

Critical Factors Influencing Success of Infrastructure Projects

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Abstract

Infrastructure projects that do not meet organisations' goals and objectives can have a negative impact on organisations, stakeholders and end-users. Studies have been conducted by various researchers to identify critical success factors (CSFs) that influence the successful outcomes of infrastructure projects. The main objective of the study discussed in this paper was to identify critical factors influencing project success. Questionnaires were devised from literature review and administered to construction industry professionals which included project team members, line managers and project managers. Based on the findings, political influence, adequate planning, project manager competence and adequate funding were ranked the highest critical success factors. The research findings are focused to assist industry professionals gain better understanding on key areas based on prioritised success factors in order to improve performance in project delivery.

Keywords: construction industry, critical success factors, project success, infrastructure projects

1. INTRODUCTION

Infrastructure projects have an important part to play in the development of countries and most importantly contribute significantly to the economic growth and sustainable development of a country (Nijaki and Worrel, 2012). The construction industry plays a role in the economy of every country (Mashwama, Aigbavboa and Thwala, 2016). As much as the construction industry is improving, the industry still faces challenges like rise in costs (Windapo and Cattell, 2013; Subramanyam and Haridharan, 2017). Project failure can result in, financial loss to the business environment, stakeholders, creditors and investors (Castillo, 2010).

Project success has eluded the construction industry to the point whereby keeping existing clients has become a struggle. Infrastructure projects are becoming more difficult to successfully complete

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(Garbharran, 2012). There is no a single definition of project success mainly because project teams find themselves in different situations, which that the definition will be different from that of a different project team. The topic of project success is frequently discussed; however there is no agreement on a specific meaning (Al-Tmeemy, 2010; Yong and Mustaffa, 2013). Nguyen (2013) believes that once the term of project success has been defined, infrastructure projects will be easier to manage, control and to plan for. The success of organisations is affected by every project and the performance (Zavadskas, 2012, 2014). There have been several interest from researchers to study which factors influence project success and what criteria to use to measure project success. Some of the studies emphasise the important role of the project manager in ensuring project success (Yang, 2011; Nixon, 2012; Hwang, Ng, 2013). It is then very important for the project manager to come up with an effective strategy of increasing the likelihood of achieving project success. Project managers must possess essential managerial and leadership knowledge, competencies, skills and characteristics which ensure successful projects by making the correct decisions at the correct time and involving the correct people in the right places (Ahmed, 2013). According to Ibrahim (2013), successful projects are the results of a well put together team.

The question of how to manage infrastructure projects successfully still needs to be asked and this has attracted a significant amount of research in the past couple of years. Even though much research has been conducted in the field already (Toor and Ogunlana, 2009; Davies, 2014), critical success factors that are most important for effective project management are still uncertain (Ika, 2009). Toor and Ogunlana (2009) investigated other studies of critical success factors in infrastructure projects and state that those studies are context specific. With this discovery the researchers believe that research on critical success factors is only limited to countries, cultures, markets and environments whereby the study is being conducted. The authors believed that more research should be done in other countries so that it accounts for the nature and structure of local infrastructure projects, the level of maturity for organisations being in charge, the procurement strategies put in place by the organisations, the scale of the infrastructure project and the local norms, values and culture. This is because of the ever-changing environment in which constructions companies are operating in and with globalisation of the industry has brought along many other challenges to the relevant stakeholders that are involved in infrastructure projects (Nunnenmacher, 2011).

1.1 Study objective

Given the above introduction, the main aim of this study was to investigate to critical success factors which influence project success in infrastructure projects with the South African construction industry and the Limpopo Province. The objective of the study was therefore to identify critical factors that influence success of infrastructure projects.

