



**Determinants of Success/Failure of Engineering Projects in eThekweni Municipality,  
KZN**

**By**

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## **ABSTRACT**

The increasing numbers of project failures have become a cause for concern as it indicates some underlying critical factors determining project failure. In view of this, this study was an endeavour to establish the determinants of project success and or failure, using the case of the eThekweni Municipality engineering department. The main objective of the study was to establish the critical factors affecting the success or failure of engineering projects within the eThekweni Municipality. The mixed method approach was adopted to gather data from the employees attached to the engineering department. For the quantitative phase, sixty (60) randomly selected contractors and their respective counterparts from the department were recruited to participate in the study. For the qualitative data, the researcher purposively selected 5 officials from the managers, for semi-structured, in-depth individual interviews. The findings of the study revealed the need to recognise the critical success/failure factors for projects. The participants of the study were able to identify some of the critical factors for project success and these include the time schedule for the completion of the project, the need to deliver projects within the allocated budget, the essence of delivering the project quality requirements, achieving stakeholders' satisfaction and essentially, the importance of achieving the project purpose. The participants indicated that their unit managers decided on the projects that have to be developed, they actively defined the project's success criteria and they were frequently informed about the progress of the projects. They also revealed that the project management processes within their organisation were well documented and controlled, they were standardised and subject to improvement, as well as being continuously updated. The participants also pointed to the causes of project success or failure, which included lack of support from top management, project managers' leadership, competence, authority, experience, as well as their qualifications. Poor planning was also highlighted to be a cause for project failure. In that view, it was recommended that project managers' abilities and characteristics are developed through continuous workshops and training programs to enhance their skills and knowledge in the field of project management. Project managers should also be encouraged to enrol in courses on leadership and project management, for them to enhance their effectiveness in project management. It was also recommended that the critical success/failure factors described in the preceding chapters be reviewed at each and every phase of the project life cycle.

**Key words:** project management; critical success/failure factors; eThekweni Municipality; engineering

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# CHAPTER 1

## INTRODUCTION TO THE STUDY

### 1.1. Introduction

The essence of project management in all aspects of our lives cannot be over-emphasised. Project management entails the planning, organising and management of resources to ensure the successful completion of certain project goals. It is also important to note that projects have defined or specific scopes, time frame and budget. The Project Management Institute's (PMI, 2008) highlights that projects have life cycles which include the initiation stage, planning, execution, monitoring and evaluation or controlling, as well as the closure stage. In this view, the success of projects relies on several issues which include paying attention to detail, engaging the relevant stakeholders, as well as proper documentation at each and every stage. This means that the project management team, from the beginning of the project, ought to clearly state the purpose of the project, the anticipated outcomes, the budget, timeframe and deliverables. Thus, the responsibility of the project manager entails ensuring that the project is up to the required specifications, is within the timeframe, budget and scope. It is important to note that the success of a project is not only judged by achieving the project specifications, but it also has to meet the expectations of the key stakeholders. In this view, this chapter provides an overview of the study by highlighting the background of the study, the focus of the study, the problem statement, the purpose of the study, the objectives of the study, research questions, assumptions to the study, scope of the study, significance of the study, as well as the structure of dissertation.

### 1.2. Background to the study

Engineering projects play a vital role in the achievement of infrastructure development and maintenance in the economic sector across the globe, through their technical components of architectural, civil, structural, electrical and mechanical engineering (Matar, Maged, Abou-Zeid & El-Said, 2015). The infrastructure sector projects cost multi-billions of money in general and particularly in South Africa, and this grows every year in size and scope of challenges (IDC, 2016). The sector significantly contributes to the growth of the local economy by providing employment and direct positive impact to the Growth Domestic Product (GDP). Infrastructure projects includes roads, parks, buildings, road lighting, road slope protection,

bridges and storm water drainages. The South African government supports infrastructure projects by investing large parts of revenue in the sector. Municipalities, as the local sphere of the government, are tasked with the responsibility to implement, manage and monitor these projects (National Treasury, 2012).

Many scholars hold the view that major weaknesses have been identified within the infrastructure projects, such as the lack of project management practices, unskilled staff, poor execution processes, poor monitoring and control, as well as performance measurement. In recent years, studies have been conducted around the issues of projects failures in the private sector (Dubem, 2014) and success factors in engineering projects, but fewer studies have been done in the public sector ( Gepp, Hellmuth, Schäffler & Vollmar, 2014).

However, the research into the municipal projects (public sector) remains with gaps for further studies. The lack of municipal specialists may be one of the reasons for lack of studies in this area. Hence, this study will look at the success and failure factors in the infrastructure projects of the municipality as a public- private partnership with lot of risks (Maseko, 2014). The infrastructure projects can be divided into “construction and maintenance” activities in the context of Municipalities (Di Sivo, 2011).

It has been reported that, construction includes new and addition buildings, roads, bridges etc., whereas maintenance refers to repairs of air cons, electrical services, painting, and revamps of existing assets (Liyin, 2011). The construction activities involve wide range of professionals such as architects, engineers, quantity surveyors, contractors and project managers (Ramanathan, 2012). Also involve limited skilled workers such as carpenters, electricians and plumbers.

According to many in the field, infrastructure projects are more labour intensive, large, complex, volatile, and risky and demands huge capital budgets. This increase the need for tight project planning, it is very common to measure the success and failure of the project looking at the set of parameters such as time, budgetary cost, and appropriate quality. In isolation time, costs and quality may not mean much if the desired benefits were never realised by the local communities and businesses as they are the beneficiaries.

It has been reported that, the conflict with determining the success and failure of a highly complex project is when the project is completed months or years later than it was originally intended, and costs more than the original budget, but upon completion the quality and benefits outweigh the costs overruns and late completion (Ahmed, 2016). This give a challenge to the measure of whether the project was successful or failed.

