OPERATIONS AND SUPPLY CHAIN MANAGEMENT
Vol. 14, No. 4, 2021, pp. 431 – 443
ISSN 1979-3561 | EISSN 2759-9363

Key Components and Critical Success Factors for Project Management Success: A Literature Review

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ABSTRACT

This paper aims to comprehensively identify the key project components and their associated critical success factors (CSFs) contributing to project management success in the context of the construction industry. Although the CSFs have been documented in the literature, insofar there has been no attempt to consolidate them. An extensive search of literature was conducted on the Internet and publication databases using multiple keywords which include, inter alia, 'project management success', 'critical success factors in construction projects' and 'key project components'. As a result, this paper proposes five key project components (project human resources management, project design package, project management efficiency, project stakeholder management and project budget) and their unique CSFs contributing to project management success specifically for construction projects, along with some common CSFs such as top management support and commitment in terms of clear direction, communication, technical and skills development, as well as providing a conducive cultural work environment and friendly environmental factors which apply to all types of projects. The resulting outcomes fetch research and managerial implications which are detailed in the body of the paper.

Keywords: *project management success, critical success factors, project human resources management, project design package, project management efficiency, stakeholder management, project budget*

1. INTRODUCTION

A project is defined as a temporary endeavour in the activities undertaken to arrive at a specific result, product and/or service. It is concluded when its objectives have been terminated, whether or not they have been met. Whilst projects always bring about new products or services that have not existed before, the methods, processes and activities involved are never the same (Barron and Barron, 2009). Project management, on the other hand, includes cyclical planning, organising, monitoring and controlling of all aspects of a project to achieve its objectives (Alam, 2009; Chan *et al.,* 2009) in terms of cost, time, quality (De Wit, 1988; Kerzner, 1998) and environmental concerns (Mir and Pinnington, 2014), providing a broad base definition of project management success.

Despite the progress in the field, however, the definitions of project success and project management success remain ambiguous. The terminologies of project success and project management success may appear to be similar as both concentrate on achieving success, but they should be seen as distinct concepts although they are related to each other. De Wit (1988) and Nicholas (1989) make an interesting distinction between project success and project management success where projects can still be classified as successful despite poor project management. A classic example is the Sydney Opera House Project (Thomsett, 2002) where the project was a major success for the people but it was a failure from the project management point of view.

Project success often concentrates on task completion, whereas project management success is defined as planning, directing and controlling of resources to meet the technical, cost and time constraints of a project (Jacobs and Chase, 2018), including environmental concerns (Mir and Pinnington, 2014). Although project management is wider in scope, Baker *et al.* (1988) and Pinto and Slevin (1988) elucidate that there is no simple answer and conclude that there are multiple factors which affect project management success. In essence, the definition of project management success should not be limited to broad base assumptions on the predefined constraints of cost, time, quality and environmental concerns. Instead, the focus should be on why and what contributes to the success (or failure) to comply with the said constraints. This points to the need to identify the key project components along with their critical success factors (CSFs) that ought to be planned, managed, monitored and controlled to accomplish projects within the agreed cost, stay within project schedule, work completed with acceptable quality, taking into consideration environmental concerns such as political, legal, institutional, cultural, sociological, technological, economical, financial and physical infrastructure (Hughes, 1989; Walker, 1989; Zhang, 2011).

Having said so, most of the studies to date have concentrated on the CSFs either on one or several key project components (see **Table 1** and section 2.3 for details), giving a cursory view of what project management success means. This study aims to carry out a comprehensive review of the literature on the key or fundamental components affecting project management success, along with their associated

CSFs. The theoretical and managerial implications arising from this review are discussed before the paper is concluded with future research directions.

2. LITERATURE REVIEW

2.1 Review Approach

The process of review and analysis of literature was carried out based on the cue by Gunasekera and Chong (2018). It began with the search on the Internet and publication databases, using multiple keywords, which include, inter alia, 'project management success', 'critical success factors in construction projects' and 'key project components'. In addition, relevant publications such as Project Management Body of Knowledge (PMBOK) Guide (2017), theses and books were referred to. This has resulted in the identification of a considerable number of CSFs, which enabled the key project components to be determined. The results of the review and its analysis are presented in the following sub-sections.

2.2 Critical Success Factors

Rockart (1979), who was the first to introduce CSFs in the context of project management (called factors producing success of projects), defines CSFs as the critical areas of project activities that should receive continuous and careful attention from managers since these factors will have a significant impact on project management success if they are properly managed, maintained and controlled (Leidecker and Bruno, 1984; Pinto and Slevin, 1987).

