 0.188 | C | H |
| Competitive procurement | 4.00 | 38 | 0.89 | 3.83 | 38 | 0.70 | 4.00 | 35 | 0.58 | 3.92 | 40 | 0.587 | C | H |
| Construction technology | 3.82 | 42 | 0.41 | 3.75 | 41 | 0.74 | 3.69 | 42 | 0.48 | 3.75 | 41 | 0.849 | C | H |
| Public acceptance towards the project | 3.73 | 43 | 1.01 | 3.71 | 42 | 0.55 | 3.77 | 41 | 0.73 | 3.73 | 42 | 0.998 | C | H |
| Nature of client whether he is privately or publicly funded | 4.00 | 37 | 0.63 | 3.54 | 43 | 0.72 | 3.46 | 45 | 0.52 | 3.62 | 43 | 0.088 | C | H |
| Political stability | 3.55 | 45 | 0.82 | 3.54 | 44 | 0.83 | 3.69 | 43 | 0.86 | 3.58 | 44 | 0.835 | C | H |
| Weather conditions | 3.64 | 44 | 1.03 | 3.50 | 45 | 0.89 | 3.69 | 44 | 0.86 | 3.58 | 45 | 0.864 | C | H |
| Complexity of the project | 3.00 | 46 | 1.10 | 3.17 | 46 | 1.01 | 3.23 | 46 | 1.01 | 3.15 | 46 | 0.864 | C | H |

*Notes*: * The mean difference is significant at the 0.05 level of significance. ** Criticality: 5 = extremely critical; 4 = very critical; 3 = critical; 2 = somewhat critical; 1 = not critical.*** Factor categories: H = hard features (objective, tangible and measureable), S = soft features (refers to attitudinal or mindset problem, subjective and difficult to measure).

ings that hinder project success. Hence, it is not unexpected that developers and consultants (both ranked 8) opined that contractors (ranked 19) should be more 'committed' in supervising the work of their subcontractors while on the other hand, developers (ranked 1) and contractors (ranked 4) deemed that the consultants (ranked 10) needed to provide adequate details and specifications in 'communicating' their designs.

Both shortcomings are perhaps due to the adversarial nature and opportunistic behaviours of project stakeholders in the industry (Latham, 1994; Egan, 1998; Chan *et al.*, 2003; Harmon, 2003; Eriksson, 2006). Misunderstanding and distrust resulting from these adversarial attitudes will hamper not only the stakeholders' communication but also their willingness to perform their duties up to the expected quality. Poor performance in turn will lead to disputes and confrontational relationships among different parties thus starting a vicious circle.

Apart from that, the team leader's leadership and authority, early and continuous involvement in the project development and adaptability to amendment in project plan was ranked 13th, 14th and 16th respectively. In the context of the Malaysian construction industry, the project team leader is usually the architect in charge or developer appointed project manager. Both of them played a vital role, as they are to coordinate the entire design team from inception stage until completion of the project. Their leadership and continuous involvement are critical factors affecting project planning, scheduling and communication (Belassi and Tukel, 1996).

## Discussion of findings

Results of analysis in this study are in line with several other studies conducted in other parts of the world. Ratings of critical success factors in Table 4 reveal high-scoring factors are mostly related to three major aspects as follows.

## Project personnel

Project stakeholders' competence is one of the main themes that emerged from the study. Greater proficiency in managing project inputs will result in a better quality output and detailed perception of risks throughout the project (Agarwal, 1994). Stakeholders' competence is vital in establishing credibility among stakeholders; it is one of the main ingredients in engendering an atmosphere of trust in the industry (Mayer *et al.*, 1995; Kadefors, 2004; Pinto *et al.*, 2009). As such, credibility and competence are two of the most important determinants of a healthy project relationship. A higher level of satisfaction in working relationships will generate a higher positive impact on the project outcomes (Pinto *et al.*, 2009).

While many researchers emphasized the competencies of consultants and contractors, some focused on the competencies of the developers and project managers. With regard to that, the developers and project managers must be competent to respond to different situations in order to avoid any ambiguities throughout the project period. Low and Chuan (2006) realized that clients' participation and their decisions throughout the project duration could affect the project performance. Their responsiveness should involve different dimensions, for example, clients need to be clear about their own decisions, be quick in their responses and make sure that their decisions are communicated clearly to all stakeholders.