Recent studies have suggested that, project participants play a vital role in the determination of successful project. Participants includes stakeholders, people working on the project, contractors, managers and the intended customers for the project deliverables (Neringa, 2013). This research intends to reveal the views of the participants about the project success and failure in the eThekwini municipality engineering unit, KZN.

### **1.3. Problem statement and rationale**

Like many developing countries, South Africa is also plagued by a myriad of challenges, with regards to project management. The problems are both technical and non-technical and they all affect the general quality and success of projects, specifically, engineering projects, in the country. Given this dilemma, this study aimed at identifying the determinants of success/failure in engineering projects by eThekwini Municipality, in KwaZulu-Natal.

The development and maintenance of municipal infrastructure is achieved by coordinating a set of engineering technical skills, financial resources, material resources and strict timeframes planning. We can refer to this as the engineering and infrastructure project. Success of these projects results in a satisfied municipal community and other stakeholders when it comes to infrastructure service delivery. Success gives positive remarks to the municipal management performance at the national and provincial government level. Furthermore, this also adds to the growth in the economy of the country (DPLG, 2006).

Unfortunately, these infrastructure project are not always achieved according to the plan. They end up with financial and material resources overly used. The timeframes end up way over the initial plan (Ahmed , 2016). The service delivery to the community and stakeholders get less satisfactory and results in the municipality management being judged as inefficient. The impact of late completion is the delay of business activities intended by beneficiaries and loss of millions of monies due to costs overruns.

Factors contributing to this problem must be determined. The costs overrun factor, the late completion factor, stakeholders and project participants' satisfaction factor are to be investigated. The lack of project management skills practices is the other contributing factor that require more investigation. The political influences in government sector. The service delivery of municipal infrastructure can be improved if these factors are well understood and the views of project participants are well considered.

The overall benefit from the study could be the knowledge about the factors that give possible project costs savings and on time completion. The other benefit could be positive image of the municipal management through improved infrastructure service delivery and beneficiary's satisfaction.

#### **1.4. Purpose of the study**

The main aim of this study is to determine the contributing factors to the success and failure of the engineering project. The factors will be categorized according to their level of significance for the impact measurement purpose. The project participants such as project managers, staff working in the project and contractors are going to be interviewed for their perspective on the identified factors.

#### **1.5. Aim and objectives of the study**

The main aim of this study is to assess the perceptions of project role players such as contractors and project managers regarding the critical success and failure factors which lead to project success or failure in the engineering projects in eThekweni Municipal area. The study has the following objectives.

##### **1.5.1 Objectives of the study**

- To identify the critical success and failure factors of engineering projects.
- To establish and evaluate the management, management processes and the meaning of project success by eThekweni Municipality employees
- To assess the perceptions of project contractors and project managers relating to critical success and failure factors.

### **1.5.2 Research Questions**

- What are the critical success and failure factors of engineering projects in eThekweni municipality?
- What is the role player's perspective about the identified factors of the project?
- How effective is the project management process?

### **1.6. Significance of the study**

This study is crucial in ensuring that municipal management, contractors and consultant's/project managers are able to achieve project success consistently in their future projects. Similar players (that is, the developers/architect) in the engineering and construction sector would also benefit from this study. Project success has continued to elude many players in the sector and this has made it difficult to attract investors. Residents and businesses as beneficiaries are becoming more knowledgeable which leads to more complaining. Complaining should be viewed as a channel for clients to highlight existing problems. Identifying critical success factors which influence project success within under municipal management and as the client for construction industry in Durban would lead towards establishing a competitive advantage. Essentially, a new approach is needed by the project role players in the eThekweni municipality engineering unit to ensure project success. It is envisaged that knowing the best practices would be a step ahead in improving the quality of engineering project management and hence, project success. The study therefore contributes a significant body of knowledge to the field of project management, within a developing country like South Africa.

### **1.7 Overview of the methodology**

The methodology employed in this study is the mixed methods approach. In this view, data were collected through both quantitative and qualitative means. A questionnaire and an interview guide were constructed for the purpose of data collection. For the quantitative element, the questionnaire was randomly distributed to participants from the engineering department of eThekweni Municipality, while for the qualitative aspect, participants were purposively chosen to answer the research questions.

## **1.8 Assumptions**

*Theoretical assumptions:* The assumption will be made that when the term engineering project will be used it implies both economic and social infrastructure development and infrastructure maintenance projects.

*Methodological assumptions:* The mixed method of collecting data for both quantitative and qualitative data will be utilised and every attempt such as email follow-up, telephone calls, and personal reminders at meetings will be done and participants will respond at a high rate.

*Assumptions about measures:* The study assumes that all participants are active officials, project managers who are employed by the eThekweni Municipality and contractors who are contracted with the municipality.

## **1.9 Limitations of the study**

The scope of the study was KwaZulu-Natal's eThekweni Municipality Engineering Department. This study covers the greater Durban area. Therefore, the findings of the study cannot be generalised to other cities.

## **1.10 Structure of dissertation**

Chapter 1 provide the introduction to the study, background of the study, focus of the study, problem statement of the study, purpose of the study, research objectives, research questions, theoretical base, operational definition, assumptions, scope of the study, significance of the study. Chapter 2 provide literature review on the relevant research on project success factors, with emphasize on engineering and infrastructure assets development and maintenance projects. Chapter 3 describes research methodology used in this study, including design, population/sample, survey methods, data collection and analysis. Chapter 4 is the presentation and analysis of results that was gathered from questionnaires that were answered by participants and from interviews. Chapter 5 is a discussion of the major findings, based on the objectives. Chapter 6 provides the conclusions and recommendations of the study.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1. Introduction

The previous chapter described the research process, beginning with the background information to the study, the rationale, as well as the aims and objectives of the study. The purpose of this chapter is to discuss the literature relevant to the subject matter of this study. The focus of the chapter is the critical factors which determine the success or failure of engineering projects, with the case of the eThekweni Municipality. Among other things, the following issues are discussed: an overview of the construction industry, as well as that of South Africa, the conceptual framework informing the study, the critical project success factors, the causes and effects of project delays, as well as measures to increase project success.