In evaluating the CSFs, three distinct situations need to be addressed (Dvir *et al.*, 1998). The situations comprise factors leading to project management success, factors leading to successful projects and factors leading to consistently successful projects (Cooke-Davies, 2002). Cooke-Davies (2002) further points out two distinctions: (1) by distinguishing between project success (measured against the overall project objectives) and project management success (measured against existing traditional measurement performance of cost, time and quality); and (2) by distinguishing between the success criteria (measures of success and failure of a business or a project) and success factors (those input to the management system that leads directly to the success of the project). These provide the grounds for the current research to be conducted.

In addition, CSFs have also been categorised according to common and unique CSFs. The common CSFs are considered as factors necessary for success in any project undertaken regardless of the sector the project belongs to. On the other hand, the unique CSFs are considered as the key or essential project components in achieving project management success. **Table 1** shows the list of common and unique factors contributing to project management success proposed by studies ranging from 1995 to 2020.

Table 1 Critical success factors influencing project management success

Researchers	Common CSFs	Unique CSFs
Chan and Kumarasamy (1997) Chan and Yeong (1995) Flyvbjerg (2004) Mohamed (2001) Stasinopoulos *et al.* (2009)	Top management support, schedule and plan, communication	Design package
Ashley *et al.* (1987)	Leadership qualities	Project manager capabilities and experience, scope and work definition
Pinto and Slevin (1987)	Top management support, schedule and plan, communication	Human resources, stakeholder management
Pinto and Prescott (1988)	Top management support, adequate technical support	Clear scope identification, consultation with stakeholders, adequate resource allocation
Verma (1995, 1996)	Leadership qualities	Effective human resource management, efficient project manager
Belassi and Tukel (1996)	Commitment to project success	Project manager, project team members
Nicolini (2002)		Budget control
Dong *et al.* (2004)	Top management support, communication, the ability of clients to make quick decisions, technology support	Project manager and team members, stakeholder involvement
Nguyen *et al.* (2004)	Commitment to project success	Competent project manager, competent project team
Spalek (2005)	Communication	Project scope (design document), project resources, project budget
Cooke-Davies (2014) Dvir *et al.* (2006)	Top management recognition	Efficient project management, efficient project management
Ugwu *et al.* (2006)	Top management support, use of proper technology	Clear project definition, the skill level of project team
Jha and Iyer (2007)	Commitment, communication	Competent project manager, competent stakeholders
Toor and Ogunlana (2008)	Top management support, learning from past projects, technology support	Stakeholder consultation, effective project management, competent team members, budget control, design document.
De Silva *et al.* (2008)	Quality	Financial, skilled resources, efficient project management

Table 1 Critical success factors influencing project management success (con't)

Researchers	Common CSFs	Unique CSFs
Saqib *et al.* (2008)	Top management support, communication, technology support	Project management, project definition
Park (2009)	Commitment, communication	Good budget estimate
Chan *et al.* (2009)	Top management support	Clear project definition, good resource availability
Limodio (2011)	Cultural and environmental	Good budget, good design package
Kaming *et al.* (1997) Ogwueleka (2013)	Top management support, financial support, commitment of participants	Good budget, availability of skilled manpower, management of design document, stakeholder management
Davis (2014)	Top management support, communication, benefits	Stakeholder satisfaction, clear definition of project
Silva *et al.* (2015)	Top management support, clear scope, training, skill development	Good budget, stakeholder management, human resources
Taherdoost and Keshavarzsaleh (2015)	Environmental factors	Project manager skills, team member skills
Aneesha and Haridharan (2017)	Top management support, good communication, commitment of the group, good leadership	Competent project manager, competent project team, good financial package
Buvik and Tvedt (2017)	Clear roles and responsibilities, comprehensive control, clear directions	Experienced project manager, experienced project team
Alleyne *et al.* (2018)		Budget control
Frefer *et al.* (2018)	Environmental factors	Stakeholder satisfaction
Li *et al.* (2019)		Efficient project management, clear project definition, stakeholder management
Viles *et al.* (2019)	Top management support	Good budget
Gumay *et al.* (2020)	Top management support	Project manager leadership, stakeholder management
Yudhistyra *et al.* (2020)		Skilled labour

2.3 Analysis and Observations

The studies shown in **Table 1** indicate that some of the CSFs have received research attention since 1995. Amongst the common CSFs identified include top management support and commitment in terms of clear direction, communication, technical and skills development, as well as providing a conducive cultural work environment and friendly environmental factors. These CSFs are labelled as common as they apply to all types of projects, including those beyond the construction setting.

