

KEYWORDS

Project success • Large scale projects • Critical success factors • Systematic review • Project performance • Iron triangle • Construction project • Defense project • Engineering projects • Information technology project • Infrastructure project

A Comprehensive
ASSESSMENT OF
PROJECT
SUCCESS
Within Various
LARGE
PROJECTS

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1. INTRODUCTION

Large scale projects are known to be the prime enablers of business and social change; they are also vital contributors to future business success, although they are notoriously difficult to manage (Whitty and Maylor, 2009). Despite the growing number of large scale projects implemented around the world, most large scale projects fail to meet their objectives and experience substantial cost and schedule overruns (Brady and Davies, 2014; Flyvbjerg, 2014; Molloy and Chetty, 2015; Rezvani et al., 2012; Khosravi et al., 2012). For example, the Summer Olympics in Rio de Janeiro ended up costing \$16.4 billion over the 2008 budget of \$4.6 billion (Flyvbjerg et al., 2016). Another example of project cost and schedule overrun is the Sydney Opera House, which exceeded the original budget by 14 times, costing AU\$102 million, and was delivered ten years over schedule (Söderlund and Lenfle, 2013). These disappointing outcomes motivate further investigation into identifying the best practices for succeeding in large scale projects (Toor and Ogunlana, 2009a; Zhang and Fan, 2013). Project success have been identified in prior reviews (e.g. Cooke-Davies, 2002; Davis,

2014; Jugdev and Müller, 2005; Rezvani et al., 2015). Davis (2014), for example, described the development of project success across various timeframes, paying particular attention to different stakeholders' perceptions of success. Jugdev and Müller (2005) produced a historical review and focused on the development of project success at different time periods in the project life cycle. These prior reviews illustrate that project success has been identified and reproduced in various studies; however, project management literature has not considered the importance of identifying project success across different types of projects, specifically large scale projects. The unclear view of project success in large scale projects has therefore created a gap to further examine project success across various types of large scale projects (Adoko et al., 2015; Liu and Wang 2016). This review, therefore, extends our understanding in the field by first focusing on large scale projects, owing to their specific features. Large scale projects are characterised by multiple joined organisations with often dissimilar objectives;

a large scope, timeline, and budget; a high level of technology advancement; a high degree of interdependency; and a high degree of uncertainty (Chang et al., 2013). Large scale projects vary regarding goals, budgets, ownership, structure, and accountability compare to normal or small-scale projects (Flyvbjerg, 2014). Large scale projects attract public interest, while the goals of small-scale projects are driven by profits and self-interest (Toor and Ogunlana, 2009a). Stakeholders in large scale projects disperse around the world with conflicting interest, and performance of these projects are dependent on a high degree of interdependency and communication (Locatelli et al., 2014; Rezvani et al., 2016). Research also shows that large scale projects are more open to external influences because of their accountability to multiple communities, legislative, and mandates policy (Kwak and Smith, 2009; Chang et al., 2013). Furthermore, Rezvani et al. (2016) found that project managers in these projects require approaches and skills that are beyond those of traditional project management. Thus, the specific features of large

• ABSTRACT •

Large scale projects are important drivers of social change. Even when operations follow best practices there are serious challenges, which all too often lead to failure in large scale projects. However, while large scale project success and failure have been widely studied there is no comparison of project success in large scale projects across different types of projects. This study reveals project success factors in the context of large scale projects by analysing 30 articles. This review systematically identifies and compares project success factors in three types of large scale projects: construction/infrastructure, aerospace/defense, and information technology. The paper offers practitioners and researchers a more comprehensive understanding of success in managing large scale projects and useful recommendations for future research.

scale projects make them much more challenging to manage than smaller-scale projects (Toor and Ogunlana, 2009a).