2. LITERATURE REVIEW

The first researcher to use the terminology of CSFs was (Rockart, 1982). The terminology “critical success factors” means that certain phases that are important, vital and contribute to the ultimate project success. In this case to be able to achieve success on construction projects, Project managers, along with organisations must determine the critical success factors that influence project success and cause ultimate failure on projects. The research of critical success factors has not only been conducted in the construction industry, but also in other industries including Information technology (IT), production industry and medicine. There has been an increase in studies to investigate critical success factors in the past two decades (Rockart, 1982).

Cooke-Davies (2002) says that project success is a simple concept in the field of project management. They also argue that the traditional definition which investigates the golden triangle is not adequate at all. Using the golden triangle as a method to measure project success cannot be an objective measurement of success on construction project because using the golden triangle is difficult and can be ambiguous.

Project success can mean something different to different parties (Toor and Ogunlana, 2009) and individuals. Achieving the organisations objectives can be considered a success on infrastructure projects and this can be done through project management systems, by allocating the required resources to complete the tasks. Kerzner (2013) says that a project is considered successful when the project is finished according to detailed specifications of the project from the beginning till the end date, within the provided budget and set quality. To accomplish the objectives of a project, it is important that critical success factors are identified, and this process plays an important role during the phases of design and execution during infrastructure projects. Available research that has already been produced shows that existing literature has identified critical success factors ranging from 4-43 CSFs identified by researchers.

Some CSFs are categorised or grouped ranging from Human-related factors, Project-related factors, External environment-related factors, Project Procedure-related factors and Project Management-related factors. Existing literature that is available does show that the study of critical success factors in infrastructure projects has been conducted in other countries as well such as Nigeria, Vietnam, Lithuania, Malaysia, Spain, Hong Kong, Ghana and Tanzania.

From the early 1960s-1980s project success was seen when the initial objectives and aims of the project have been met, and this was from the viewpoint of the golden triangle (Lim and Mohammed, 1999), (Kerzner, 2013) and (Jugdev and Muller, 2005). Much of the focus from the 1960s to 1980s was more on the importance of the end-user satisfaction. However, things have changed currently whereby CSFs are identified but these CSFs are not grouped. Project success took centre stage and frameworks for project success were created and integrated (Jugdev and Muller, 2005). The researchers understood that project success was more from the viewpoint of stakeholders.

Davies (2014) has determined that research on project success has significantly shifted between the 1960s -1980s when the technical aspect on infrastructure project was the main focuses on projects. Nunnemacher (2011) believed that the definition of project success will be based on the type of project that is taking place and the set goals an objective of the project. Ultimately project success is defined as when the project meets the budget, timorously completion, specific quality standards and inherently functionality.

However, the 21st century researchers understand that defining the concept of project success is difficult, complex and ambiguous because many researchers understand and define project success in their own ways. Ensuring project success on infrastructure projects some researchers state that key stakeholders must be involved on the project throughout the project to ensure the project is delivered successfully. Successful project management requires commitment and planning so that the project can be completed successfully.

2.1 Project success

Project success is an abstract concept and determining whether a project is successful is subjective and extremely complex (Sanvido, Grobler, Parfitt, Guvens, and Coyle, 1992; Chan, Scott, and Chan, 2004). Project success can be categorised into groups one being hard and objective; measureable and tangible while on the other hand subjective, soft, and less measurable and intangible (Chan, Scott, and Chan, 2004). However, the criteria of measuring success, the golden triangle, is not enough to measure project success.

There has not been a distinct answer as to how to take control of construction projects which are unique and dynamic by their nature (Nguyen, Ogunlana, and Lan, 2004). This is an environment that constantly changes and brings challenges with lots of activity, unplanned and those that are planned during the project life-cycle (Sanvido, Grobler, Parfitt, Guvens, and Coyle, 1992). The parties that are involved on the project strive to try and minimize the unknowns and uncertainties for the sake of attaining project success (Josephson, and Bjorkman, 2011; De Wit, 1988).

