

Critical Success Factors: En Route for Success of Construction Projects

Susil Kumara Silva (PhD Candidate)
Faculty of Management Studies & Commerce
University of Sri Jayewardenepura
Nugegoda, Sri Lanka

Prof. Warnakulasuriya B N F
University of Sri Jayewardenepura
Sri Lanka

Dr. Arachchige B J H
University of Sri Jayewardenepura
Sri Lanka

Abstract

The study of critical success factors is a means of improving effectiveness and efficiency of projects. Critical success factors have been identified in various contexts but there is no general agreement. Most of these studies are too generic and pose a question of applicability on a specific industry such as construction. Therefore, the purpose of this paper is to identify critical success factors through a critical literature review with special attention on project execution stage of construction projects and to identify research gaps to be filled in the future. 40 external factors and 34 internal factors were identified. 10 external factors and 19 internal factors are repeated in 3 or more papers. More researches are needed on the relationship between critical human resource management factors and project success. Findings are instrumental for industry professionals, academics and policy makers. Further, it will add to the project management body of knowledge.

Keywords: Construction Industry, Critical Success Factors, Project Management, Project Success, Sri Lanka.

1. Introduction

Global construction market is worth around US\$ 3,200 billion per year (Sohal & Cavill, 2008). Government of India has committed an outlay of INR 20,562 billions (US\$ 514 billions) for infrastructure development (Tabish & Jha, 2011). The estimated value of construction projects was US\$ 1.5 trillions in the Gulf region until September 2007 (Mitra & Tan, 2012). Malaysia planned (2011-2015) to inject an estimated RM 138 billions (US\$ 46 billions) to enhance the growth of the construction sector (Yong & Mustafa, 2012). The construction industry has multiple implications to many areas of any national economy. Contribution of construction industry to the national economy of Sri Lanka was USD 6882 millions in 2013 and USD 8846 millions in 2014 (USD 1 @ Rs. 130). The construction subsector grew significantly by 20.2 percent during 2014, in comparison to 14.4 percent growth during 2013 (Central Bank of Sri Lanka/Annual Report, 2014. p.51).

The post-war-era has increasingly stimulated and attracted the government's attention as well as private (both local and foreign) sectors to invest heavily on large scale capital projects such as high-rise buildings, renovation of airports, ports, roads, highways, land reclamation, water and sanitation etc. However, locally as well as globally, construction industry faces significant challenges and difficulties, some of which are unique to the specific industry and some are context specific. Construction industry, by its nature, is a complex, high risk, high value, competitive and project oriented business. Construction project failures are increasingly reported around the globe and achieving success of construction projects is becoming extremely difficult in today's turbulent environment. The study of project success (PS) and critical success factors (CSFs) are considered to be a means to improve the effectiveness of projects (Yong & Mustafa, 2012; Chan et al., 2004).

Project management and construction industry are complementary to each other. Construction sector has an influencing bearing on project management practice (Crawford, Pollack & England, 2006, as cited in Han et al (2012). Though project management has a rich set of literature, the knowledge areas and its concepts have been continuously evolving. Although lists of variables have been identified over a period of time by different researchers, there is no general agreement (Chan et al., 2004). On the other hand, with rapid changes that are taking place in the construction industry, findings have become obsolete and are unable to reflect on the current development in the industry (Yong & Mustaffa, 2012). In such a circumstance, it is prerequisite to revisit literature on CSFs as a precise understanding of CSFs is a paramount need in the journey towards enhancing the likelihood of project success, enhancing project management organizations and the industry. Therefore, this paper is aimed at critically reviewing literature on CSFs in construction project context with special attention to Sri Lanka and to identify research gaps to be addressed in the future. Findings of this study will be instrumental for industry professionals, academics, policy makers and will add to the project management body of knowledge.

2. Literature Review

2.1. Three Streams of Literature Related to Project Success

The project management literature frequently refers to two streams of studies of project success. One stream is the project success factors; these are the independent variables that make success more likely. Other one is the project success criteria; these are the dependent variables that measure success (Morris & Hough, 1987; Wateridge, 1998; Turner, 1999, as cited in Muller & Jugdev, 2012). In addition to the two said streams, Han et al. (2012) reviewed of the project success notions and proposes a conceptual framework for enhancing project success by identifying the relationship between success factors and success criteria as a new research area (third stream) in construction project context. The literature review summarized by Han et al. (2012) echoes that there are very few studies in this area of research. Therefore, in a construction project context, studies of these three streams will be instrumental to the development of the project management knowledge domain.