In an attempt to cluster the unique CSFs, which is the backbone of this study, they fall into five categories of key project components based on the keywords used and their contexts within the literature. Amongst the key components, project human resources management seemed to have received the greatest research attention, followed by project design package, project management efficiency, project stakeholder management and project budget. **Table 1** also implies the fragmentation of studies conducted on the CSFs or the key project components. There have been studies combining several key project components although insofar none of the individual studies have covered all the five key project components in a single study.

The key project components and their associated CSFs, as well as their link to project management success, are elaborated in the following section.

3. CONCEPTUAL REVIEW OF THE KEY PROJECT COMPONENTS AND THEIR CRITICAL SUCCESS FACTORS

3.1 Project Human Resources Management

Pryke and Smyth (2006) found that allocation of human resources to projects, monitoring performance and motivation are important dimensions of project management success. In fact, some researchers have acknowledged the management of human resources as one of the critical factors leading to project management success (Belout, 1998; Fitz-Enz, 1984; Ulrich, 1987). Specifically, Bayilev and Teklu (2016) point out that the competence of key manpower, with their ability and experience to understand the dynamics of project environment, is a key success factor for projects funded by the European Union. This could be the reason why this key project component has received the greatest research attention so far.

Successful implementation of a strategic plan leading to project management success is influenced by the behaviours of organisations and organisational direction (Belout, 1998; Rogers, 1990; Thornberry, 1987). Indeed, the commitment from top management to implement projects and systems is well-documented (Somers and Nelson, 2001). Such support and commitment include identification and recruitment of skilled personnel, motivation and proper communication, including organisational goals, with employees. The efforts include developing an apt organisational structure and building a conducive culture (Kumar *et al.*, 2021). Bangi *et al.* (1999) insist that there is no other factor as effective as the recognition and support from the top management in predicting performance management success.

Top leaders of construction organisations also play an important role to ensure that organisational members have the requisite skills (Yudhistyra *et al.*, 2020). An effective human resource function will help to identify and compile such organisational abilities, as well as audit and keep track of skills development (Mayfield *et al.*, 2016). Indeed, selecting the best human resources for a project requires a good understanding of the project requirements, along with identifying the various skills that are necessary to manage the project. Failure to recognise the levels of skills required for a project by managers will contribute to poor quality work, backlogs and rework (Lee *et al.*, 2010).

However, estimating the actual human resources required for a project in practice is often complicated, which requires efforts and time (Newton, 2008). In addition, conflicts and disputes over loyalty and power are common in the allocation of human resources (Jacobsen and Thorsvik, 2007; Kerzner, 2009; Payne, 1995). Hence, the allocation of human resources, particularly in large multi-project organisations, should be done taking into consideration these challenges, as well as the temporary working conditions and changes in human resource allocation (Engwall and Jerbrant, 2003; Huemann *et al.,* 2007), focusing on meeting the needs of employees (Bondarouk *et al.,* 2019).

Hence, managing project human resources require special skills too, with the critical ones include selecting, training and managing resources, with special attention paid to motivating, communicating, organising and managing project teams (Demilliere, 2014; Schuler, 1992). Project managers play a key role in the selection and motivation of key human resources, providing necessary training and demanding total commitment from everyone in the project team to achieve project management success. For this, Somers and Nelson (2001) identify the following CSFs for project human resources management: (1) top management support; (2) recognition by top management; (3) availability of technology; (4) availability of right skills; (5) training to perform specific tasks; (6) availability of proper training facilities; and (7) clear identification of goals. The skills required to go beyond the tasks of the projects include the ability to understand how the environmental factors impact on projects and vice-versa, as well as the ability to maintain quality through continuous monitoring.

3.2 Project Design Package

Besides project human resources management, a considerable number of studies have emphasised that a well-formulated basic and detailed design package is the key requirement for project management success (Chan and Kumarasamy, 1997; Chan and Yeong, 1995; Flyvbjerg, 2004; Mohamed, 2001; Toor and Ogunlana, 2008). Although bad project implementation can harm structurally solid projects, good implementation cannot make structurally weak projects successful (Limiodo, 2011), suggesting the importance of a proper initial design package. A recent survey carried out by PWC (2018) confirmed a well-prepared design package to be the most prevalent key project component for project management success.