#### 2.2. Understanding the construction industry

The construction industry is a dynamic and multifaceted one which comprises the successful coordination of various entities which include specialists, professionals, contractors, tradesmen, investors, manufacturers and trade unions, to mention a few (Keane & Caletka, 2008). It is also important to note that construction projects have a great effect on the economy of any country, as the successful completion of projects often result in the socio-economic growth, the creation of wealth and the improvement in the quality of life of those who benefit from the projects (Memon, Rahman, Abdullah & Azis, 2011; Sweis, Sweis, Hammad & Shboul, A, 2008). Traditionally, countries are rated as developed, underdeveloped or developing, based on the number and quality of construction projects that they have (Abdullah, Mukmin & Samad, 2011; Kaliba, Muya & Mumba, 2009). This means that delaying the completion of projects might negatively affect countries' economic projections. The element of delays in the projects is one of the greatest challenges faced by the construction industry and it is the most common problem globally (Farid & El-sayegh, 2006; Enshassi, Al-Najjar & Kumaraswamy, 2009; Majid, 2006). The consequences of delays in completing projects are undesirable, in terms of cost, time, safety and quality (Pourrostan, Ismail & Mansounejad, 2011; Carnell, 2008; Okumbe & Vester, 2008).

The common terms in the context of construction include project, project management and quality. These terms need some unpacking. Wysocki, Beck and Crane (2000) define a project as the sequence of complex, connected and unique activities with one purpose which must be completed within a specific timeframe, budget and according to the intended specifications. This is different from daily routine operations which are continuous and have no specific end. The main characteristics of projects entail the goal or purpose, the uniqueness, life cycle, interdependence, as well as conflict (Meredith & Mantel Jr., 2000). In other words, a project is a unique kind of investment of resources aimed at achieving certain objectives, for the benefit of profit or for the provision of community services. The main role player in this process is the project manager, who is supposed to possess the necessary knowledge and skills to facilitate the project.

Project management, on the other hand, entails the planning, organising, monitoring and evaluation of all of the project's elements. The Project Management Body of Knowledge (PMBOK, 2013) defines it as “the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder's needs and expectations from a project”, while Kerzner (2006) points that:

*Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy assigned to a specific project (The horizontal hierarchy).*

It also includes the motivation of all the parties involved, in order to achieve the objectives of the project within the specified time, budget and performance. Quality is the main factor in evaluating project success and project management activities. Quality is an important output of projects because project performance is measured on the basis of cost, time and quality, what Orwig and Brennan (2000) referred to as the “iron triangle”.

However, the attributes of quality can be objective or subjective, as some attributes are not quantifiable. In this view, a comprehensive approach to assessing project quality is recommended and this involves the traditional project success factors like cost, customer satisfaction, schedule, leadership, safety, training, teamwork and responsiveness, to mention a few. An essential element of quality involves the stage at which the project is assessed in its life cycle. The quality of a project is normally assessed when the project is completed, even

though assessment can be done at any point during construction (Toakley & Marosszeky, 2003). However, the important quality decisions are made at the planning and design phases, while most of the quality control is done during the project implementation. Thus, the project manager and the whole team ought to ensure the best practices for a successful project management.

### **2.2.1. Overview of the South African construction industry**

The construction industry of South Africa greatly contributes to the country's economy (Dlungwana, Nxumalo, Van Huysteen, Rwelamila & Noyana, 2002). The most important aspect of the industry is its capacity to employ thousands of people, thereby reducing unemployment levels and positively contributing to the country's Gross Domestic Product (GDP). Unfortunately, the industry experiences its own challenges which include poor service delivery, especially by the public sector, probably due to the poor capacity of the public sector institutions. The poor capacity of the public sector in this regard results in poor quality in terms of the workmanship, which also affects the productivity and eventually leading to low profit margins.

Ofori (1996) pointed that some of the problems affecting the South African construction industry includes the unacceptable industry practices like underbidding, failure of the industry to attract the most talented people to do the job, the exodus of the expert people in this field, to greener pastures, which results in skills shortage in the area of construction. In view of this, it is indicated that the industry attracts the best people to do project management by advertising in the media, which unfortunately brings in the wrong people who do not possess the required qualifications, skills and technical expertise (Thwala & Mvubu, 2008). Thwala and Mvubu further noted that the reason why contractors do not employ the most qualified personnel is that they are expensive.