Moreover, we argue that evaluating success indicators across different types of large scale projects is important, as the meaning of success may vary across different project types (Hyväri, 2006; Ika, 2009). Recent empirical research into large scale projects suggests that different types of large scale projects may require different success factors (Alshawi et al., 2012; Chang et al., 2013; Toor and Ogunlana, 2009a; Turner and Zolin, 2012; Williams, 2016). This is mainly due to the differences in environmental variables, the nature of the project, the nature of the participant organisations and the prioritisation of project goals (Toor and Ogunlana, 2010). For example, a large scale defence project typically attracts high public attention. Thus an increase in defence capability may dominate the perception of success. On the other hand, large scale construction projects may place a heavier emphasis on health and safety records. A systematic review is needed to synthesize, integrate the literature and to provide a comprehensive view of success factors within large scale projects. This study, therefore, aims to answer the following research questions:

- Research Question 1: What are the project success factors in large scale projects?
- Research Question 2: Are there any differences in success factors between different types of large scale projects which have been identified in the literature?

2. PROJECT SUCCESS

Defining project success is a challenging issue as it can mean different to different project stakeholders and individuals (Ika, 2009; Toor and Ogunlana, 2005). However, in project management literature scholars are agreed on two viewpoints of project success: project success factors and project management success/success criteria. The PM success criteria relate to standard project measures of cost, time and quality, referred to as the “iron triangle”, which can be measured retrospectively after project completion (Müller and Jugdev, 2012; Cooke-Davies, 2002; Davis, 2014). Success factors, on the other hand, are understood as an element which can be influenced to increase the chance of project success/failure. Critical success factors more specifically focus on soft issues, such as the behavioural skills of project teams and customer and stakeholder satisfaction, and can be measured prior to the project’s completion (Pinto and Slevin, 1987; Turner and Zolin, 2012). A preliminary review of the literature showed that project success factors have been researched extensively in the project management literature. Some of the foremost works involved: Kerzner (1987) who identified 6 critical success factors for successful projects including: executive commitment to project management, corporate understanding of project management, organisational adaptability, commitment to planning and control, project manager’s leadership style, and project manager selection cri-

teria. Pinto and Slevin (1987), identified ten critical success factors including: top management support, project mission, project schedule/plan, client acceptance, monitoring and feedback, communication, and troubleshooting. Cooke-Davies (2001) identified project management success factors and factors related to the successful projects. He reveals four critical success factors and six project management success factors. Under project management success factors, he identified factors which help ensure the project is completed on time and specific budget. Kendra and Taplin (2004) created a list of success factors and grouped them into four types: micro-technical, and macro-technical, micro-social and macro-social. Turner et al., (2009) and Turner and Zolin (2012) focused on the role of stakeholders and long-term business success. Their study shows the importance of internal and external stakeholders to achieve long-term business success. These studies show that the development of success factors frameworks and the importance of success factors to accomplish successful projects.

We also found several review articles regarding project success (See Table 1). For example, Savolainen et al. (2012) reviewed seven articles on areas of research on software development project success and failure. They identified three success factors from the supplier’s perspective: short-term and long-term business benefits and customer satisfaction. Ika (2009) analysed 30 articles on success from two journals in project management, the Project Management Journal (PMJ) and the International Journal of Project Management (IJPM). He emphasised the large scaleity of defining project success, but also highlighted the distinction between project success factors and project management success (e.g. time and budget) and the link between project management success and project success factors. Davis (2014) conducted a systematic review of 29 papers, paying attention to different stakeholders’ perceptions of success. Jugdev and Müller (2005) conducted a longitudinal literature review of 30 papers and explored the development of project success at different time periods in the project life cycle.