The importance of a good project design package is amplified by the fact that it determines 80% of the cost of the entire project (Stasinopoulos *et al.*, 2009). Hamilton (2007) provides a typical example of the Scottish House of Parliament where poor initial design has led to more than 545 design changes in a month, with a 20-month delay to the original schedule and cost overruns of £230 million. Other examples of bad designs reported which fetched negative consequences on project cost and delays included the Kuala Lumpur International Airport (Ghazali, 2015; Yap *et al.,* 2015) and the Victoria-based Australian pipeline project (Han *et al.*, 2013; Orangi *et al.,* 2011). In fact, poor initial design or subsequent design changes has been recognised as the most common reason for project delays and budget overruns, leading to either rework or new designs (Alnuaimi *et al.*, 2010; Chan and Kumarasamy, 1997; Chan and Yeong, 1995; Flyvbjerg *et al.,* 2003, 2004; KPMG, 2012; Lovins *et al.*, 1999; Morris, 2000; Viles *et al.*, 2019; Toor and Ogunalana, 2008).

The ITC Project Design Manual (2010) specifically highlights the need to spend more time on developing the project design and data collection, even though very often little time is devoted to the design phase due to the scarcity of human resources. In addition, designing a project requires an upfront investment, in which the top management of many organisations is less willing to do so.

Project design is a structured activity (**Table 2**), including many downstream activities such as construction drawings, specifications, procurement packages, datasheets, project technical documents, as well as methodologies for system development which depend heavily on a good project design package. Hamilton (2007) emphasises that the primary design should not be rushed before the outcomes of the conceptual design is known, taking into consideration expectations of clients and other external stakeholders, as well as the possible changes in the environment which include technology, geological, innovation, market opportunities and pressure from the owners, community groups, amongst others. Stasinopoulos *et al.* (2009) also stresses on the need for 21st century designs to consider the effect of the projects on safety and the environment. Hamilton (2007) further adds that design control during the later stage of the project and the post-design phase is required to be managed carefully to avoid any massive cost, quality or even time impact on the project.

Table 2 Activities involved in project design

Stage	Description
Pre-design	This is the initial phase which addresses the key requirements of the project and is typically merged with the conceptual design stage.
Conceptual design	This phase studies the design solutions, definitions of shapes and spaces, materials and building systems. Proper evaluation of this stage is sacrosanct to achieve a good initial design.
General design	Plans, major systems and materials are taken to a higher level of detail, along with the estimation of the overall cost of the project.
Construction level design	This phase generates the final set of documents for use in construction activities. It includes detailed drawings, specifications of systems and materials, site work plans and acceptance criteria.

Ogwueleka (2013) elucidates that the use of efficient project management methods and systems, as well as to ensure inclusion of proper technical content and skilled personnel are significant CSFs in the preparation of the project design document, without which this will lead to negative consequences on cost and schedule due to changes in design (Olawale and Sun, 2010). Since the development of the project design package is a collaborative effort, it is imperative for project designers with expertise in different technical fields to work with each other to maintain quality (Mohandas and Sankaranarayanan, 2008). This requires a shared vision of functions and organisational structure that are achieved through communication, which is vital to

incorporate the different yet contradicting requirements of clients and stakeholders. The design team must agree on the basis of the design, i.e. basic codes and standards, design parameters, types of documentation required, risk analysis, to name a few. For this, the skill level of project team members is imperative (Chan and Kumarasamy, 1997), especially in recognising the separation between project design and the actual construction activities.

In short, the CSFs for project design package includes an efficient communication system with a high level of coordination, sufficient time allocation for comprehensive preparation of the project design package, skilled personnel working in a collaborative environment, paying attention to the environment, as well as taking into consideration the requirements of different stakeholders (Koskela, 1992). In fact, Deming (1986) stresses that the importance of quality design must be understood by all concerned from the inception of any project. Further care needs to be taken to ensure that the prepared design package contains the initial specifications without compromising the design.

3.3 Project Management Efficiency

Project management efficiency has since become an important issue for many developing countries due to its effectiveness in attaining the desired project goals and objectives (Haron *et al.*, 2017). In fact, the importance of efficient project management is pronounced in many studies (Ballard and Koskela, 1998; Haider *et al.,* 2011; Mohandas and Sankaranarayanan, 2008). Accordingly, efficient project management entails functions that must be controlled and coordinated by the project management group. Specifically, the managerial skills of project managers, their technical background, project attributes and environmental factors are critical for efficient project management. However, the conflict between the so-called ideal project management best practices followed by many project managers and the reality of each project having unique requirements has many inherent conflicts (Newton, 2008). Although standardised project management practices bring advantages, they do not work in all situations and may even increase the risks of a project failure.