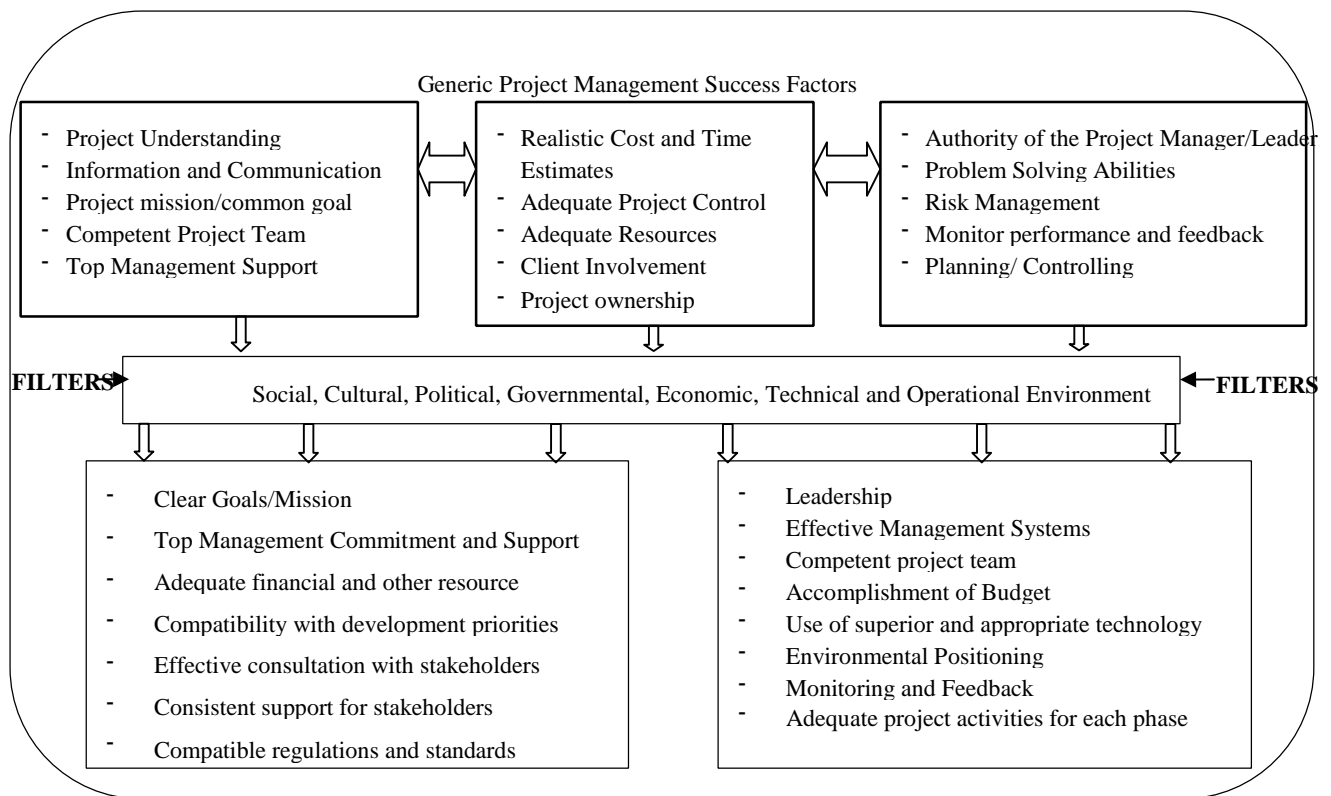
However, the repercussions of employing cheap labour are far more damaging than hiring the qualified people. Cheap labour implies that the people lack the skills and technical expertise to tackle the job hence, they are incompetent in most of the areas like the proper programming of the project's resources, preparing documents for early payments, as well as their failure to understand the contract's terms and conditions (Thwala & Mvubu, 2008). The incompetence of the contractors thus risks their relationship with the client. Despite the issues mentioned above, a study by the Construction Industry Development Board (CIDB, 2014) indicated that

an improvement in the business confidence amongst small and medium building contractors. This has been attributed to improved building activity, business conditions, better employment opportunities, as well as improved profitability, which was also linked to contractors' little competition in tendering.

Thwala and Phaladi's (2009) study of the problems being encountered by emerging contractors in the country include poor capacity to manage the risks and complexities of contracting. Poor management in the early stages of projects, poor business management skills like record keeping, financial, managerial and technical skills. Essentially, inadequate financing has been pointed as the most element affecting the success of construction projects. It is difficult for contractors to access credit from suppliers. Other challenges, as highlighted earlier, include incompetent workers, poor tendering, poor entrepreneurial skills, poor training, poor mentoring, as well as delays in payment for the completed work (Thwala & Phaladi, 2009).

### **2.3. Conceptual Framework**

The conceptual framework underpinning this study is one suggested by Ofori (2013). Giving reference to critical success factors for Ghanaian construction organisations, Ofori identified the following as critical to project management: cost, time, communication, scope competency, leadership, stakeholder involvement, cultural, social, economic and political factors. Figure 2.1 illustrates the critical factors that determine the success or failure of projects, particularly in the construction industry.