Clients, especially government developers, should be ready to be the project champion, to impart new management philosophy and incorporate relationship-based strategies consistently throughout the project duration to foster a greater sense of trust among stakeholders (Dainty *et al.*, 2005). The sense of 'affinity' or attachment backed by top management and team leaders' support will lead to improved commitment to project objectives. It is a crucial strategy for gaining acceptance to the paradigm shift desirable in the local industry from the traditional measure of time, cost and quality to a relationship-based approach in procurement.

Apart from that, Alaghbari *et al.* (2007) and Sambasivan and Soon (2007) both recognized that one of the most significant factors causing delay in the Malaysian construction industry is the delayed progress payments. They stressed that the developers need to ensure that they are financially competent throughout the project duration. Often times, there are too many under-capitalized developers embarking on speculative development and many of these projects may eventually run into cash flow problems as a result of bad financial planning (Lim, 2005). A cash flow problem will likely lead to project failure and losses are usually transferred to the parties down the contractual chain in the form of non-payment or delayed payment. Hence, developers have to be prudent in their financial planning and be a credible paymaster to pay the stakeholders promptly in order to ensure timely completion of the project works.

Studies have also shown that leadership capabilities of a project manager can greatly influence the project outcome (Munns, 1995; Walker and Hampson, 2003; Toor and Ogunlana, 2009). Current perceptions of project managers largely relate to their misuse of

power, profit-orientation and lack of commitment to stay on throughout the entire project duration. This is perhaps due to the traditional focus on the technical and managerial features of the construction project. However, with the increasingly difficult business environment, there must be a change of mindset now for project managers to focus on the relationship features of construction projects, even more so where they are the final decision makers and client representatives.

Although it may be difficult to develop long-term trust among different stakeholders due to the temporal nature of the construction project, clients or project managers must begin to see the value of teamwork in project performance (Munns, 1995). The first impression of each construction individual when entering a project is important in shaping the eventual outcomes; therefore, the ability of the project manager to create a collaborative environment for the project is important. He must be sensitive to the needs of other construction players in the team.

## Commitment and communication

Commitment, in general terms, refers to dedication and interest of all related parties in a construction project. It has often been recognized as one of prerequisites of project success (Belassi and Tukel, 1996; Nguyen *et al.*, 2004; Andersen *et al.*, 2006; Toor and Ogunlana, 2008). It is closely related to the other CSFs such as stakeholders' early involvement, adequate design details and specification and emphasis on high quality workmanship. Commitment to set a well-defined scope of work and clear identification of varied expectations, challenges and project constraints at the early stage of the project will provide a clearer direction to all the stakeholders (Toor and Ogunlana, 2008). Developers have to be sensitive to the different needs throughout the project period while the consultants are expected to furnish adequate design details, specifications and advice to their clients and contractors. On the other hand, the contractor should be committed to ensure high quality workmanship. Commitment is often a physical and mental manifestation of the concept of trust (Walker and Hampson, 2003). A strong commitment will initiate an atmosphere of trust which is a pivotal factor for encouraging the collaborative spirit amidst the widespread adversarial attitude within the local industry.

Effective communication is another widely recognized factor for the success of organizations and projects (Cheung *et al.*, 2003; Andersen *et al.*, 2006; Dainty *et al.*, 2006; Meng, 2012). As construction projects involve multiple levels of relationships, communication is essential. Each project worker cannot be a lone ranger working on their assigned task without communicating with the rest of the team. Besides that, communication should not be just words or task oriented, it should be a form of relationship building where all stakeholders are willing to spend time to 'connect' with one another both at project level and on a personal level. Andersen *et al.* (2006) emphasized that rich project communication plays a key role in trust building among project stakeholders that will in turn contribute to effective and sustainable working relationships in the long run.