While a number of studies have been conducted to understand the success factors in project management literature, however each study emphasis on a certain facet of project success. One of the most important findings arising from the preliminary studies and prior literature reviews was that the factors so far illustrated may not appropriate in the context of large scale projects. In addition, when we reviewed the published articles, we found that the evaluation of large scale project success in project management literature is based upon the combination of the most common PM success or meeting time, cost and quality goals and therefore large scale project success seems to adhere to the traditional measure of iron triangle. However, researchers criticised these criteria and argued that traditional focuses on time cost and quality is not adequate to define project success and leads to an incomplete view of project success (Turner and Zolin, 2012). This is because due to the long time frame of large scale projects usually between 5 to 10 years, project specification and original requirements will almost certainly change and this will impact the time and cost of large scale projects (Rezvani et al., 2016). As de Wit, (1998) argued that focuses on PM success can contribute to project success, however, it is not likely to be able to avoid failure, or it has been said that “the operation was a success but the patient has died” (Jugdev and Muller, 2005, p.22). An example of this is the Sydney Oprah House where the project was not managed well from a project management perspective but at the end was viewed as an engineering masterpiece. The project was 14 times over budget and took 15 years to complete. This project was a success and engineering masterpiece in terms of project success, but it was a failure in terms of PM success (Baccarini, 1999; Munns and Bjeirmi, 1996).

This has led to the current effort in re-examining the understanding of the critical success factors and success criteria across various type of projects in large scale projects. This is an important topic because the success of large scale projects and its implication, consequently, influences the broader organisation and society in several dimensions. Identifying project success factors in large scale projects is also essential because it has a bearing on the future guidelines of project management in the strategic context. Our study adds to the previous reviews as it concentrates on project success in large scale projects.

Reference	Included papers (n)	Focus of the review
Savolainen et al. (2012)	7	This review focused particularly on software projects
Ika (2009)	30	This review analysed articles on project success definitions from two journals on project management: the PMJ and IJPM
Jugdev and Müller (2005)	30	This longitudinal literature review explained the development of project success at different time periods
Davis (2014)	29	This review described the evolution of the idea of project success over successive decades, paying particular attention to different stakeholders’ perceptions of success

TABLE 01. Previous Reviews of Project Succes

3. METHODOLOGY

Following guidelines offered by Tranfield et al. (2003), we conducted a systematic review to identify and synthesise all the available research evidence of sufficient quality over three stages: planning, conducting and reporting the review. In the planning stage, we identified a need for a review and developed research questions and the review protocol. In the conducting stage, we performed searches, identified included studies, extracted data from studies and synthesised the data. In the reporting stage, we reported the results.

--- 3.1 Search terms ---

This systematic literature review was guided by the research questions investigating project success in the context of large scale project management. A three-step search strategy was used. An initial search of Science Direct, Wiley and ABI/INFORM databases was undertaken to determine optimal search terms, followed by a second search using all relevant keywords. In the second search, following discussions between the co-authors and focusing on the key papers related to large scale project success, a number of search terms were identified and grouped into two categories: (“mega project*” OR “large scale project*” OR “large project*” OR “major project*”) AND (“success” OR “project success factor*” OR “project performance” OR “project success criteria” OR “performance” OR “project success” OR “success criteria” OR “critical success factor”).

Finally, the selected terms were searched for across publication keywords, titles and abstracts. In total, the search identified in excess of 1660 papers. It was possible to get a large number of papers, even with some limitations to the search, while performing searches in databases with search strings. However, most of these papers were discussion papers, duplicate papers or contained one of the review search terms but did not address project success in large scale projects. Therefore, once all studies had been retrieved from the databases, the inclusion and exclusion criteria were used to determine whether the study was relevant to the review, leaving a total of 513 publications for further analysis. After removing duplicates and unrelated papers, the authors applied a two-stage filtering process previously adopted by Yang et al. (2011) and Mok et al. (2015) in their literature review. In the first stage, the authors reviewed the abstracts and introductions of the remaining 513 papers that addressed project success factors. This process led to the extraction of 435 papers, leaving 78 papers for further review. In the second stage, the authors excluded irrelevant papers after the full text was retrieved and thoroughly assessed. As a result, 30 articles were included in this study and were considered to offer insights about project success in large scale project environments based on the inclusion criteria. We believe the articles identified for the systematic review are demonstrative of the literature, owing to the rigorous search process employed.