**Figure 2. 1: Factors affecting project management**

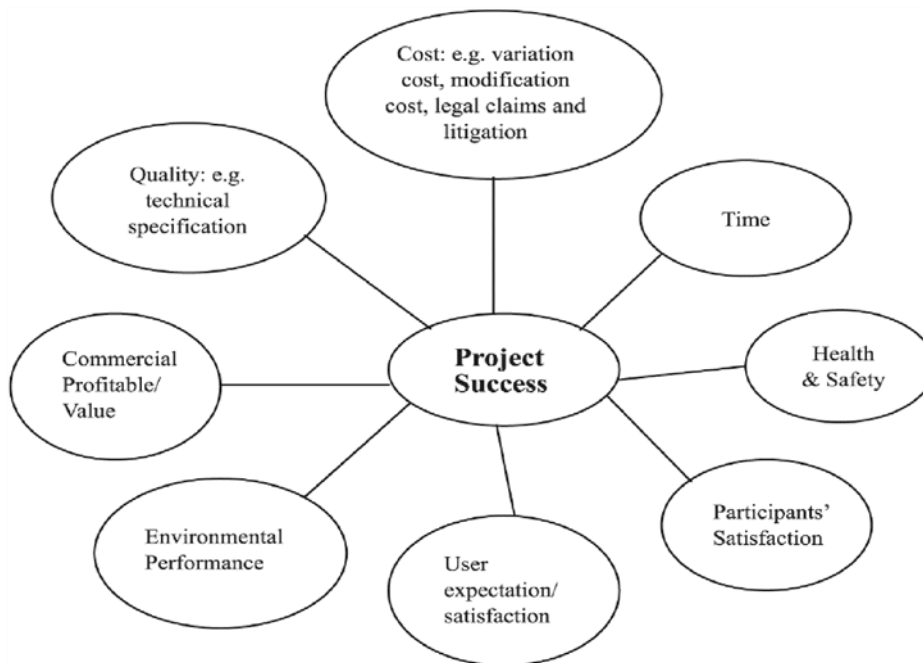
*Source: Adapted from: Ofori, 2013.*

The framework above indicates some internal and external factors which might influence project management. The factors might be social, political, cultural and economic, and these often influence the design and implementation of the project. For instance, issues like the change in leadership might affect project funding, which might then result in project delays and thus, also affecting the success of the project. Therefore, the factors illustrated in Figure 2.1 can become filters and their pervasiveness influences their impact on the outcomes of any project. The project management success factors represented in Figure 2.1 are discussed in detail in the following section.

#### **2.4. Critical success factors for project management**

It is difficult to define what project success entails. The challenge is in understanding the process of project management, as well as its performance. In simple terms, project success involves completing a project within the given time period, cost and the anticipated quality, while at the same time meeting the client’s expectation. Overall, project success has been

defined as being a result of a combination of how the process is able to achieve its technical goals, but not excluding the main constraints which include time, scope and cost, how the project performs, as well as the purpose of the project (Kerzner, 2003). The explanation given above indicates that the success or failure of a project can therefore only be effectively determined when the project is completed. Figure 2.2 is an illustration of the factors affecting project success.



**Figure 2.2: Factors affecting project success**

**Source: Adopted from Ofori, 2013**

The main reasons behind project failure include poor planning, changing the scope, budget and deadline and, poor monitoring and evaluation or control. For Boyd (2001) there are some ways of measuring project success, besides the size, scope or time taken and these include providing quality which commensurate with the price, giving the customers the product that they need or desire, completing the project within the stipulated timeframe, providing the feedback anticipated by the customer, as well as the presence of a conflict management that fairly considers both the development team and the customer. In the same manner, DeWit (1988) provides the difference between project success and project management, arguing that the former refers to the measurement against the general objectives of project, while the latter refers to the measurement against the traditional and common performance measures against

time, cost and quality. In view of the above, a set of best practices with regards to project management were suggested by Pinto and Slevin (1988) and these are thought to positively affect the success of a project. These are:

- *Project Mission:* the general direction and the clarification of project goals
- *Top Management Support:* the extent to which top management is willing to provide the relevant authority and resources necessary for the success of the project
- *Project Schedule/ Plans:* a clear explanation of the necessary steps or actions required for the execution of the project
- *Client Consultation:* consulting, communicating and actively listening to all the relevant stakeholders
- *Personnel:* the process of recruiting, selecting, training and development of the personnel needed for the project
- *Technical Tasks:* the provision of the necessary expertise and technology for the achievement of specific activities
- *Client Acceptance:* entails the “selling” of the final product to the intended consumers or users
- *Monitoring and Feedback:* providing detailed information at the different stages during project implementation. The information should be provided on time and whenever needed
- *Communication:* providing the appropriate network and relevant information to all interested parties in the implementation of the project
- *Trouble Shooting:* managing to handle unanticipated crises that might arise and the ability to deviate from the initial plan

The practices highlighted above can effectively ensure the success of project management (Cleland & Gareis, 2006). It therefore shows that project management is a complex process, especially on the element of monitoring and evaluation or control. The complexity of the process saw the development of some computer-based tools or techniques used to measure if the project is in the right track and these include the Gantt chart and critical path methodologies. However, the successful use of these techniques also depends on whether the project management team can identify, from the beginning and at each phase of the project life cycle, the critical success factors. It is easy to identify the essential variables for project success

or failure if the team constantly checks if the project is meeting the client’s needs, whether the management is supporting the project and if the appropriate skills and knowledge are invested in the project.

Project success factors entail those variables that strongly correlate to the success of the project and their favourability maximise or minimise the success of the project. In that view, Frese and Sauter (2003) pointed to some critical factors in the success of a project and these include effective planning, accountability and clear responsibility, schedule control, project leadership, as well as communication. Similarly, Khang and Moe (2008) recommended several critical success factors at the different phases of the project life cycle. These are summarised in Table 2.1.

**Table 2. 1. Project critical success factors**

<b>Phase</b>	<b>Success factors</b>
Conceptualisation	Understanding the environment in which the project would be implemented Effective stakeholder consultation Project team competency
Planning	Aligning project with development priorities Resources availability Effective stakeholder consultation Team competency
Implementation	Project management to be compatible with regulations Effective stakeholder consultation Supporting stakeholders Team competency
Closing	Project closure activities should be adequate Effective stakeholder consultation Team competency

*Source: Khang & Moe (2008)*

Despite the many definitions of what project success or failure entails, making conclusions on such a matter is as intricate as the project management process itself. However, the most agreed upon factors influencing project success or failure include having realistic and clear objectives, effective planning and support from top management (Bakar, Razak, Abdullah & Awang, 2009). In this view, this section continues to identify and discuss project success measures, conceptualising the variables into a framework, for the practical analysis of this study. Two elements of project success have been identified: project success criteria, which refers to “the measures used to judge the success or failure of a project”, as well as project success factors, which refers to “the elements of a project which, when influenced, increase the likelihood of success” (Aibinu & Odeyinka, 2006).