Many studies have acknowledged that the project manager is the central figure in determining project success and project management success (Cleland, 1984; Kezsbom *et al.*, 1989; Nicholas, 1994). One primary function of the project manager is to manage and gratify a variety of stakeholders by considering their expectations and needs (Mali and Waghmare, 2016). Hence, the project manager is not only involved in technical realities but should also understand the surrounding community and the people in it. Although it is challenging to map the power and interests of stakeholders (Bourn and Weaver, 2010; Collinge, 2016), if the project manager fails to judge the thoughts of stakeholders, project failure will result.

The project manager also plays a vital role in managing the preparation of design documents (Ogwueleka, 2013). Proper design coordination, communication with stakeholders and skills availability are some of the key essentials required for a successful design package, in which the project manager has a key responsibility. If the project manager fails in any of these activities, the result will be a sub-standard design package (Ghazali, 2015; Ng, 2015) which leads to cost overruns and schedule delays (Orangi *et al.*, 2011). Similarly, the project manager is also responsible for the preparation of project budget (Haider *et al.*, 2011; Hamilton, 2007; Mohandas and Sankaranarayanan, 2008), management and control of unplanned work that creeps into the project which severely drains the resources, agreed budget and undermine the schedule.

It is for these reasons that project managers must be recognised as a leader and have sound understanding of rules, expectations and assumptions for all the stakeholders to follow (Ahmed, 2008). In addition, project managers must also demonstrate strong leadership quality to motivate and guide project staff, excellent communication skills, foster teamwork and the ability to control projects and resolve conflicts (Cleland, 2004; Kerzner, 2006; Larkin and Larkin, 1996; Laufer *et al.*, 1990; Verma, 1995, 1996). Project managers must also allocate more time for planning, identifying problems, as well as training and developing their line managers and project teams, recognising that project management is not an isolated role (Johnson, 1999). These imply that although project managers must have some technical background, they need not have all the technical expertise to direct the project single-handedly (Verma, 1995) but to recognise, coordinate, delegate and direct project staff to find answers (Mandson and Selnes, 2015; Sahlin, 1998).

In short, efficient project managers must manage, control and mediate on all of the key project activities. These include efficient communication, coordination, planning and motivating all project stakeholders (Cleland, 1984; Kezsbom *et al.*, 1989; Nicholas, 1994). He or she should possess sufficient experience to achieve the main objectives of projects in overcoming the constraints of cost, time and quality (Chen, 1997; Cleland, 1999; Cleland and Gareis, 1994; Harrison, 1992; Keeling, 2000; Kerzner, 1998). In addition, he or she should demonstrate environmental concerns through the ability to recognise and implement the Environmental Impact Assessment on projects (Shah *et al.,* 2010). He or she must develop a true sense of belonging to the organisation and develop training and an effective measurement system for each project using appropriate practices and strategies.

3.4 Project Stakeholder Management

A stakeholder is a person or an organisation who or which is committed and stands to gain or lose from the success of a project, irrespective of whether they affect and/or are affected by the project deliverables (El-Gohary *et al.,* 2006). In a typical project, stakeholders may consist of the sponsors, stockholders, general public, project directors, project managers and other relevant project personnel (Leung *et al.*, 2004). In other words, they could be internal or external to the project organisation who may be superficially or totally involved in a project.

Because of their diverse occupational, professional backgrounds and interests, the interests, goals and expectations between the internal and external stakeholders, as well as within them often differ, creating conflicts with each other (Buotelle, 2004). It is common for different stakeholders to attempt to exert their influence to push their objectives into projects by means of advancing, interfering or blocking projects (Swift, 2019).

Hence, stakeholder management is an important component which influences project management success (Abdullah *et al.,* 2010; Jepsen and Eskerod, 2009; Jergeas *et al.*, 2000; Liang *et al.*, 2017; Ogwueleka, 2013; PWC, 2018). Project organisations that consistently maintain good relationships, characterised by a mutual trust with their stakeholders often have a competitive advantage over those which do not (Barney and Hansen, 1994). In fact, poor stakeholder involvement has been identified as one major reason for project failures in developing countries since their behaviour impact schedules, attention to cost control and environmental due to poor decision making (Davis, 2014; Eyiah-Botwe, 2015). Hence, it is paramount for management to sustain stakeholder management (Multaharju, 2016) by making sure that all stakeholders collaborate in the project for project management success (Bond-Barnard *et al.*, 2018).