--- 3.2 Inclusion/exclusion criteria ---

We limited our review to empirical papers that: (1) were published in peer review journals, (2) were published between 2000 and 2017, and (3) provided empirical evidence regarding the success of large scale projects. Studies in languages other than English, conceptual papers, conference papers, unpublished full-text documents and review pa-

pers were excluded from the search. We also excluded reports because reports have criticised for failing to describe research method used (Savolainen et al., 2012; Jørgensen and Moløkken-Østvold, 2006).

Following the Global Alliance for Project Performance Standard (GAPPS, 2007) guidelines and prior studies in large scale projects (Ahern et al., 2014; Chang et al., 2013; Locatelli et al., 2014; Rezvani et al., 2016; Bosch-Rekvelدت et al., 2011) we consider a project as being “large scale” if it has at least one of the following characteristics: a high degree of uncertainty and mixture of joined organizations and sub-contracting (Ahern et al., 2014); rapid change of technology (Davies and Mackenzie, 2014; Bosch-Rekvelدت et al., 2011); high degree of interdependency between a number of system parts and organizations involved (Locatelli and Mancini, 2012); strong legal, social or environmental implications from undertaking the project (Chang et al., 2013); strategic importance of the project to the organization or organizations involved (Mazur et al., 2014; Bosch-Rekvelدت et al., 2011); stakeholders with conflicting needs regarding the characteristics of the project’s product (Locatelli et al., 2014); and newness of technology (Robinson Fayek et al., 2006).

--- 3.3 Data synthesis ---

This study used a combination of analytical approaches to guarantee a rigorous research process and to increase the validity and reliability of the systematic literature review (Levy and Ellis, 2006), namely descriptive and thematic analysis (Morgan and Smircich, 1980; Ritchie et al., 2013). The descriptive analysis allows the main characteristics of the field under investigation to be identified (Dey, 2003) such as a year of publication, countries, methodology and study design. The thematic analysis consists of synthesising the main outcomes extracted from the literature and condensing the text into fewer content-related categories of qualitative data via content analysis (Braun and Clarke 2006; Guest et al., 2011). Content analysis is a method used to determine the major facets of a data set by counting the number of times a topic appears (Neuendorf, 2002). According to the literature, this is a valid method to undertake a systematic literature review (Levy and Ellis, 2006). Following Ritchie et al.’s (2013) method, a series of steps were undertaken in order to conduct a thematic analysis. First, the literature was read and textually analysed to derive a set of suitable categories. This led to identifying recurring themes from the collected literature with specific reference to various large scale project types and their success factors in order to answer the first and second research questions. After the themes were identified the first author arranged the main categories and their attributes using a Microsoft Excel spreadsheet to compare the identified categories. Finally, the results of the complete categorisation set were condensed into a table to answer the research questions and were revised as necessary by all authors. Any discordances were settled during meetings with authors, and the complete set of final categories was finalised. Section 4 of this study, the results section, provides the final detailed categorisation of various large scale project types and their success factors.

4. RESULTS

--- 4.1 Overview of Selected Publications ---

As shown in Figure 1, a rapid increase of publications on large scale projects was seen in 2009, 2012 and 2013. The fast pace of research into large scale or large projects can be attributed to the advanced technology, rapid globalisation and gradual increase in interest in exploring the best ways to deliver successful large scale projects (Williams, 2016).

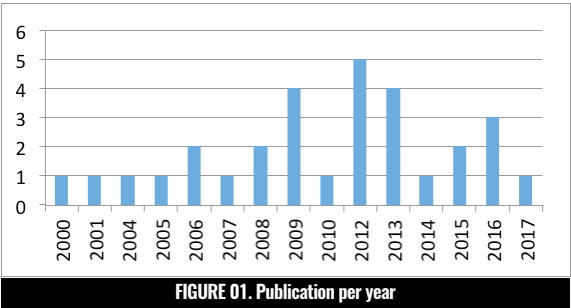


FIGURE 01. Publication per year

In order to ascertain countries with the most research on large scale projects in our final pool, we conducted a simple counting of papers. There were a number of papers that focused on large scale projects which were not attributed to any specific country or were focused on multiple countries; these were considered to be “International” papers. Figure 3.2 presents research into large scale projects based on countries.