While discussing the critical success factors for projects, it is essential to understand what it means when a project is said to be successful. There are three main dimensional goals of projects that is according to Steyn et al. (2013). These are time, cost and quality. The dimensions can however be traded off against each other at the planning stages. After approval for implementation, the project manager has the important role of ensuring that the project is completed within these dimensions, to ensure project success. The success of projects is often rated based on achieving certain levels of the dimensional goals identified above. However, as pointed earlier in this chapter, the success of a project can be subjective. Cooke-Davies (2002) pointed out the difference between project success and project management success, highlighting the former as achieving the general objectives of the project, while the latter refers to the historical measure as stipulated by Steyn et al. (2013), this implies that the two are not closely related. It also implies that top management does not necessarily focus on project management success, unless maybe when a project is not on time or has exceeded budget (Young & Jordan, 2008). For Young and Jordan, management is concerned with project success, as well as the fact that the project produces the intended benefits. In this view, project success or failure is measure from different perspectives which include:

- Meeting the specifications, both technical and functional (customer’ perspective)
- Meeting the schedule and the budget (operational perspective)
- Extent of business success from the project
- Extent of health and safety on the project

(Tishler, Dvir, Shenhar & Lipovetsky, 1996; Ahadzie, Proverbs & Olomolaiye, 2008)

However, the critical success factors for projects cannot be the same, because the projects also vary, therefore, there is need to exercise caution when considering the critical success factors (Pinto & Covin, 1989). This means that projects can be similar in type and class, but there exist characteristic variations between the factors that are critical for their successes. Pinto and Covin argue that project success factors differ and change, depending on the various stages through which the projects go, that is, the conceptualisation, planning, implementation and termination. In the same way, the success factors for one project company cannot be the same or applicable to other companies. This assertion concurs with Belassi and Tukel (1996) who noted that it is difficult to pinpoint the potential factors influencing certain projects due to the diversity of projects. The fact is that projects tend to differ and so are the management practices. Nonetheless, project success factors are grouped in terms of those that relate to the project itself, those that relate to the project manager and their team members, those related to the organisation and, others relating to the external environment. It is thus clear from the above description that the project manager plays a central role in project management. In that view, the project manager should be someone who has the necessary skills which include being a good communicator, being adaptable and one who is willing to continuously learn. The project manager should possess the project management skills and knowledge, while he or she should be able to master the project (PMBOK, 2008). Overall, the project manager should also possess the required competencies which include time, scope and cost management, human resources management, quality and contract management, as well as risk management. This means that the project manager should possess extensive cross-functional experience, together with having a basic understanding of the competencies described earlier. El-Sabaa (2001) found that the human resources management competency is more important than the others. This highlights Belassi and Tukel's (1996) findings that there are links between project success and the project manager's job performance, technical background and commitment to the project. They also found that environmental factors also play a role in influencing project success. For instance, bad weather can adversely affect project success and in this case, might delay the completion of the project because people cannot work in bad weather. At this point, it is thus essential to describe in detail, the element of project delays, as it is a very crucial aspect in the construction industry.

## 2.5. Project delays

When projects are delayed, it means the project has not been able to be completed within the stipulated timeframe. In developing countries, project delays are a common and most challenging scenario in the construction fraternity (Pourrostan, et al, 2011). There are different categories of delays: excusable non-compensable, non-excusable, excusable compensable and concurrent delays (Ahmed et al, 2002).

- *Excusable non-compensable delays*: they are beyond the control of anyone, be it the owner or the contractor.
- *Non-excusable delays*: the contractor is held responsible for these delays.
- *Excusable compensable delays*: the project owner (client) causes these delays.
- *Concurrent delays*: are caused by both the owner and the contractor.

For a delay to be regarded as excusable and compensable, certain tests have to be done and should be satisfying to conclude that. This means that a basis for assessing delay must be established, then the events that led to the delays must be identified. The consequences or effects of delays are overwhelming. On that note, it is essential to highlight the causes of project delays. Tables 2.2 and 2.3 highlight the causes and effects of project delays, respectively.

**Table 2.2: Causes of project delays**

Client-related issues	Description
Inadequate funding	<p>Insufficient funds are released at the different stages of project implementation.</p> <p>Limited cashflow results in delays in materials and equipment delivery to the construction site</p> <p>Milestone payments are often delayed</p> <p>Delays in payment of workers' salaries</p>
Interfering with project performance	Top management from the client often interfere with project implementation, due to vested interest.

Non-payment or delays in payment for completed tasks	Poor cashflow projection often results in milestone payments being delayed.  The public sector often delays paying consultants and contractors
Unrealistic resource allocation	Caused by project owners or clients' failure to clearly assess the availability of adequate resources (financial, materials, manpower, equipment) for the completion of the project.
Unrealistic duration of contract	Could result from political interference, wrong packaging of the contract document, inexperienced or unprofessional client's staff.
Choosing wrong consultants & contractors	Faulty selection of vendors might result in engaging unqualified or poorly qualified consultants and contractors (vendors). The result could be faulty works, frequent re-working and delays in completing the projects.
Slow decision making	Delaying decision making slows down project activities at the site. Wrong communication channels or bureaucracy often result in slow decision making.
Altering designs and changing orders	Changing the specifications and scope, as well as the designs might delay project completion.
<b>Contractor-related issues</b>	<b>Description</b>
Poor coordination	This often happens with subcontractors who get assigned to do specialised construction work. Some of them fail to deliver the right specifications, while others fail to deliver at he agreed upon time.