In addition, the political and cultural environments also play a significant role in shaping the interests, influence and behaviour of stakeholders in deciding cost, schedule and impact on the environment, particularly in developing countries where mega projects with integrated procurement is involved (Aapaoja and Haapasalo, 2014; Gudienė *et al.,* 2013; Mok *et al.*, 2015). A project without political support will experience major and critical barriers to get cost, schedules and even environmental approvals (Eyiah-Botwe *et al.*, 2015). Similarly, community groups fighting for environmental protection also exert significant influence on projects. For instance, large dam projects, which have a profound irreversible environmental impact and reduce the availability of land, are likely to face opposition from the groups. Likewise, other more general projects which may contribute to water pollution, the release of carbon dioxide and which harm aquatic lives may be protested too. Reducing the environmental effect from construction projects will require collaborative efforts with the affected stakeholders.

Mali and Waghmare (2016) identify several CSFs of stakeholder management which include: (1) attitude of stakeholders; (2) interests of stakeholders; (3) confidence of project managers; (4) power of stakeholders; (5) knowledge of stakeholders; (6) effective communication; (7) satisfaction of stakeholders; (8) top management support; (9) needs of stakeholders; and (10) involvement of stakeholders. They also suggest that a competent project manager will be able to play a pivotal role to coordinate between all the stakeholders and mitigate all unnecessary interferences. In addition, the project manager must create an environment to show that the stakeholders are a very important part of the project so as to command the necessary involvement and commitment from stakeholders in making management, quality and financial decisions. An assessment to determine the degree of importance and influence of each of the stakeholder groups is imperative. Another critical aspect is communication with the stakeholders to maintain good relationships and trust with them (Barney, 1986, 1991; Cohen and Prusak, 2001), including convincing them that the recommendations made are beneficial to all. Hence, stakeholder management should be seen as a process involving systematic identification of all stakeholders, their interests, analysing engagement and offering the necessary support for successful project delivery (Eskerod and Jepsen, 2013).

3.5 Project Budget

Project budget refers to the amount of funds allocated to a project by clients, sponsors and the senior management group (Campbell, 2009) that represent the estimated planning of expenditure on the resources required to plan, execute and monitor a project (Newton, 2008). Many studies have concluded that budget allocation and control are essential for project management success (Chan and Kumarasamy, 1997; Chan and Yeong, 1995; Kaming *et al.*, 1997; Mohamed, 2001; Sansone *et al.*, 2020; Toor and Ogunlana, 2008; Viles *et al.*, 2019). Indeed, project activities are tightly interwoven around the project budget. A survey carried out by PWC (2018) has identified project budget as one of the most prevalent factors for project management success.

Vasista (2017) found that when quantitative base information and historical base information are combined, they tend to produce better quality estimates. Besides the time length of the implementation phase of a project (Flyvbjerg, 2004), the project budget is also determined by external factors which delay the project schedule and hence cost overruns. Size of projects is another determination of cost overruns although contradictory findings have been reported. Bertisen and Davis (2008) found no relationship between project size and cost overruns although this is proven otherwise in other studies (Creedy, 2006; Odeck, 2004). Sometimes situations beyond the control of construction organisations such as weather, health, safety, political, social and economic acts may also delay the project schedule.

Since lack of control of project budget and planning impact on project management success, management must have sufficient training and education not to accept projects based on perceived value, but to revive the risk and the value it brings to the organisation (Alleyne *et al.*, 2018). Project managers must take project length, size and foreseeable external factors, including the needs of different stakeholders into consideration as they estimate the cost of projects, with contingencies included to cover unforeseen expenditure and constant budget revisits as and when necessary, to keep the stakeholders and management happy (Alexandra, 2017).

According to Vasista (2017), amongst the CSFs for project budget preparation include: (1) project information (good specifications); (2) estimation methodology; (3) historical information; and (4) cost estimator which is supported by the maintenance of adequate quality and respect for the environment. Similarly, the Washington State Department of Transportation (2015) points out that, amongst other factors, the following considerations should be given when preparing a good cost estimate: (1) historical information; (2) good design; (3) sufficient allocation of contingencies; (4) skilled estimators; and (5) use of established estimation methods.