2.2. Project Success (PS)

Project success is an abstract concept and determining whether a project is successful is subjective and extremely complex (Parfitt & Sanvido, 1993; Chan, 2002). Oxford Advance Learners' Dictionary defines "success" as "the fact that you have achieved something that you want and have been trying to do or get". Therefore, the PS could be defined as the fact that a project has achieved the objectives or goals of a particular project. However, often when defining PS, it includes project success criteria/measures (PSC). Pinto & Slevin (1988) suggested that PS should have two major components: issues dealing with project itself (time, cost, performance) and issues dealing with the client (use, satisfaction, effectiveness).

PS, project management success (PMS) and project performance (PP) can sometimes be a bit of confusing because these words have been used in different ways by different researchers in the literature. PP often refers to PMS. Semantically PS is measurable only after the project is completed (Morris & Hough, 1987, as cited in Han et al., 2012), while PP is measured during the life of the project (Cooke-Davies, 2002, as cited in Han et al., 2012). De Wit (1988), Atkinson (1999), Lim & Mohamed (1999), Cook-Davies (2002) and Takim et al. (2004) have all differentiated project success (measured against the overall objectives of the project) against project management success (measured against the widespread and traditional measures of time, cost and quality).

The concept of success in a construction project according to some researchers is corresponding to efficiency and effectiveness measures (Brudney & England, 1982; De Wit, 1988; Pinto & Slevin, 1988; Pinto & Slevin, 1989; Smith, 1998; Belout, 1998; Atkinson, 1999; Crawford & Bryce, 2003, as cited in Takim & Adnan, 2008). Efficiency measurers deal with time, budget and specifications; effectiveness measurers refer to achievement of project objectives, user satisfaction and the use of the project (Takim & Adnan, 2008). Moreover, it could be seen that different usage of these key concepts/words are dependent on when it is measured and on which criteria being used.

2.3. Project Success Criteria (PSC)

Project success criteria mean the measure by which success or failure of a project will be judged (De Wit, 1988; Cooke-Davies, 2002). Traditionally, time, cost and specifications which are often referred to as Iron-triangle or/and Triple-constraints in literature are used as PSC. But PSC have evolved drastically in the past decades.

For examples: Pinto & Slevin, (1988) included client's satisfaction, use and effectiveness in addition to time, cost and performance. Shenhar et al. (2001) take a holistic view of project success stating that there are "four major distinct success dimensions: (1) project efficiency (2) impact on the customer (3) direct business and organizational success, and (4) preparing for the future". Therefore, in literature, project success criteria have been used in various ways depending on their objectives and type of projects. Important point to note is that there is no general agreement over and PSC are still being evolved.

2.4. Success Factors (SFs) and Critical Success Factors (CSFs)

Han et al. (2012) define SFs as factors that influence, constitute as well as determine the success of a project. SFs are those inputs to the management system that lead directly or indirectly to the success of the project (De Wit, 1988; Cooke-Davies, 2002). SFs are further classified under two main categories, one being hard, and objective, tangible and measurable while the other soft, subjective, intangible and less measurable (Erling & Arne, 2000; Chan et al., 2004; Erling et al., 2006). According to Sanvido et al. (1992) the concept of project success factors was first introduced by Rubin & Seeling (1976) but the term CSFs in the context of project management was first used by Rockart (1982). Rockart (1982) defines CSFs as those relatively small numbers of truly important matters where a particular industry should focus her attention in order to achieve success. According to Yong & Mustaffa (2012) CSFs represent "factors" which are "critical" to the "success" of the industry concerned. CSFs are those factors which are necessary for the project participants to achieve their goals in a project (Sanvido et al., 1992; Tiong, 1992 and Cooke-Davies, 2002).

It has been agreed that CSFs are vital for managers to improve their organization in the sense that it will indicate that the progress is being made in particular areas. It should be acknowledged that the contribution made by Pinto and his colleagues to this area. Slevin & Pinto (1986) proposed a model with ten generic CSFs which is known as Project Implementation Profile (PIP). Further in 1988, they proposed a more general measure of PS and in the same year (1988a) tested the importance of PIP to PS. The changes in the importance of project CSFs across four stages in the project life cycle were investigated by Pinto & Prescott (1988). In 1990, they investigated the role of a set of project planning and tactical factors across the stages of the project life cycle. Pinto & Mantel (1990) further contributed by studying the patterns of causes of project failure depending on three contingency variables. Muller & Jugdev (2012) discussed the impact of seminal contributions by Pinto, Slevin and Prescott. However, it was noted that their studies/sample have included a mixture of different types of projects (projects from different industries) such as construction, information technology, research and development and manufacturing etc. Therefore, their findings have become too general and broad posing a question of the applicability on specific construction projects. CSFs will certainly differ from country to country depending on their respective operating environment, policies and legal constraint. Hence, they are not a standard set of measurement or key indicators, which can be applied to all industry (Yong & Mustaffa, 2012).