Wrong construction methods	Inappropriate methods which can result from using the wrong tools and practices often lead to delays and some of the work would need to be re-worked.
Poor planning	Faulty plans result in project delays. Some contractors do not draft realistic work programs at the initial planning stage, which affects project monitoring.
Lack of experience	This often leads to construction errors, which would result in project delays as some activities need to be re-worked.
Construction errors	Errors are often caused by inexperienced contractors, or sometimes they employ unskilled staff so that they pay them less and increase their profits. In this case there is a high risk of construction errors.
Management incompetency	Lowly skilled employees sometimes fail to efficiently manage the construction site, resulting in faulty works, re-workings and delays in project completion.
Choosing the wrong bankers	Most projects are funded by banks, so, the internal processes of the banks might influence the project construction, for instance, untimely release of funds affects the implementation of the project in terms of schedule.
<b>Labour and equipment related issues</b>	<b>Description</b>
Unskilled manpower	Unskilled workers at the construction site deter the implementation of construction work, causing errors in specifications and other critical works. If detected this causes delays as alterations would have to be done.
Faulty and incorrect equipment	This causes unnecessary delays as most of the time is spent repairing the faulty equipment.

Labour disputes	Go slows and strikes delays project completion. More time is also spent on settling grievances and negotiations.
<b>Materials-related issues</b>	<b>Description</b>
Quality of materials	Poor quality materials result in workmanship that is also of poor quality, which might need to be re-worked and thus causes delays.
Scarcity of materials	This slows down project work, as sometimes workers have to temporarily leave the site until material has been secured. It delays project completion.
<b>Consultant-related issues</b>	<b>Description</b>
Poor design	Improper design affects project implementation as the design has to be reviewed and accepted before construction begins. Inappropriate design makes the project work being suspended until it gets amended and approved.
Poor contract management	The use of consultants as contract managers delays project implementation because most consultants lack the management principles.

Inspection & testing taking too long	Inspection and testing occur at certain stages during project implementation. The clients and consultants responsible for this might take longer time and the project activities cannot continue without inspection. This causes delays in the completion of the project.
Poor information coordination	Ineffective information management can negatively affect project activities. A good communication plan must be put in place to effectively channel and coordinate information. Poor information coordination can result in misunderstandings which could trigger conflicts.

<b>Community-related issues</b>	<b>Description</b>
Lack of community buy-in	Community members are stakeholders in project development, especially if the project is meant to benefit them. Thus, consultation with them is very important. If community members feel that they have been adequately consulted and they would benefit from the project, they are highly likely to support the project, but if they feel side-lined, they are more likely not to cooperate with the project management, which would cause unnecessary delays.
<b>Contractual relationship related issues</b>	<b>Description</b>
Poor communication between stakeholders	This leads to misrepresentation of facts and subsequently, misunderstandings. The result is conflict, which hinders the progress of project implementation.
Disputes & negotiations	These often occur and slows down project activities until the aggrieved persons resolve their disputes.
Poor organisational structure	It affects project performance, e.g. bureaucracies and slow decision- making processes affect project implementation.
<b>External issues</b>	<b>Description</b>
Weather conditions and natural disasters	Bad weather conditions delay project activities, as sometimes workers on site are forced to temporarily vacate the project site. Natural disasters like floods or drought can affect project activities.
Government policies and leadership	Changes in fiscal policies can affect the cost of project equipment and materials. If changes occur, the contract has to be revised, while price fluctuations have to be approved. Change in leadership also affect project's progress, e.g. with municipalities, political leadership changes every five years, so the outgoing and incoming

	leadership might not share the same vision or priorities, thus, affects project implementation if change of leadership occurs before project completion. Some political leaders develop personal interests in certain projects and their interference must result in poor project performance.
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**Source:** Adapted from Pourrostam, et al, 2011

**Table 2.3: Effects of project delays**

<b>Effect</b>	<b>Description</b>
Time overrun	This occurs when the project completion takes longer than the stipulated time.
Budget or cost overrun	This occurs when more money than what was budgeted for, is spent on the project.
Poor quality product	The project can be of poor quality if unskilled workers work it, if the material and equipment used are of poor quality.
Litigation	Can be a result of disputes
Total abandonment	Some projects remain unfinished for several reasons, e.g. delays in project implementation might result in total abandonment if some issues are not resolved in time.

**Source:** Adapted from Pourrostam, et al, 2011

## **2.6. Increasing chances of project success**

Having identified the causes and effects of project delays, it is thus essential to also point to some of the pertinent factors that increase the chances of project success. Firstly, for any project to be successful, it is important to involve all the relevant stakeholders, for instance, sub-contractors and community members. It is important to note that different stakeholders have different expectations and needs hence, these have to be managed as well (Swan & Kalfan,

2007). As mentioned earlier, this implies the need to ensure that a competent manager is in place, who possesses the necessary knowledge, skills and expertise to manage the different stakeholders. In the same way, for the manager to be able to effectively deal with the different stakeholders, a critical factor in this regard is the availability of the necessary resources (Newton, 2005). This therefore means that the relevant stakeholders should develop a resource management plan.

Technology is playing a very important role in the construction industry. This means that project managers should adopt the latest technology to maximise the potential success of the projects (Pathirage, Amaratunga & Haigh, 2007). It also implies that the people using the technology must be up to date and competent enough in terms of their skills and knowledge of the tools (Melkonian & Picq, 2010). If the project workers are not competent enough, they must be willing to commit themselves to learn as much as possible, as the project requires. It also calls for the support and commitment of the top management, as these are people responsible for stirring the project ahead. In other words, project success is highly associated with the sense of collectivism, while individualism might render the project to fail. This highlights the essence of communication in project management. In this view, a communication plan needs to be developed, to ensure effective information dissemination (Teo, 2010).