On another perspective, communication and power or influences are closely linked. Lovell (1993) opined that inappropriate power application such as delaying, withholding or obstructing information flow will hamper effective communication within the team. As in the traditional procurement approach practised locally, the contractor usually takes the majority of the cost risk while the developer has the major input and influence upon the working relationship. These power dimensions shaped the nature of the relationship between design teams and determine how conflicting opinions are channelled. Therefore, the clients should take the initiative to respond to the needs of the concerned parties while all the other parties should be empowered to speak their mind so that their needs, struggles and suggestions are aired through a proper channel. Clients should also be ready to impart project vision consistently throughout the construction duration to foster a sense of 'affinity' among the stakeholders (Dainty *et al.*, 2005). The sense of 'affinity' or attachment will lead to improved commitment to project objectives.

## Site management and supervision

Numerous studies have highlighted the importance of site management and supervision for project success (Chan and Kumaraswamy, 1996; Lim and Mohamed, 1999; Alaghbari *et al.*, 2007). Site management and supervision include several aspects, such as project planning and monitoring, supervision of subcontractors' work, and availability of skilled labourers. The supervision of site work is vital to ensure the required qualities are being achieved at construction sites (Akintoye, 2000).

Construction projects need very careful and thorough planning before the actual execution of the works and effective monitoring while the project is running (Toor and Ogunlana, 2009). Inadequate planning will result in cost overruns and unexpected delay. Therefore, the setting up of an effective project monitoring mechanism by all project stakeholders is vital (Lim and Mohamed, 1999). It enables the team

members to have a clear direction and information on the project. Sambasivan and Soon (2007) discovered that the local contractors are often incompetent at site planning and proper project monitoring, resulting in construction mistakes that affect the profitability of the project. This view accords with our findings where there is significant difference of opinion among the three principal stakeholders being surveyed. Both the developers and the consultants opined that the contractors needed to improve the quality of their work through the supply of a more skilled workforce and better supervision of subcontractors' work (Table 4: significance = 0.101 and 0.034 respectively).

Inadequate contractor experience could further be traced down to the shortcomings inherent in the contact awarding procedures in Malaysia where most of the construction projects are awarded to the lowest bidder (Construction Industry Development Board Malaysia, 2006). The bidding and contract awarding procedures are adversarial in nature as clients and contractors tend to take advantage of one another during the negotiation process. The clients try to suppress the project cost to an unrealistic level in order to reap more profit while the contractors in response will bid at an unrealistic price to get the project. Most of the time, the contractors will seek to recoup their profit through variation or compromising on the quality of work during the construction phase later.

However, the problem of site management and supervision should not be limited to the developers and contractors alone. Lack of experienced site staff such as the clerk of work or site supervisors also affects the quality of supervision on site. Some of these site supervisors often lack proper vocational training, as they are the early school leavers. They normally learn through trial and error.

In addition to that, the local construction industry is also swamped with foreign workers from Indonesia and Vietnam (Department of Statistics Malaysia, 2011). Most of these foreign labourers are not skilled workers and their work quality is relatively low compared to that of the locals (Narayanan and Lai, 2005). The low quality and productivity will have a substantial effect on project quality. The foreign workers should be monitored closely with an effective control mechanism and be given training from time to time to improve productivity.

## Conclusions and implications of findings

The focal point of this analysis is the emerging trend of critical success factors as reflected by various stakeholders in the Malaysian construction industry. An exploration of 46 factors was conducted and ranked accordingly using Kruskal-Wallis one-way analysis of variance (ANOVA).

Based on the analysis, there was unanimous agreement among the stakeholders on the importance of both 'hard' and 'soft' factors for project success. Although past literature on the Malaysian construction industry tended to relate CSFs to 'hard' factors such as time, cost and quality, current findings offer a new perspective of looking at CSFs for local construction projects. An initial analysis shows that the main factors critical to project success consist of the interplay between 'hard' and 'soft' elements. 'Hard' features are consultants' and contractors' competence, project financing and team leaders' competence while 'soft' features consist of strong commitment and effective communication among project stakeholders. Except for the supervision of subcontractor works, there is no difference of opinion, at the 5% significance level, on the factors critical to project success.