Having said so, cost estimation by itself is a difficult activity. Many studies have found that the actual costs have been much higher than the estimated costs (Flyvbjerg *et al.*, 2003; Handler, 1996) for public, private and international projects as well. Cost estimation errors could be attributed to technical, physiological and political factors. The technical errors include poor design, unskilled human resources and insufficient data when allocating costs to mitigate risk, location and project type, which should be corrected over

time. Physiological errors include over-optimism on the side of the forecasters, in which learning plays an important role. Political errors are mainly attributed to political influence, particularly on many government projects. The list of projects with cost underestimation and overruns have led to many tragedies, amongst the notable ones include the Colombia shuttle disaster in 2003 which took the lives of seven astronauts (Flyvbjerg, 2004) and the 2014 Athens Olympics which affected the credit rating of Greece.

In short, proper estimation and continuous review of project budget, management, control and maintenance against the initial project design and planning are imperative. The main objective is to provide a sufficient budget including contingencies to cover unknown factors that could result from incomplete design, as well as unforeseen conditions within the project scope. In addition, availability of valid and useful data from different stakeholders and understanding of possible cost overruns based on project length, size, as well as technical, environmental, physiological and political reasons are required. Besides the project managers taking the lead role, having skilled staff to estimate and manage schedule and resource allocation is another important factor for consideration.

4. CONCLUSION, DISCUSSION AND IMPLICATIONS

This paper has achieved its objectives of identifying the key project components and their associated CSFs for project management success through an extensive review of the literature. This review is based on the motivation that an attempt to consolidate the key project components and their associated CSFs contributing to project management success is yet to be made given the empirical studies available.

In this review, an attempt was made to distinguish between project success and project management success. Although the aims of both are to achieve success, project success tends to have a narrower scope, whereas project management includes the 'management' perspective, which includes the cyclical planning, organising, monitoring and controlling all aspects of a project (Alam, 2009; Chan *et al.*, 2009; Jacobs and Chase, 2018) to meet the performance criteria of cost, time, quality and to some extent the environmental concerns. What constitutes aspects of a project give rise to the need to identify the key project components and their CSFs (Cooke-Davies, 2002) contributing to project management success.

The review approach of using multiple keywords and relying on relevant publications resulted in the identification of a comprehensive set of common and unique CSFs (see **Table 1**). Amongst the common CSFs, top management support and commitment have been identified as a very important factor, leading to many forms of support provided by organisations such as technical, financial, social, cultural and skilled human resources (Bangi *et al.*, 1999; Mayfield *et al.*, 2016; Somers and Nelson, 2001). It is therefore not surprising for these factors to be identified as common CSFs to support the unique CSFs.

The unique CSFs, on the other hand, are CSFs which are peculiar to the construction setting. The review of literature has resulted in the identification of a considerable number of CSFs contributing to project management success (**Table 1**), which were clustered into five key project components. They are project human resources management, project design package, project management efficiency, project stakeholder management and project budget.

The identification of the five clusters was further verified by their relationships with project management success. Specifically, the literature has confirmed the associations between project management success and project human resources management (Belout, 1998; Chan *et al.*, 2009; De Silva *et al.*, 2008; Fitz-Enz, 1984; Kaming *et al.*, 1997; Ogwueleka, 2013; Pinto and Prescott, 1988; Pinto and Slevin, 1987; Pryke and Smith, 2006; Silva *et al.*, 2015; Somers and Nelson, 2001; Spalek, 2005; Toor and Ogunlana, 2008; Ugwu *et al.*, 2016; Ulrich, 1987; Yudhistyra *et al.*, 2020), project design package (Chan and Kumarasamy, 1997; Chan and Yeong, 1995; Flyvbjerg *et al.*, 2003, 2004; KPMG, 2012; Limodio, 2011; Mohamed, 2001; Ogwueleka, 2013; PWC, 2018; Spalek, 2005; Stasinopoulos *et al.*, 2009; Toor and Ogunlana, 2008), project management efficiency (Aneesha and Haridharan, 2017; Ashley *et al.*, 1987; Belassi and Tukel, 1996; Cleland, 1984; Cooke-Davies, 2014; De Silva *et al.*, 2008; Dong *et al.*, 2004; Dvir *et al.*, 2006; Gumay *et al.*, 2020; Haron *et al.*, 2017; Jha and Iyer, 2007; Kezsbom *et al.*, 1989; Li *et al.*, 2019; Nguyen *et al.*, 2004; Nicholas, 1994; Taderhoost and Keshavarzsaleh, 2015; Verma, 1995, 1996), project stakeholder management (Abdullah *et al.,* 2010; Buvik and Tvedt, 2017; Davis, 2014; Dong *et al.*, 2004; Eyiah-Botwe, 2015; Frefer *et al.*, 2018; Gumay *et al.*, 2020; Jepsen and Eskerod, 2009; Jergeas *et al.*, 2000; Jha and Iyer, 2007; Kaming *et al.*, 1997; Li *et al.*, 2019; Liang *et al.*, 2017; Mali and Waghmare, 2016; Ogwueleka, 2013; Pinto and Prescott, 1988; Pinto and Slevin, 1987; PWC, 2018; Silva *et al.*, 2015; Toor and Ogunlana, 2008;), as well as project budget (Alleyne *et al.*, 2018; Chan and Kumarasamy, 1997; Chan and Yeong, 1995; De Silva *et al.*, 2008; Kaming *et al.*, 1997; Limodio, 2011; Mohamed, 2001; Nicolini, 2002; Ogwueleka, 2013; Park, 2009; PWC, 2018; Silva *et al.*, 2015; Spalek, 2005; Toor and Ogunlana, 2008; Vasista, 2017; Viles *et al.*, 2019). Indeed, the discussion on each of the key project components has further yielded a more comprehensive set of CSFs for each of them and provided indication that the key project components are interrelated.