Chan et al. (2004) did a thorough literature review related to CSFs in seven major management journals and identified 44 SFs. Belout & Gauvreau (2004) re-tested in a field study, the theoretical model used by Pinto and Prescott and developed by Slevin and Pinto in order to further investigate the impact of the life cycle stage, type and structure of a project on the relationship between the CSFs and PS. Takim & Adnan (2008) identified 29 factors (project success effectiveness measures) and assessed their level of success criticality to the Malaysian construction projects. In addition to direct studies on PSFs/CSFs, studies on causes/reasons for project delay/failure, causes for cost overrun, project management's issues, bottlenecks and challenges could also be considered as valuable inputs to identifying CSFs in construction project context. For an example, time extension is a very serious and chronic problem in construction projects (Kazaz & Ulubeyli, 2009, as cited in Kazaz et al., 2012) and "time" is very important PSC. Failure factors are exact opposite of the success factors (Gunasekera, 2009).

Odeh & Battaineh (2002) identified 28 causes of project delay in the construction industry in Jordan. In Sri Lanka, no research or, if at all only minimal research, has been done in relation to project management and its contribution to the success of construction projects (Gunasekera, 2009). However, various attempts have been made by different researchers to determine CSFs in construction projects in other countries. A number of variables influencing PS have been proposed. Some variables are common to more than one list, but there is no general agreement on the variables (Chan et al., 2004). Yong & Mustaffa (2012) further suggests that CSFs could be grouped under different categories depending on the evaluation dimension that the researchers are looking at.

2.5. Recent Studies on Critical Success Factors (CSFs)

De Silva et al. (2008) identified 46 challenges/issues faced by the construction industry of Sri Lanka and grouped those under 10 major categories. Furthermore, 13 main motivators which could be used to improve the performance of the construction industry were identified. Among these motivators, some sub factors were more important than others. However, they have used a relatively small sample. On the other hand, consultants, project managers and other staff who have real experience in day-to-day project operation have not been included. Gunasekera (2009) identified 30 critical success factors which affect construction project success in the context of Sri Lanka and proposed compensatory model for industry to increase project success. He has focused on controllable factors but not only by contractor but also client, consultant and an independent project manager. Though very important HR related factors have been identified he has not considered the relationship of these factors to project success and organizational success but he has grouped these factors under three traditional criteria: Time, Cost and Quality. Further, he has not considered moderating or mediating factors in this study. However, due to rapid changes happening, specially after the war, more contemporary studies are needed in these areas in Sri Lankan context.

36 success factors for public construction projects in India have been identified and categorized under 5 project success criteria by Tabish & Jha (2011). The study has revealed that some factors are of generic nature and would be required to be present to ensure success against two-three performance criteria while some specific factors are required to be present to ensure success against a certain criterion. Depending on the circumstances the relative importance of performance criteria varies. But the problem of this study is that only the engineers have been used and all the other important construction participants have been ignored. Also only the public sector has been focused on this study. Kazaz et al. (2012) determined the most predominant 10 causes of time overruns in construction projects in Turkey and grouped them under 7 key factors. Further, they emphasize that considering the current construction atmosphere in Turkey in this respect, 40% of top rated factors belong to “financial factors”, while 30% of them are of “labour based factors”, 20% are of “managerial factors” and 10% are of “project-based factors”. Though they have elicited perception of project managers and site managers, other important players were not included for the sample.

Yong & Mustaffa (2012) identified 15 factors that are critical to construction project success in Malaysia and grouped under seven key headings. But sample is very small and not representative. However, the results suggest a strong consistency in perception between respondents in recognizing the significance of human related factors such as competence, commitment, communication and cooperation towards the success of a construction project. They further recommended that more emphasis should be given on improving the human related factors in order to ensure the successful implementation of a construction project in future. Furthermore, it is stressed herein that in order to improve project performance and industry, it is needed to look into industry specific strategies and research to be carried out within the local context and business operating environment.