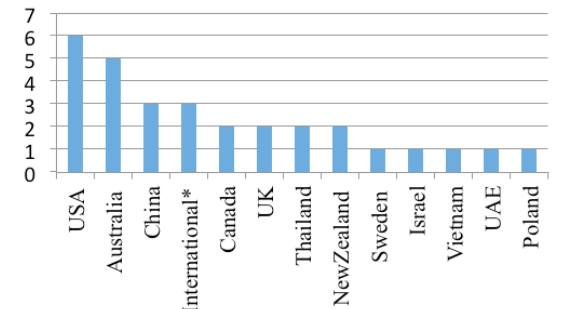


FIGURE 01. Publication per year

--- 4.2 Analysis of the studies ---

Based on the papers in our final pool, we classified large scale projects into three categories: construction/infrastructure; defence and aerospace; and information technology (IT) projects. Table 2 portrays project success across these three types of large scale projects. The study followed the division of project success into project management success criteria and project success factors used in previous studies on project success (Cooke-Davies, 2002; Davis, 2014; Dvir et al., 2003; Ika, 2009; Jugdev and Müller, 2005; Toor and Ogunlana, 2009; Papke-Shields et al., 2010; Sadeh et al., 2000; Savolainen et al., 2012; Shenhar and Dvir, 2007; Williams, 2016). We combined both PM success criteria and project success factors for ease of data presentation in Table 2. Table 2 contains five sections.

Section A in Table 2 highlights success criteria. The PM success criteria (schedule/time, budget/cost and quality), used in 20 studies. Our result shows that the PM success criteria reign supreme in all three types of large scale projects. Seven out of 20 articles only used project management success criteria to measure success of large scale projects. This is also consistent with prior studies that conceptualise project success as a uni-dimensional construct concerned with meeting budget, time and quality (e.g. Tai et al., 2009). Thirteen out of 20 articles argue for the multidimensionality of success. In addition to the PM success criteria, researchers also measured project success factors such as stakeholder satisfaction (Williams, 2016; Zhang and Fan, 2013), communication, technical capabilities and meeting design goals (Alshawi et al., 2012; Liu and Wang, 2016). This illustrates that large scale project management is still a very young research area, thus it still relies strongly on traditional project success measures, while continuing to search for additional success factors to complement the traditional measures.

Section B in Table 2 highlights the five most common success factors across all three types of large scale projects: construction, IT and defence projects. Common success factors among the three types of projects are project planning, effective communication, meeting user/customer/owners’ requirements and stakeholder satisfaction. This potentially illustrates a consensus of some success indicators across construction, IT and defence projects, and also the importance of soft measures when defining project success in large scale projects.

Section C in Table 2 reports on factors identified by two (but not all three) types of large scale projects. Top management support and training were mentioned in defence and IT projects (Dvir et al., 2006; Ferratt et al., 2006; Lech, 2013; Liu and Wang, 2016; Mazur et al., 2014; McGillivray et al., 2009; Rezvani et al., 2016) but surprisingly were not echoed in construction projects. This highlights a gap in the literature, presenting an opportunity to conduct an empirical study into assessing these essential success factors in large scale construction projects when defining project success. Staff commitment (Ogunlana, 2008; McGillivray et al., 2009) was found in both IT and construction projects, but was not mentioned in defence projects, which is understandable as staff members in defence projects are mostly ongoing or close-to-retirement defence personnel; “commitment” within the defence culture is an important selection criterion for all project personnel, thus little variation is expected to be observed among different staff on this factor (Chang et al., 2013). Technical capabilities (Alshawi et al., 2012; Adoko et al., 2015) were echoed in construction and defence projects but surprisingly were not mentioned in IT projects. It could be assumed that technical capabilities should be on the top of the success factors in large scale IT projects as they allow staff to customize the equipment to meet their specific needs (McGillivray et al. 2009); however, to date there has been limited empirical research conducted in large scale IT projects to identify the importance of technical capabilities as a prerequisite selection criterion for staff when measuring project success.