Studies have been conducted to define what project success is and researchers such as (Sanvido, Grobler, Parfitt, Guvens, and Coyle, 1992; Nguyen, Ogunlana, and Lan, 2004) state a project is a success when the main goals and objectives of the project have been achieved; only then a project is considered successful. Sanvido, Grobler, Parfitt, Guvens, and Coyle (1992) argues that several Project Managers often agree to that; however, they also acknowledge that this definition is by far the only definition for project success. The definition of project success differs because of the view that success will depend on which criteria are chosen to evaluate project success (Sanvido, Grobler, Parfitt, Guvens, and Coyle, 1992).

2.2 Critical success factors

The term CSFs comes from the field of management information systems. The first researcher to use the term in his study was (Rockart, 1982). Rockart (1982) defines CSFs as those few areas that

the organisations top management and the Project Manager should focus their attention to these areas are very important for the goals and objectives to be ultimately achieved. Rockart (1982) emphasises that the key to obtaining success is by the Project Manager focusing the resources on the issues that are important between obtaining ultimate success or project failure. Cooke-Davies (2002), and Sanvido, Grobler, Parfitt, Guvens, and Coyle (1992) also define critical success factors as factors that are important for the project team participant to ultimately achieving their objectives.

Rockart (1982) takes it a step further and states that critical success factors relate to the certain factors and conditions of a sector. Identified critical success factors on projects often will change because the industry changing, the organisation repositioning within the industry or because of arising business opportunities for the industry. It is therefore important that the organisation and Project Manager understand what critical success factors are.

3. RESEARCH METHODOLOGY

A questionnaire was designed based upon literature and current construction practice to obtain information on the critical success factors perceived by participants on the projects. The questionnaires dealt with critical success factors for infrastructure projects. The targeted respondents were project manager, line manager and project team members who were directly involved in the projects. The project managers comprised of managers of the organisation and line managers reporting to the Project Manager and finally the project team members who were also available and working on site during the construction phase. The questionnaires were distributed to conveniently selected construction sites. However, only 10 questionnaires were returned and therefore used for the analysis. The respondents included one project manager, two-line managers and seven project team members.

4. RESULTS AND DISCUSSION

In the structured part of the questionnaire, the respondents were asked to rank the degree of significance of 16 critical success factors drawn from literature. Furthermore, the respondents were asked to add other success factors that they perceive as being necessary. However, they did not make significant additions. Table 2 shows the ranking of 16 critical success factors by project members involved in the projects. Four critical success factors namely, political influence, adequate planning, project manager competence and adequate funding were ranked highest by the respondents. Therefore, the four critical success factors are considered as been critical.

Table 2: Ranking of critical success factors

S/No.	Critical Success Factors	Number of respondents	Rank
1	Political influence	10	1
2	Adequate planning	10	1
3	Project manager competence	10	1
4	Adequate funding	9	4
5	Owners involvement	8	5
6	Relationship between project team and contractor	8	5
7	Realistic goals and objectives	8	5
8	Labour unrest	7	8
9	Project team competence	6	9
10	Interpretation of specification	4	10
11	Ability to carry out meetings	4	10
12	Roster strategy	3	12
13	Adequate plans and Specification	3	12
14	Community Involvement	3	12
15	Availability of Stakeholders	3	12
16	Buy in of Local Chieftaincies	2	16

4.1 Political influence

Political influence was the highest ranked critical success factor. This finding was consistent with other studies (Hwang and Lim, 2012; McCabe, 2003). Political influence can have a negative and a positive impact on the project. When political power is in support of an infrastructure project, the Project Manager can ensure that all goes according to plan and all is effective when it comes to planning, the execution of goals and motivating the project team to deliver the project in the required time. The negative impact on the other hand is that people get appointed in positions that they are not qualified for and have no experience. This can lead to projects to have delays because of the Project Manager not knowing how to manage infrastructure projects. People within projects are often unwilling to conform to an imposed standard (Clarke, 1999). Thus, very clear project objectives and scope will eliminate this symptom. People should be informed to know the project direction, expected project outcome, and especially their roles. Clear responsibility and accountability are necessary to sweep away what Clarke (1999) called the “counter-productive effects of individualism”. It has been recognised as one of the most critical factors for the successful completion of projects in numerous studies (White and Fortune, 2002; Sanchez and Perez, 2002).