9 reasons for project delay were identified by Mitra & Tan (2012) through a case study in a specific construction project in Saudi Arabia. They grouped reasons for project delay in the region under four main factors. But there is a big question about the ability of generalization of the findings due to a single case study. Furthermore, it is mentioned that the main causes of delay in project completion are mainly using of inferior tools and methods as well as having inexperienced staff in critical project coordination positions. Chen (2012) analyzed the longitudinal data of 121 capital projects and findings were that the scope, quality, team, communication, risk, and change variables not only significantly affect project success, but have a strong, stable, discriminatory power to predict project success and failure. However, Chan focused on the project-initiation and planning phases and he acknowledged the need of future research to develop the findings reported here into more sophisticated models for predicting project success.

Garbharran et al. (2012) identified 18 critical success factors in construction industry in South Africa and grouped according to four COMs model: comfort, competence, communication and commitment. The findings suggest that both project managers and contractors strongly support the critical success factors as significant in achieving project success. The findings also show no significant differences between project managers and contractors on the biographical variables of gender, age, tenure in the industry and sector (public and private), and their perceptions of critical success factors. But it was noted that the sample included only independent project managers and contractors. It was not given who represented the contractor. However, consultants and project management staff have been excluded from the sample.

Gunathilaka et al. (2013) presented a conceptual paper. 21 CSFs and 9 PSCs were identified. Further they stress that significantly less attention has concentrated on investigating relative importance of PSF. Accordingly, PSFs and PSC are much talked about and written about, however their relative importance and relationships are hardly backed by empirical evidence. Further they conclude that the interest appear to be in identifying PSFs and PSC, rather than identifying which are important and in what ways or how PSFs actually influence PSC and to what degree.

Gudienė et al. (2013) presented a conceptual model with 71 factors for construction projects in Lithuania. It has described 7 major groups of factors. 20 factors causing the failure of construction projects in Vietnam were identified by Nguyen & Chileshe (2013) through a research and out of them top-ten factors were classified into 4 categories. This research established that, despite the all-round renovation process undertaken in Vietnam, the construction industry is still plagued by the same critical factors as identified from eight studies spanning a period of eight years from 2004-2012. The major critical factors were associated with knowledge and technical issues. Moreover, the result obviously proves that the biggest problem leading Vietnam construction projects to failure are issues associated to project management elements. They have gone beyond other researches mentioned above in term of composite (lecturers of universities, managers, consultants, designers and site supervisors) however their sample size was relatively small to represent variance of perceptions.

Alias et al. (2014) identified 5 variables of project performance through a literature review and it has specifically focused on project execution phase. Zidane et al. (2015) identified 9 delay factors in the Norwegian construction industry through a qualitative study but with a fairly large sample. “Management and coordination”, “quality issues and errors”, “administration and bureaucracy”, “decision issues” and “waiting” were the top five delay factors. The first two were important to all parties, the other three were more important for contractors and subcontractors, less to the clients and sponsors.

Project success factors identified by different researchers mentioned above could be grouped into two broader types/categories from contractors’ point of view. They are; success factors on which contractor has no or has the least control/influence and success factors on which contractor has full or a considerable level of control/influence. 40 success factors on which contractor has no or has the least control/influence are presented in Table 1. These factors include client and consultant related factors, construction industry related factors, political, economic, legal and social environment related factors etc. 34 success factors on which contractor has full or a considerable level of control/influence were identified and presented in Table 02. 19 factors out of 34 were repeated in 3 or more papers and included important human resources management related factors as well.

3. Research Approach/ Methodology

The approach used in this paper is Critical Literature Review Approach (Saunders et al., 2007). The term “critical” refers to the judgement exercised. It therefore, describes the process of providing a detailed and justified analysis of, and commentary on, the merits and faults of the key literature within chosen area (Saunders et al., 2007). Mingers (2000) as cited in Saunders et al., (2007) argue that there are four aspects of a critical approach that should be fostered by management education: critique of rhetoric, critique of tradition, critique of authority and critique of objectivity. To ensure the criticality, checklists (appendix 01) presented by Saunders et al. (2007) were deployed.

Emerald Insight, Google Scholar, Taylor and Francis, Science Direct and Snowballing technique were used to collect related papers. Due recognition were given for early researches but the recent selected studies were used for extraction of factors, as factors in early researches were repeated in recent studies. There is no enough research in this area in Sri Lankan context. However, two researches which are available in local context were considered. Factors identified as important from selected papers were listed and grouped as factors on which the contractor has no control (external factors) and factors on which the contractor has a control (internal factors). In the process, similar ideas were combined. Some negative factors were converted to positive and some were modified in order to increase the level of clarity.

4. Discussion

This paper aimed at presenting literature relevant to project critical success factors with special reference to construction industry. The argument is that the factors in Table 1 are external to the contractor as well as the contractor has minimal/no control or influence over it.