Several implications can be derived from the paper. First, the paper benefits researchers in terms of the development of an overarching framework to examine the relationships between the key project components and their associated CSFs with project management success. The combination of common and unique CSFs in every key project component as evident from the review will hopefully overcome the issue of fragmentation in future studies. More importantly, the interaction of the key project components and their associated CSFs based on the empirical data obtained could contribute to knowledge and enable a more meaningful and directed managerial implications to be derived at.

Second, since the research focused on the identification of the more popular key project components as evident from the attention given to them by researchers, the resulting review will enable researchers to expand the performance measures to cover, say cultural concerns on top of the traditional measures of cost, quality, time and environment.

By using advanced statistical tools, cause and effect and the more important components and/or CSFs can be identified, enabling researchers to make informed recommendations to construction organisations, managers and even policy makers.

Third, the resulting review also suggests the context of which future studies can be conducted between or within developed or developing countries. Fourth, the potential moderating effects of type, size, complexity and length of projects, knowledge and skills of project managers and teams, as well as organisational factors could be considered. Fifth, as different stakeholders may exhibit different requirements, future research should consider the moderating effects of key stakeholders such as the consultants, contractors and clients. Incorporating these considerations will contribute to existing knowledge.

From the managerial perspective, it is hoped that the review provides a guide to construction organisations to better manage projects from the lens of project management success. To begin with, the literature suggests that the five key project components do not operate in isolation but complement each other, along with the common CSFs. This paper has provided a comprehensive list of unique CSFs for each key project component that the construction organisations can refer to. Appropriate plans could be formulated and supported by appropriate management support and commitment in terms of financial, technical and resources, conducive organisational structure and culture, the leadership of project managers, appropriate human resources management practices, capacity building and continuous professional development, use of effective communication channels and knowledge management system to capture and share experiences, expertise and best practices across projects, taking cognisance of the different methods, processes and activities of different projects and environmental concerns, as well as technical support where investment in relevant software may help the construction organisations to better manage and control projects and resources.

The information on the CSFs must be made available to all levels of management and within project teams, including the use of standard operating procedures (SOPs). Although the resulting key project components and their associated CSFs could be used as a checklist for the construction organisations, ideally the key project components could also serve as key result areas where key performance indicators (KPIs) against the well-defined project objectives and measures can be developed around the CSFs. Continuous monitoring and review are important to ensure that the SOPs are complied with and that the intended KPIs are achieved (Dadashzadeh, 1989) for project management success.

Although the environmental factors are beyond the control of the construction organisations, proper management of projects through the implementation of the key project components and their CSFs could help them to mitigate some threats to project management success. Besides the environmental factors highlighted in the literature, the recent COVID-19 pandemic has called for the construction organisations to manage risks through the development of a risk register that contains the probability and severity of each risk, as well as the action plans through the key project components to address them. Similarly, an understanding of the United Nation's Sustainable Development Goals may help the construction organisations to embed the key project components and the CSFs around them for better environmental and stakeholder management.

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