It is now empirically evident that the local industry favours a more balanced approach on CSFs by recognizing the significance of both 'hard' and 'soft' factors in project management. The findings are robust as they were correlated with the literature review. They are in line with the rising trend, in recognizing the importance of human-related factors for project success. This being the case, the implication could be that more research efforts should be concentrated on developing tangible strategies to implement these CSFs in construction projects. Further gaps were revealed on the collective knowledge, particularly on the theoretical understanding underpinning various dimensions of trust construct. In addition to competency and integrity dimensions as stated in the works of Schoorman *et al*. (2007) and Pinto *et al*. (2009), the potentials of human-related or 'benevolence' dimensions were capitalized to improve relationships among stakeholders. The application of both competency and communication factors for example, would help to instil an atmosphere of trust in the local industry.

Hence, it is crucial for the industry to recognize that it will not be sufficient merely to take up different types of procurement, guidelines and management tools adapted from other literatures; it does not necessarily guarantee a better working relationship among the stakeholders. In fact, it is the human-related factors, mainly concerned with attitude change, the process of facilitating team spirit and the strong commitment to improving the team relationship that are far more important to the success of projects. In a nutshell, the key is the 'man'. As building team spirit through mutual goals and objectives is easier to preach than to practise, constant education, training and awareness need to be continuously applied in the

industry to develop authentic leadership and management styles that foster trust and commitment.

It is timely for the Malaysian construction industry to rethink its current traditional procurement procedure by incorporating relationship-based strategies at difference stages of construction. It is an identified need as there has not yet been any widely published research that capitalizes on the prospect of stakeholders' attitudes and behavioural change in relation to project success in Malaysia.

## Limitation of the study and future research

The findings of this study are tempered by limitations. It is conditional upon the context (building project) and the relationships selected (developers, consultants and contractors). The generalizability of the findings across Malaysia is thus doubtful because the study was conducted within Klang Valley *per se* due to time and budget constraints. The fairly small sample population also renders the quantitative observations indicative rather than representative. Therefore, further research is needed to expand our understanding of CSFs in different locations in the country especially in East Malaysia where the market conditions, local cultures and practices are different as compared to West Malaysia. Apart from that, the research would also benefit from a larger sample for the questionnaire survey. This would in turn increase the confidence in the reliability of the findings.

The findings should serve as a starting point for future empirical analysis of the cause and effect of opportunistic behaviours in the construction industry. They should also pave the way for research into the operationalization of human-related factors in the local industry.

## Acknowledgements

This paper is part of a larger research project concerned with the development of an effective relationship-based procurement model in Malaysia. The authors would like to thank Universiti Teknologi Malaysia (UTM) for the funding provided under the *Zamalah* scholarship scheme without which it would be impossible for the authors to finish the study.

## References

Abdul-Aziz, A. (2012) Control mechanisms exercised in Malaysian housing public-private partnerships. *Construction Management and Economics*, **30**(1), 37–55.

Abdul-Rahman, H., Berawi, M., Berawi, A., Mohamed, O., Othman, O. and Yahya, I.A. (2006) Delay mitigation in the Malaysian construction industry. *Journal of Construction Engineering and Management*, **132**(2), 125–33.

Abdul-Rahman, H., Wang, C. and Yap, X.W. (2010) How professional ethics impact construction quality: perception and evidence in a fast developing economy. *Scientific Research and Essays*, **5**(23), 3742–9.

Agarwal, S. (1994) Socio-cultural distance and the choice of joint ventures: a contingency perspective. *Journal of International Marketing*, **2**(2), 63–80.

Akintoye, A. (2000) Analysis of factors influencing project cost estimating practice. *Construction Management and Economics*, **18**(1), 77–89.

Al-Tmeemy, S.M.H.M., Abdul-Rahman, H. and Harun, Z. (2011) Future criteria for success of building projects in Malaysia. *International Journal of Project Management*, **29** (3), 337–48.

Alaghbari, W., Kadir, M.R.A., Salim, A. and Ernawati (2007) The significant factors causing delay of building construction projects in Malaysia. *Engineering, Construction and Architectural Management*, **14**(2), 192–206.

Andersen, E.S. and Jessen, S.A. (2000) Project evaluation scheme: a tool for evaluating project status and predicting project results. *Project Management Journal*, **6** (1), 61–9.

Andersen, E.S., Jessen, S.A., Birchall, D. and Money, A.H. (2006) Exploring project success. *Baltic Journal of Management*, **1**(2), 127–47.

Atkinson, R. (1999) Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*, **17**(6), 337–42.