These factors (Table 1) could be considered as given settings within which the contractor should perform to achieve objectives of a particular project. However, though the individual contractor's influence over factors in Table 1 is low, its criticality to the achievement of a particular project success and to the industry development cannot be under-estimated. It is well established that the external environment has an impact on organizations. However, individual companies' management point of view, factors in Table 2 are the most decisive and critical for contracting companies as full account ability lies on them for it. It is very likely that penalties are being imposed by the client for project failures due to factors in Table 2. On the other hand, these factors are directly related not only to the success of a particular project but for the organizational success of the contracting company in many ways. Moreover, such factors are more likely to be contributing to the sources of sustainable business in the construction field simply because the entire organization would be blacklisted and wiped out from the business unless these factors are managed properly. Resource-based View (RBV) of strategy; one of the dominant contemporary theories to identify the sustainable competitive advantage stresses the importance of inward looking approach to develop competitive advantages. In line with this stream of thoughts, factors in Table 2 are likely to be the sources of competitive advantage over competitors in construction industry and those once developed could be the enablers to capture the opportunities and strengths to face threats posed by external factors (Table 1). Organizations have to improve their internal capabilities continuously and have developed capabilities to face external threats.

Many studies conducted on critical success factors are very broad and include both types of factors: e.g. Nguyen & Chileshe (2013), Kazaz et al. (2012), De Silva et al. (2008), Yong & Musttaffa (2012), Garbharran et al. (2012), and Gunathilaka et al. (2013). Traditionally, project success is considered as the dependent variable and many studies have attempted to identify factors but have not considered the relationship or the linkage of success factors with diverse success criteria. Project success has been considered as a generic term rather than considering specific measurement criteria: e.g. De Silva et al. (2008), Kazaz et al. (2012), Yong & Musttaffa (2012), Mitra & Tan (2012), Chen (2012), Garbharran et al. (2012), Nguyen & Chileshe (2013). The weakness of such studies is that it is not possible to see what factors are really related to the particular aspect of project success. Studies on direct relationship between criteria of measuring project success help to overcome this weakness. Han et al. (2012), Muller & Jugdev (2012) and Gunathilaka et al. (2013) all found that there is not enough research that considers the relationship between project success factors and project success criteria. However, Tabish & Jha (2011) have focused on the relationship of critical success factors and success criteria. But Tabish & Jha (2011) do not see how diverse success factors impact on organizational success. Gunasekera (2009) has inquired the relationship of success factors to success criteria based on the perception of different participants. But he has used only the traditional criteria of time, cost and quality.

Furthermore, none of the researches that have been selected for this study considered the relationship of critical success factors and organizational success. There may be factors critical to organizational success in the long run though the same factors are not critical to achieve particular aspects of project success. Similarly there can be factors that have a significant impact on the particular aspect of a project success but the same factor might have less impact on organizational success. Such understanding could be a crucial input for strategy formulation and implementation. Another very important point of study that has drawn less attention is what factors have moderating and intervening effect on the relationship between critical success factors and success criteria. Muller and Jugdev (2012) also stressed the need of research that examines causal relationships between success factors, project success and organizational success, and research that explores moderating and mediating variables of success.

Most of the identified factors through the said studies cover different disciplines or knowledge areas such as human resources management, financial management, logistics and operational etc. However, less attention has been drawn on specific areas such as human resource related factors (HR knowledge area). This finding corroborates the finding of Yong & Musttaffa (2012). They stress the need of empirical support on human related factors. Belout & Gauvreau (2004) stressed that research on HRM in the project management context is undeveloped. It seems that this has been a long outstanding issue which needs immediate attention. Gunathilaka et al. (2013), Mitra & Tan (2012) and Tabish & Jha (2011) stressed the importance of conducting studies in different context/countries. Though researches related to construction project success are available in other countries, such studies in Sri Lankan context are very rare.

On the other hand, with rapid changes happening in the turbulent environment and in construction industry, it is curious whether previous research findings have become obsolete and unable to reflect the current position of project success factors. With the end of the three-decade-long war, massive amount of resources have been pumping to this industry in Sri Lanka and this could be the ideal time to focus on these areas.

5. Conclusion

Factors in Table 1 are external to the contractor but these factors have a great impact on achieving particular project success and on industry development. 40 external factors were identified and 10 factors are repeated in three or more papers. External factors basically could be viewed as issues related to government policies, client & consultant's characteristics and industry issues/challenges. Industry-wide issues should be addressed at the industry level forums/institutions. In order to develop this industry, the government agencies and authorities must address political, economic and legal issues at the national policy level. We can argue that, though the influence of an individual company over industry-wide issues and national policy level issues is little, most of these issues could be collectively addressed. Industry stakeholders through their alliances can collectively influence the government on policy matters. Such approaches will greatly contribute to enhance the likelihood of project success, success of individual contracting companies, industry and the country as a whole.