Section D in Table 2 shows the factors only identified in defence projects, namely: problem-solving, defence capabilities, mission clarity, and project member wellbeing. In the specific context of defence projects it is not uncommon for projects to have vague goals, such as “increase defence capability”, at the beginning of a long-term project (Rezvani et al., 2015) or to face unexpected problems and challenges due to task interdependency and large scaleity (Rezvani et al., 2016). This reveals that having more specific goals or handling unexpected crises and deviations from the plan will likely lead to greater project success in defence projects, hence the importance of these specific indicators.

Section E in Table 2 lists factors for IT projects only: technical support; software selection; team contribution; consulting capabilities; and achieving business goals such as profit, market share or growth (Chua et al., 2012; Khosravi et al., 2013; Khosravi et al., 2016; Ferratt et al., 2006; Lech, 2013; McGillivray et al., 2009). Among these factors, technical support was the most frequently identified factor. This makes it apparent that having the ability to provide technical support is critical in large scale IT projects with new and advanced technology (McGillivray et al., 2009; Ferratt et al., 2006). Furthermore, integrated IT solutions must address customer needs from end to end, hence adequate technical support plays a central role in maintaining and upgrading the system

Section	Project success	Construction &Infrastructure projects														Defense & Aerospace projects							IT & Engineering projects							Total		
Sources*		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
A. PM Success Criteria	Time/Schedule	√			√	√	√	√	√	√		√	√			√	√			√				√		√		√	√	√	√	20
	Cost/Budget	√			√	√	√	√	√	√	√	√				√	√			√	√				√		√	√	√	√		
	Quality	√				√	√				√					√											√		√	√		
B. Common success factors across all types of large scale projects	Stakeholders satisfaction	√						√				√						√	√									√	√		7	
	Open communication			√				√						√		√	√					√		√							7	
	Specific Plans	√				√								√				√					√		√						6	
C. Common success factors between two types of projects	Meeting users/customers/owner's requirement	√	√	√															√					√				√	√		7	
	Top management support																√					√		√	√						4	
	Staff commitment			√									√	√										√							4	
D. Success factors identified by defence projects	Training															√								√	√						3	
	Technical capabilities							√													√										2	
	Problem solving															√	√					√									3	
E. Success factors identified by IT projects	Defence capability															√				√											2	
	Mission clarity																√				√										2	
	Project member wellbeing															√															1	
F. Success factors identified by construction projects	Technical support																							√				√			2	
	Achieve business/organisational goals																										√	√			2	
	Software selection																									√					1	
G. Success factors identified by defence projects	Team contributions																									√					1	
	Consulting capability																									√					1	
	Health and safety	√								√		√																			3	
H. Success factors identified by construction projects	Project manager and project team competence			√										√	√																3	
	Project control	√													√																2	
	Involvement of client	√																													1	
I. Success factors identified by defence projects	Risks management	√																													1	
	Claim management	√																													1	
	Absence of conflicts	√																													1	
J. Success factors identified by construction projects	Standardization of the project delivery				√																										1	
	Project efficiency									√																					1	
	Availability of resources												√																		1	

TABLE 02. Project Success

(Ferratt et al., 2006; Slywotzky and Wise, 2003).