Belassi, W. and Tukel, O.I. (1996) A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*, **14**(3), 141–51.

Belout, A. and Gauvreau, C. (2004) Factors influencing the project success: the impact of human resource management. *International Journal of Project Management*, **22**(1), 1–11.

Chan, A., Scott, D. and Lam, E. (2002) Framework of success criteria for design/ build projects. *Journal of Management in Engineering*, **18**(3), 120–8.

Chan, A.P.C., Chan, D.W.M. and Ho, K.S.K. (2003) An empirical study of the benefits of construction partnering in Hong Kong. *Construction Management and Economics*, **21**(5), 523–33.

Chan, A.P.C., Scott, D. and Chan, A.P.L. (2004) Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, **130**(1), 153–5.

Chan, D.W.M. and Kumaraswamy, M.M. (1996) An evaluation of construction time performance in the building industry. *Building and Environment*, **31**(6), 569–78.

Cheung, S.-O., Ng, T.S.T., Wong, S.-P. and Suen, H.C.H. (2003) Behavioral aspects in construction partnering. *International Journal of Project Management*, **21**(5), 333–43.

Chua, D.K.H., Kog, Y.C. and Loh, P.K. (1999) Critical success factors for different project objectives. *Journal of Construction Engineering and Management*, **125**(3), 142–50.

Construction Industry Development Board Malaysia (2006) *Construction Industry Master Plan (2006–2015)*, CIDB, Kuala Lumpur.

Construction Industry Development Board Malaysia (2009) *Construction Industry Review 1980–2009 (Q1)*, CIDB, Kuala Lumpur.

Construction Industry Development Board Malaysia (2011) *Construction Quarterly Statistical Bulletin*, CIDB, Kuala Lumpur.

Construction Industry Development Board Malaysia (2012) *Construction Quarterly Statistical Bulletin*, CIDB, Kuala Lumpur.

Cooke-Davies, T. (2002) The 'real' success factors on projects. *International Journal of Project Management*, **20**(3), 185–90.

Dainty, A. (2008) Methodological pluralism in construction management research, in Knight, A. and Ruddock, L. (eds) *Advanced Research Methods in the Built Environment*, Wiley-Blackwell, Oxford, pp. 1–13.

Dainty, A.R.J., Bryman, A., Price, A.D.F., Greasley, K., Soetanto, R. and King, N. (2005) Project affinity: the role of emotional attachment in construction projects. *Construction Management and Economics*, **23**(3), 241–4.

Dainty, A., Moore, D. and Murray, M. (2006) *Communication in Construction: Theory and Practice*, Taylor & Francis, London.

de Wit, A. (1988) Measurement of project success. *International Journal of Project Management*, **6**(3), 164–70.

Department of Statistics Malaysia (2011) *Economic Report 2011/2012*, Department of Statistics Malaysia, Kuala Lumpur.

Department of Statistics Malaysia (2012a) *Economic Report 2012/2013*, Department of Statistics Malaysia, Kuala Lumpur.

Department of Statistics Malaysia (2012b) *Labour Force Survey Report on Malaysia 2011*, Department of Statistics Malaysia, Kuala Lumpur.

Dissanayaka, S.M. and Kumaraswamy, M.M. (1999) Evaluation of factors affecting time and cost performance in Hong Kong building projects. *Engineering, Construction and Architectural Management*, **6**(3), 287–98.

Dulaimi, M.F., Ling, F.Y.Y. and Bajracharya, A. (2003) Organizational motivation and inter-organizational interaction in construction innovation in Singapore. *Construction Management and Economics*, **21**(3), 307–18.

Egan, J. (1998) *Rethinking Construction*, Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the Scope for Improving the Quality and Efficiency of UK Construction, HMSO, London.

Eriksson, P.E. (2006) Procurement and governance management: development of a conceptual procurement model based on different types of control. *International Review of Management Studies*, **17**(1), 30–49.

Fellows, R. (2010) New research paradigms in the built environment. *Construction Innovation: Information, Process, Management*, **10**(1), 5–13.

Fellows, R. and Liu, A. (2005) *Research Methods for Construction*, Blackwell, Oxford.

Fortune, J. and White, D. (2006) Framing of project critical success factors by a systems model. *International Journal of Project Management*, **24**(1), 53–65.