Factors in Table 2 are internal and likely to be the sources of a sustainable construction organization. RBV proponents emphasize that intangible resources such as skills, knowledge, process and systems that have been developed over a period of time will give more sustainable competitive advantages over tangible resources or external factors. 34 internal factors (Table 2) were identified and the findings consisting of important human resources management challenges as well. 19 factors were identified as very important as they are repeated in 3 or more papers and it is important to note that none of the internal factors are technical. Sauser et al., (2009) mentions that "When important projects fail, the investigation is often focused on the engineering and technical reasons for the failure. Yet, in many cases the root cause of the failure is not technical, but managerial. Often the problem is rooted in management's failure"

In line with these streams of thought and the results of the discussions above, more empirical researches are needed on the relationship of human resources management related critical success factors with project success and organizational success in construction project management context. Contemporary empirical research on internal managerial factors, especially in Sri Lankan context, will greatly instrumental for the development of the industry.

6. References

- Alias, Z., Zawawi, E. M. A., Yusof, K., & Aris, N. M. (2014). Determining Critical Success Factors of Project Management Practice: A Conceptual Framework. *Procedia-Social and Behavioral Sciences*, 153, 61-69.
- Andersen, E. S., & Jessen, S. A. (2000). Project evaluation scheme: a tool for evaluating project status and predicting project results. *Project Management*, 6(1), 61-9.
- Andersen, E. S., Birchall, D., Arne Jessen, S., & Money, A. H. (2006). Exploring project success. *Baltic Journal of Management*, 1(2), 127-147.
- Annual Report (2014). Central bank of Sri Lanka, 51.
- 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), 337-342.
- Belout, A., & Gauvreau, C. (2004). Factors influencing project success: the impact of human resource management. *International Journal of Project Management*, 22(1), 1-11.
- Chan, A. P., Scott, D., & Chan, A. P. (2004). Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, 130(1), 153-155.
- Chan, A. P., Scott, D., & Lam, E. W. (2002). Framework of success criteria for design/build projects. *Journal of Management in Engineering*, 18(3), 120-128.
- Chen, Joe, (2012), Predictor of project performance and the likelihood of project success. [Online] Available: <http://www.jimsjournal.org>. (October 1, 2015).
- Cheong Yong, Y., & Emma Mustaffa, N. (2012). Analysis of factors critical to construction project success in Malaysia. *Engineering, Construction and Architectural Management*, 19(5), 543-556.