Section F of Table 2 illustrates factors that are only mentioned in construction projects, in particular: health and safety, the involvement of clients, project control, risk management, claim management, the absence of conflict, standardisation of the project delivery, competency, and efficiency. Among these factors, health and safety of personnel was the most frequently mentioned factor. This reflects the importance of health and safety issues in construction projects and the emphasis on enhancing workers’ abilities to anticipate possible hazards in large scale construction projects (Williams, 2016). This also shows that management needs to be more active in the safety program to ensure that accidents are prevented and that personal injury and property damage are avoided, in turn ultimately increasing the chance of project success (Toor and Ogunlana 2010; Zhang and Fan, 2013).

1	Toor and Ogunlana (2009a)	16	Mazur et al. (2014)
2	Zhang and Fan (2013)	17	Lyneis et al. (2001)
3	Ogunlana (2008)	18	Turner and Zolin (2012)
4	Locatelli and Mancini (2012)	19	Dvir et al. (2006)
5	Dimitriou et al. (2013)	20	Kwak and Smith (2009)
6	Tai et al. (2009)	21	Adoko et al. (2015)
7	Alshawi et al. (2012)	22	Rezvani et al. (2016)
8	Liu and Leitner (2012)	23	Art Gowan and Mathieu (2005)
9	Toor and Ogunlana (2010)	24	McGillivray et al. (2009)
10	Hui et al. (2008)	25	Yetton et al. (2000)
11	Williams (2016)	26	Ferratt et al. (2006)
12	Eriksson et al. (2017)	27	Sauer et al. (2007)
13	Nguyen et al. (2004)	28	Chua et al. (2012)
14	Messa et al. (2016)	29	Lech (2013)
15	Chang et al. (2013)	30	Liu and Wang (2016)

TABLE A1. Study sources

5. DISCUSSION

This study was designed to conduct a systematic literature review in order to develop a comprehensive list of project success factors in large scale projects. To achieve this aim, we consolidated the literature on large scale project settings by analysing 30 articles. The analysis of the articles evidenced the PM success criteria or meeting time, cost and quality were mentioned in 20 out of 30 articles when measuring project success across the three types of large scale projects. This shows that large scale project management still relies strongly on PM success criteria. We can assume that focus only on PM success criteria in large scale projects can lead to a very objective measurement of project success which, in our view appears to threaten the desired long-term impacts. This is because project success does not commensurate with the product success and if stakeholders are not satisfied there are no future deals (Xue, 2009; Eweje et al., 2012; Shenhar and Dvir, 2007).

Thirteen out of 30 articles used PM success criteria along with critical success factors as a measure of success across three types of large scale projects. This shows that project success is perceived across three types of large scale projects not just by the traditional view of completing within budget, time and desired quality goals, but also by whether the project delivers the desired outcomes including stakeholder satisfaction, open communication, specific plans and whether it meets user/customer/owner requirements. This evidence reveals a consensus of these four factors along with PM success criteria to achieve success across three types of large scale projects. This evidence also reveals the importance of evaluating project success as separate but interlinked measures to achieve long-term business success.

To answer our second research question, we identified differences between the three types of projects regarding their success factors. Despite the four commonly shared success factors, this review demonstrates that there are also success factors unique to each type of large scale project. In defence projects, problem-solving, defence capabilities, mission clarity, and project member wellbeing were used as a measure of success. It seems to be commonalities between the results of our study with Pinto and Slevin's (1987) success factor list. The critical success factors in Pinto and Slevin's study are: project mission, top management support, schedule and plans, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication and troubleshooting. Comparing the success factor list created by Pinto and Slevin's (1987) and those revealed in our review shows that scholars were building on previous work and there is lack of new factors being created, suggesting a gap to generate additional up to date list of success factors, instead of merely testing current success factors. In large scale IT projects technical support, achieve business/organisational goals, software selection, team contribution, consulting capability were measured as success factors. There is a commonality between our result and the result of the Savolainen and his colleague (2012) on software development project success. They used customer satisfaction, short-term and long-term business success as a measure of success in software development projects. Although the criteria found in these software development projects are similar they are not exactly the same as the ones we identified in this systematic review. Comparing our result and those project success factors identified by Savolainen et al. (2012) in software development projects divulges the significance of defining context and research settings when studying large scale project success due to the differences between success criteria by project type (Müller and Turner, 2007), as is also suggested by various studies such as Pinto and Prescott (1990), Toor and Ogunlana (2009) and Williams, (2015). In large scale construction/ infrastructure projects, health and safety, project manager and project team competence, project control, involvement of client, risk management, claim management, absence of conflicts, standardisation of the project delivery, project efficiency and availability of resources were used as a measure of success.