4.2 Adequate planning

The primary aim of the organisations and project managers is to make sure that they execute the goals and objectives of the project. The Project Manager on the project must make sure that all the required resources and information are available on site always to be able to execute the scope. Adequate planning was ranked third most important critical success factor. This was consistent

with other studies (Garbharram, Govender and Msani, 2012). Proper project planning and control require project teams to utilize appropriate project management techniques and tools. The involvement of many parties is a dominant characteristic of construction projects. If one of the parties is not capable to act within his/her role, the project is likely to fail. It is, therefore, essential to ensure that the bidding process can help single out the right designers, contractors and other parties to effectively transform project ideas into reality. A recent study (Long, 2003) conducted in Vietnam found that problems responsible by designers/consultants and contractors had very high frequency and influence on large construction projects

4.3 Project manager competence

The second highest ranked critical success factor was Project Manager competence. This finding is consistent with other studies (Garbharram, 2012; Baker, 1983). The role of the Project Manager is considered as one of the most important critical success factors on infrastructure projects. Single headedly the incompetence of the Project Manager can terminate the project prematurely when they do not have the necessary skills and knowledge that are required. When the Project Manager has strong skills this eventually rubs of the project team in a good way. Leadership is also a crucial aspect in project management. Caudron (1999) noted three different kinds of competencies required in leadership: leadership competencies such as the ability to lead change, functional competencies such as technical and human resource management skills, and personal skills such as high achievement motivation and persistence. Large construction projects need certain kinds of technology, but selecting the right technology may be problematic, especially when the project team is incompetent. Technology transfer has often been the focus of discussions, yet developing countries still use obsolete technology. Possession of modern technology is a critical factor for success and sustenance in today's business environment. A serious challenge to construction industries in developing countries is their inability to adopt or adapt established best practices already working in other countries (Ngowi, 2002).

4.4 Adequate funding

The Owners of the project, before taking on a project, must have the required funds available and funds aside for rising cost in materials. The Project Manager and the organisation will conduct a forecast to see where they will be required to spend money on up-to-date technology. Adequate funding was the fourth most important critical success factor. This was consistent with other studies (Ram and Corkindale, 2014). This component emphasizes that successful projects are implemented in comfort. That is, money, resources, efforts and leadership should always be available throughout the project's life. They ensure that construction projects run smoothly. Money and other resources in terms of adequate funding until project completion and availability of resources are obvious imperatives to carry out projects. Availability of funds/resources has also been ranked highest in recent researches (Belassi and Tukel, 1996; White and Fortune, 2002).

Clearly, most of the CSFs are human-related factors. This implies that people play a decisive role regarding the success or failure of a project. It is not surprising since they are responsible for creating, managing, operating and utilising the project and are invariably affected by it. Depending on their needs, different participants in construction may have divergent interests in the project but they must have an agreement, in principle, about project objectives and critical success factors that can help to achieve those objectives. It is argued that each of these plays an important role in project success or failure.

5. CONCLUSION

The success of large construction projects, especially infrastructure projects, is very important for all project participants as well as the community and the nation to sustain national development. However, various factors affect whether a project is completed successfully or not. The primary objective of the paper was to identify critical success factors for infrastructure projects. Four CSFs were identified as being important. These included political influence, project manager competence, adequate planning and funding.

The study has a major limitation, which is the number of responses received. The researcher faced difficulties about non-responsiveness of potential participants. The findings may be different if a larger sample was used.

Nevertheless, the findings are focused to assist construction industry stakeholders and professionals in delivering infrastructure, with an understanding of fundamental areas which contribute to the success/performance of a subject venture.

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