- Chitkara, K. K. (2013). Construction project management: planning, scheduling and controlling. 2/e, McGraw Hill Education (India) Private Limited. 01-17
- Cooke-Davies, T. (2002). The “real” success factors on projects. *International Journal of Project Management*, 20(3), 185-190.
- De Silva, N., Rajakaruna, R. W. D. W. C. A. B., & Bandara, K. A. T. N. (2008). Challenges faced by the construction industry in Sri Lanka: perspective of clients and contractors. *Building Resilience*, 158.
- De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164-170.
- Garbharran, H., Govender, J., & Msani, T. (2012). Critical success factors influencing project success in the construction industry. *ActaStructilia*, 19(2), 90-108.
- Gudienė, N., Banaitis, A., Banaitienė, N., & Lopes, J. (2013). Development of a Conceptual Critical Success Factors Model for Construction Projects: a Case of Lithuania. *Procedia Engineering*, 57, 392-397.
- Guide, A. (2008). Project Management Body of Knowledge (PMBOK® GUIDE).4/e. In Project Management Institute, 06-18
- Gunasekera, H. A. D. P. M. (2009). Managing critical factors in construction projects: applicability of compensatory model for effective project management. (Doctoral dissertation, Sri Jayewardenepura University).
- Gunathilaka, S., Tuuli, M. M., & Dainty, A. R. (2013, September). Critical Analysis of Research on Project Success, *Construction Management Journals*. In Procs 29th Annual ARCOM Conference.
- Han, W. S., Yusof, A. M., Ismail, S., & Aun, N. C. (2012). Reviewing the notions of construction project success. *International Journal of Business and Management*, 7(1), 90.
- Jugdev, K., Perkins, D., Fortune, J., White, D., & Walker, D. (2013). An exploratory study of project success with tools, software and methods. *International Journal of Managing Projects in Business*, 6(3), 534-551.
- Kazaz, A., Ulubeyli, S., & Tuncbilekli, N. A. (2012). Causes of delays in construction projects in Turkey. *Journal of Civil Engineering and Management*, 18(3), 426-435.
- Lim, C. S., & Mohamed, M. Z. (1999). Criteria of project success: an exploratory re-examination. *International Journal of Project Management*, 17(4), 243-248.
- Mitra, S., & Wee Kwan Tan, A. (2012). Lessons learned from large construction project in Saudi Arabia. *Benchmarking: An International Journal*, 19(3), 308-324.
- Müller, R., & Jugdev, K. (2012). Critical success factors in projects: Pinto, Slevin, and Prescott-The elucidation of project success. *International Journal of Managing Projects in Business*, 5(4), 757-775.
- Nguyen, T. P., & Chileshe, N. (2013). Revisiting the critical factors causing failure of construction projects in Vietnam (Doctoral dissertation, Association of Researchers in Construction Management).
- Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: traditional contracts. *International Journal of Project Management*, 20(1), 67-73.
- Parfitt, M. K., & Sanvido, V. E. (1993). Checklist of critical success factors for building projects. *Journal of Management in Engineering*. 9(3), 243-249.
- Pinto, J. K., & Mantel Jr, S. J. (1990). The causes of project failure. *Engineering Management, IEEE Transactions on*, 37(4), 269-276.
- Pinto, J. K., & Prescott, J. E. (1988). Variations in critical success factors over the stages in the project life cycle. *Journal of Management*, 14(1), 5-18.
- Pinto, J. K., & Prescott, J. E. (1990). Planning and tactical factors in the project implementation process. *Journal of Management Studies*, 27(3), 305-327.
- Pinto, J. K., & Slevin, D. P. (1987). Critical factors in successful project implementation. *Engineering Management, IEEE Transactions on*, (1), 22-27.
- Pinto, J. K., & Slevin, D. P. (1988a). Critical success factors across the project life cycle. Project Management Institute.
- Pinto, J. K., & Slevin, D. P. (1988b). Project success: definitions and measurement techniques. Project Management Institute.
- Rockart, J. F. (1982). The changing role of information system executive: a critical success factors perspective. *Sloan Management Review*, 24 (1). 3-13.
- Saunders, M., Lewis P., & Thornhill (2007). Research methods for business studies.5/e. Pearson Education Limited, England. 58-59

- Sauser, B. J., Reilly, R. R., & Shenhar, A. J. (2009). Why projects fail? How contingency theory can provide new insights—A comparative analysis of NASA's Mars Climate Orbiter loss. *International Journal of Project Management*, 27(7), 665-679.
- Shenhar, A. J., Dvir, D., Levy, O., & Maltz, A. C. (2001). Project success: a multidimensional strategic concept. *Long Range Planning*, 34(6), 699-725.
- Slevin, D. P., & Pinto, J. K. (1986). The project implementation profile: new tool for project managers.
- Sohail, M., & Cavill, S. (2008). Accountability to prevent corruption in construction projects. *Journal of Construction Engineering and Management*, 134(9), 729-738.
- Tabish, S., & Jha, K. (2011). Important factors for success of public construction projects. In 2nd International Conference on Construction and Project Management IPEDR. Singapore: IACSIT Press.
- Takim, R., & Adnan, H. (2008). Analysis of effectiveness measures of construction project success in Malaysia. *Asian Social Science*, 4(7), 74-91
- Tiong, R. (1992). Critical success factors in winning BOT contracts", *Journal of Construction Engineering and Management*, 118(2), 217-28.
- Zidane, Y. J., Johansen, A., Andersen, B., & Hoseini, E. (2015). Time-thieves and bottlenecks in the Norwegian construction projects. *Procedia Economics and Finance*, 21, 486-493.