In addition, comparing critical success factors used in each type of large scale projects in our review suggest that, although some success factors are common in large scale

projects – for example, stakeholder satisfaction, open communication and specific plans, most success factors are varied from projects to projects. This review reveals that the success factors used in IT projects whose main objective is to deliver an information system that will support and strengthen the organization's own business (Taylor, 2007; Rezvani, Dong, and Khosravi 2017) may not valid for construction projects. Therefore, it is important to define and understand the research context to identify valid success criteria and their influences on large scale project success. Although, it is difficult to determine which factors are valid for each organisation type or which factors should be taken into account in, for example IT projects but not in Defence or construction projects. However, it is important to identify and understand project success in each type of large scale projects in order to determine whether various success factors or new factors have an impact on large scale project success.

From the bibliometric analysis point of view, our result reveals that very few studies focus on IT and defence projects compare to construction/infrastructure projects. The lack of such studies is surprising given the importance of Defence and IT projects and their substantial influences on environmental, social, economics, national and even international implications associated with these types of projects (Dvir et al., 2006; Mazur et al., 2014; Rezvani et al., 2016; Rezvani, Khosravi, and Dong, 2017).

In addition, our result shows that most studies on project success in large scale projects are context specific. As reported in Figure 2, most of the research on large scale projects is based on data from developed countries. Consequently, the result and implications of studies on project success in large scale projects are restricted to the specific norms, culture and countries where these studies have been conducted. Therefore, we suggest that more research should be conducted in other national and settings to understand the nature of the various types of large scale projects, nature of organisations, management strategies, norms, socio-economic factors and local cultural values. It may be worthwhile examining large scale projects by specifically focusing on the context of developing countries to account for the nature and structure of the local industry; that is, how they differ from developed countries in terms of challenges, requirements or management styles, or what unique characteristics or specific factors arise due to infrastructure, local cultural values or languages. Specifically, cultural value and socio-economic factors have been growing astonishingly and large scale projects have placed different challenges to all stakeholders involved at various levels. Mostly in the developing world, where activities are heavily interrelated and enforced by the various stakeholders who are dispersed around the world, cross-cultural communications and coordination play a significant role towards problem-solving, management strategies, and decision making. Thus, research identifying and examining the specific CSFs by considering the nature of projects such as socio-economic and cultural factors will not only help to increase the understanding of various types of large scale projects but also help to capture the perception of different stakeholders, project managers, contractors, designer and consultants in large-scale large scale projects.

6. CONCLUSION

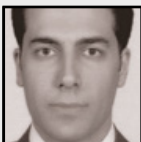
In contrast to previous project success reviews, which classify success factors into decades with a focus on the time frame of the project lifecycle (e.g., Jugdev and Müller, 2005; Davis, 2014), this paper provides a comprehensive assessment of project success in large scale projects and distinguishes these factors based on project types. The categorisation of project types with their success factors helps managers to identify factors which are more pro-

ject-type-specific within large scale projects and to embark on the subsequent steps to manage these projects. By identifying project success factors across different project types in large scale projects, project managers can determine improvement measures to raise the probability of success and reduce the chances of any setbacks in their own projects. There may also be practical benefits to policy development in improving the way project success is assessed in different large scale projects. This review may help organisations to effectively divert their resources to where maximum success lies while helping project leaders to accomplish their objectives. ♦

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