Harmon, K. (2003) Conflicts between owner and contractors: proposed intervention process. *Journal of Management in Engineering*, **19**(3), 121–5.

Hartman, F.T. (2002) The role of trust in project management, in Slevin, D.P., Cleland, D.I. and Pinto, J.K. (eds) *The frontiers of project management research*, Project Management Institute, Newtown Square, PA, pp. 225–35.

Hatush, Z. and Skitmore, M. (1997) Evaluating contractor prequalification data: selection criteria and project success factors. *Construction Management and Economics*, **15**(2), 129–47.

Kadefors, A. (2004) Trust in project relationships: inside the black box. *International Journal of Project Management*, **22**(3), 175–82.

Kong, A.T. and Gray, J. (2006) Problems with Traditional Procurement in the Malaysian Construction Industry - a Survey, in Runeson, G. and Best, R. (eds) *Proceedings of AUBEA Annual Conference, University of Technology,* 12–14 July, Australasian Universities Building Educators Association, Sydney, pp. 1–21.

Krejcie, R.V. and Morgan, D.W. (1970) Determining sample size for research activities. *Educational and Psychological Measurement*, **30**, 607–10.

Kumaraswamy, M.M. and Chan, D.W.M. (1999) Factors facilitating faster construction. *Journal of Construction Procurement*, **5**(2), 88–98.

Latham, M. (1994) *Constructing the Team*, Final Report of the Joint Review of Procurement and Contractual Arrangements in the UK Construction Industry, HMSO, London.

Lay, Y.F. and Khoo, C.H. (2009) *Introduction to Statistical Analysis in Social Sciences Research: Series 2*, Venton Publishing, Selangor, Malaysia.

Li, B., Akintoye, A., Edwards, P.J. and Hardcastle, C. (2005) Critical success factors for PPP/PFI projects in the UK construction industry. *Construction Management and Economics*, **23**(5), 459–71.

Lim, C.F. (2005) The Malaysian construction industry: the present dilemmas of unpaid contractors. *Master Builders Journal*, 4th Quarter, 80–2.

Lim, C.S. and Mohamed, M.Z. (1999) Criteria of project success: an exploratory re-examination. *International Journal of Project Management*, **17**(4), 243–8.

Lovell, R.J. (1993) Power and the project manager. *International Journal of Project Management*, **11**(2), 73–8.

Low, S.P. and Chuan, Q. (2006) Environmental factors and work performance of project managers in construction industry. *International Journal of Project Management*, **24**(1), 24–37.

Mayer, R.C., Davis, J.H. and Schoorman, F.D. (1995) An integrative model of organizational trust. *Academy of Management Review*, **20**(3), 709–34.

McCaffer, R. and Edum-Fotwe, F. (1999) Moving on from the crossroads: an agenda for research development in construction management, in Hughes, W. (ed.) *15th Annual ARCOM Conference*, Liverpool John Moores University, 15–17 September, Association of Researchers in Construction Management, Reading, Vol. 1, pp. 3–11.

Meng, X. (2012) The effect of relationship management on project performance in construction. *International Journal of Project Management*, **30**(2), 188–98.

Munns, A. (1995) Potential influence of trust on the successful completion of a project. *International Journal of Project Management*, **13**(1), 19–24.

Munns, A.K. and Bjeirmi, B.F. (1996) The role of project management in achieving project success. *International Journal of Project Management*, **14**(2), 81–7.

Naoum, S.G. (2003) *Dissertation Research and Writing for Construction Students*, Butterworth-Heinemann, Oxford.

Narayanan, S. and Lai, Y.-W. (2005) The causes and consequences of immigrant labour in the construction sector in Malaysia. *International Migration*, **43**(5), 31–57.

Navarre, C. and Schaan, J.L. (1990) Design of project management system from top management's perspective. *Project Management Journal*, **21**(2), 19–27.

Nguyen, L.D., Ogunlana, S.O. and Lan, D.T.X. (2004) A study on project success factors in large construction projects in Vietnam. *Engineering, Construction and Architectural Management*, **11**(6), 404–13.

Nicolini, D. (2002) In search of 'project chemistry'. *Construction Management and Economics*, **20**(2), 167–77.