1. Table And Figures

Table 1: Factors on which contractor has the least/no control

S/N	Factors	De Silva et al. (2008)	Gunawekera (2009)	Tabish and Jha (2011)	Kazaz et al. (2012)	Yong and Mustaffa (2012)	Mitra and Tan (2012)	Chen (2012)	Carbharran et al. (2012)	Gunatillaka et al. (2013)	Gudiñea et al. (2013)	Nguyen and Chileshe (2013)	Alias et al. (2014)	Zidanea et al. (2015)	Frequency
1	Low level of government/political support & political instability	X		X					X	X	X		X		6
2	Client's financial capability/Delay of payments		X		X	X	X					X			5
3	Client's involvement & monitoring		X	X						X	X		X		5
4	Design and material changes by Clients				X		X	X				X			4
5	Social/cultural environment & community involvement/support								X	X	X		X		4
6	Clients characteristics (Type: private vs public, size, risk attitude and emphasis on low cost, quality, speed etc.)		X								X		X		3
7	Rapid changes in the national economy/economic environment	X									X		X		3
8	High inflation rate/fluctuation of material price	X			X							X			3
9	Project Nature Related Factors (scope, size/value, project type)							X			X		X		3
10	Nature/ecological/physical environment					X					X		X		3
11	Client's experience										X		X		2
12	Consultant's competence/skills		X			X									2
13	Consultant's commitment, cooperation in solving problems/quick decisions		X			X									2
14	Bribe/Corruption and favourism	X										X			2
15	The instability and inefficiency of government policies and legal system										X	X			2
16	Adequate feasibility studies				X										1
17	Availability of resources/materials etc.					X									1
18	Technological advancement/Low level of new technology development												X		1
19	Narrow profit margins	X													1
20	Construction regulations & standards										X				1
21	Lack of opportunities for R&D	X													1
22	Low level of participation of institutes in industrial oriented R&D	X													1
23	Limited allocation of funds for R&D	X													1
24	Reluctant in using innovative building materials	X													1
25	Insufficient integration on design and build operation	X													1
26	Security of skills available in the construction/High labour turnover	X													1
27	High environment impact	X													1
28	Inadequate support from institutional organizations for T&D	X													1
29	Currently practicing government grading system	X													1
30	The ambiguousness of contractual terms and conditions											X			1
31	Communication among project stake holders					X									1
32	Capabilities and innovativeness of consultant's staff		X												1
33	Effective contract administration		X												1
34	Change control and risk management		X												1
35	Project monitoring and cash flow management		X												1
36	Recommending the lowest responsive tenders		X												1
37	Selection of the procurement system		X												1
38	Inadequate support from banking sector/high interest rates	X													1
39	Government policies on tax	X													1
40	Government involvement in R&D	X													1

Table 2: Factors on which contractor has a control/influence

S/N	Success Factors	De Silve et al. (2008)	Gunasekera (2009)	Tabish and Jha (2011)	Kazaz et al. (2012)	Yong and Mustafa (2012)	Mitra and Tan (2012)	Chen (2012)	Garbharran et al. (2012)	Gunathilaka et al. (2013)	Gudionea et al. (2013)	Nguyen and Chileshe (2013)	Alias et al. (2014)	Zidanea et al. (2015)	Frequency
1	Adequate communication among all project participants	X		X				X		X	X	X	X	X	7
2	Effective quality assurance programme			X	X			X		X			X	X	6
3	Top management support & commitment to the project		X	X		X				X		X		X	6
4	Availability of advanced/new technologies/construction equipment	X	X							X	X			X	5
5	Detailed project planning, estimations and scheduling	X			X				X	X		X			5
6	Frequent project monitoring/progress meetings	X	X			X			X	X					5
7	Implementing an effective health & safety programme	X	X								X		X	X	5
8	Managing and control of subcontractors' work		X			X					X	X	X		5
9	Adequate funds/cash flow management		X		X					X	X				4
10	Administration and bureaucracy	X		X								X		X	4
11	Availability of resources as planned throughout the project			X			X			X		X			4
12	Clear and detailed procurement process & strategy					X				X		X	X		4
13	Clearly defined scope/goals and objectives			X					X	X	X				4
14	Effective project risk management system/process		X					X		X	X				4
15	Availability of experience professionals & skillful workforce/staff	X					X				X				3
16	Effective allocation and control of manpower				X	X	X								3
17	Effective project team formation		X					X		X					3
18	Effective site management, control & coordination		X									X		X	3
19	Team leader/PM Knowledge/experience & skills		X								X	X			3
20	Adequacy of design details and specifications					X				X					2
21	Contractor's experience										X	X			2
22	Employee/staff motivation & satisfaction	X								X					2
23	Establishing an effective document control system	X	X												2
24	High degree of trust shared by project participants			X							X				2
25	Manpower/labour productivity				X		X								2
26	Adequate career development programs	X													1
27	Adequate technological knowledge & transfer	X													1
28	Adequate trainings & skill development programs	X													1
29	Clarity of roles and responsibilities										X				1
30	Developing an appropriate organizational structure												X		1
31	Effective contract management system										X				1
32	Effective management of project meetings		X												1
33	level of usage of IT	X													1
34	Team member commitment										X				1