Parfitt, M. and Sanvido, V. (1993) Checklist of critical success factors for building projects. *Journal of Management in Engineering*, **9**(3), 243–9.

Pinto, J.K. and Slevin, D.P. (1988) Critical success factors across the project lifecycle. *Project Management Journal*, **19**(3), 67–75.

Pinto, J.K., Slevin, D.P. and English, B. (2009) Trust in projects: an empirical assessment of owner/contractor relationships. *International Journal of Project Management*, **27**(6), 638–48.

Rockart, J.F. (1982) The changing role of the information systems executive: a critical success factors perspective. *Sloan Management Review*, **24**(1), 3–13.

Rockart, J.F. and Bullen, C.V. (1981) A primer on critical success factors. Working Paper, Center for Information Systems Research, Sloan School of Management, MIT.

Root, D. and Blismas, N.G. (2003) Increasing questionnaire responses from industry: practices surrounding the use of postal questionnaires, in Greenwood, D.J. (ed.) *19th Annual ARCOM Conference*, University of Brighton, 3–5 September, Association of Researchers in Construction Management, Reading, Vol. 2, pp. 623–31.

Roscoe, J.T. (1975) *Fundamental Research Statistics for the Behavioral Sciences*, 2nd edn, Holt, Rinehart and Winston, New York.

Sambasivan, M. and Soon, Y.W. (2007) Causes and effects of delays in Malaysian construction industry. *International Journal of Project Management*, **25**(5), 517–26.

Sanvido, V., Grobler, F., Pariff, K., Guvents, M. and Coyle, M. (1992) Critical success factors for construction projects. *Journal of Construction Engineering and Management*, **118**(1), 94–111.

Schoorman, F.D., Mayer, R.C. and Davis, J.H. (2007) An integrative model of organizational trust. *Academy of Management Review*, **32**(2), 344–54.

Shenhar, A.J., Levy, O. and Dvir, D. (1997) Mapping the dimensions of project success. *Project Management Journal*, **28**(2), 5–13.

Songer, A.D. and Molenaar, K.R. (1997) Project characteristics for successful public sector design-build. *Journal of Construction Engineering and Management*, **123**(1), 34–40.

Takim, R. and Adnan, H. (2008) Analysis of effectiveness measures of construction project success in Malaysia. *Asian Social Science*, **4**(7), 74–91.

Takim, R., Akintoye, A. and Kelly, J. (2004) Analysis of measures of construction project success in Malaysia, in Khosrowshahi, F. (ed.) *20th Annual ARCOM Conference*, Heriot Watt University, 1–3 September, Association of Researchers in Construction Management, Reading, Vol. 2, pp. 1123–33.

Toor, S.-u.-R. and Ogunlana, S.O. (2006) Successful project leadership: understanding the personality traits and organizational factors, Proceedings of *CIB-W107, International Symposium, Construction in Developing Economies: New Issues and Challenges, Pontificia Universidad Católica de Chile*, 18–20 January, International Council for Research and Innovation in Building and Construction, Santiago, Chile.

Toor, S.-u.-R. and Ofori, G. (2008) Leadership in the construction industry: Agenda for authentic leadership. *International Journal of Project Management*, **26**(6), 620–30.

Toor, S.-u.-R. and Ogunlana, S.O. (2008) Critical COMs of success in large-scale construction projects: evidence from Thailand construction industry. *International Journal of Project Management*, **26**(4), 420–30.

Toor, S.-u.-R. and Ogunlana, S.O. (2009) Construction professionals' perception of critical success factors for large-scale construction projects. *Construction Innovation: Information, Process, Management*, **9**(2), 149–67.

Walker, D.H.T. (1995) An investigation into construction time performance. *Construction Management and Economics*, **13**(3), 263–74.

Walker, D.H.T. (1997) Construction time performance and traditional versus nontraditional procurement methods. *Journal of Construction Procurement*, **3**(1), 42–55.

Walker, D.H.T. and Hampson, K. (2003) *Procurement Strategies: A Relationship-Based Approach*, Blackwell Science, Oxford.

Yong, Y.C. and Mustaffa, N.E. (2012) Analysis of factors critical to construction project success in Malaysia. *Engineering, Construction and Architectural Management*, **19**(5), 543–56.