## **2.7. Summary**

This chapter has reviewed the literature relevant to the study. The conceptual framework underpinning this study is also described. Among other things, the following pertinent issues were discussed: an overview of the engineering fraternity, the South African engineering environment, definitions of project management, project delays and the consequences, as well as the critical success factors for project. The next chapter describes the methodology for the study.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1. Introduction**

Research methodology entails the scientific and systematic way of solving a research problem. It involves the various steps taken by the researcher to study the research problem. In that view, the researcher ought to understand the philosophical underpinnings of various research procedures. This chapter is thus a description of the research methodology for this particular study. Among other things, the chapter discusses the following: the research design, target population and sampling, data collection techniques, data analysis, ethical considerations, validity and reliability, as well as the limitations of the study.

#### **3.2. Research design**

This study takes the case-oriented approach, thus, the case of the eThekweni engineering projects was used. The case study approach provides the opportunity for in-depth analysis and understanding of the project management in question. The choice of the case study approach is drawn from Neuman (2011), who argues that a variety of factors and activities in one place requires a deeper understanding, knowledge and insights. In view of that, the section that follows describes the step by step process of data collection for the study, beginning with describing the qualitative methodology. However, prior to that, it is necessary to also describe the paradigm in which the study is rooted. The interpretivist paradigm is discussed below.

#### **3.3. Research paradigm**

Research paradigm simply refers to the how we view the world. It is defined as “an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools...”. (Kuhn, 1977:67). The research questions of a study determine the paradigm in which the study falls, which then informs the methodology to be employed. This means that the researcher employs the most appropriate methodology, based on the questions to be answered and the objectives to be fulfilled (Mackenzie & Sally, 2006). There are three main types of research paradigms: positivism, interpretivism and pragmatism. Positivism as a paradigm emphasises the search for objective truth (Creswell, 2014; Scotland,

2012). This realist objective paradigm emphasises the use of experimental methodology because its assumption is that “there exists a reality out there, driven by immutable natural laws” (Guba, 1990: 19). The paradigm further suggests that in discovering the real truth, there is the need to “put questions directly to nature and allow nature to answer back” (Guba, 1990: 19). The description of positivism clearly indicates that the paradigm thus emphasises the use of quantitative research methods. On the other hand, the interpretivist paradigm is the opposite of positivism, as it argues for the existence of multiple ways of looking at a phenomenon. The paradigm suggests that reality comprises people’s various perspectives and their subjective experiences hence, for the paradigm, reality is socially constructed (Blumberg et al., 2011). This means that the interpretivist perspective views knowledge as being gathered through ways which “respect the differences between people and the objects of natural science and therefore requires the social scientist to grasp the subjective meaning of social action” (Bryman, cited in Grix, 2004: 64). The explanation given above implies that the interpretive paradigm emphasises the use the qualitative methodologies which are meaning-oriented (Denzin & Lincoln, 2011).

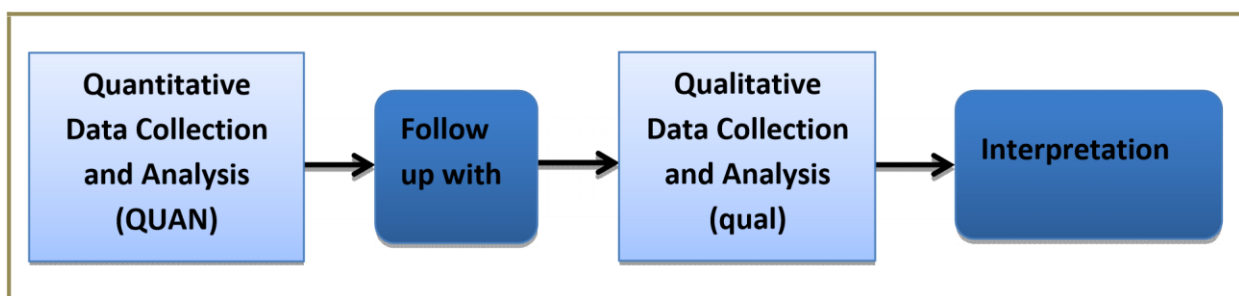
The third research paradigm, also known as post-positivism, is called pragmatism. Pragmatism advocates for the combination of methodologies. The pragmatic view postulates that there exists a false contradiction between the quantitative and qualitative approaches, thus the two approaches should be harnessed to strengthen each other. The argument is that despite the existence of objective truth, the human mind is not fully capacitated to have that objectivity necessary for discovering such knowledge (Creswell, 2014). In this case, both deductive and inductive logic is necessary, while objectivity and subjectivity complement each other. The pragmatist thesis thus challenges both the positivists and interpretivists who view the two approaches (quantitative and qualitative) as incompatible and should therefore not be mixed.

From the description given above, it is thus possible to identify that this study falls within pragmatism, as it employs the mixed methods approach to research. As argued earlier, pragmatism surpasses both qualitative and quantitative approaches (Teddlie & Tashakkori, 2010). This means that pragmatic researchers focus on the research problem and thus employ the best possible approaches in order to find solutions to the research problem (Creswell & Plano Clark, 2011; Patton, 2010). The pragmatic view is thus relevant for this study as it seeks

to use both narrative and statistical data to explore the determinants of success or failure of engineering projects. The approach thus allows for the probing of meanings, in as much as it allows for rich data from both approaches. The ontological assumption of pragmatism is that the world is not an absolute entity, therefore, knowledge is both empirical (objective) and socially constructed (subjective) (Creswell, 2014). In this regard, pragmatism is the best suited paradigm for this study, as it views knowledge as both subjective and objective. In that view, the following section describes the mixed method approach employed in this particular study.

### 3.4. The mixed methods approach

Mixed methods research refers to the “mixture of qualitative and quantitative approaches in many phases in the research process” (Creswell & Plano Clark, 2011: 5). It refers to the collection, analysis and the mixing of both quantitative and qualitative data in one study. The idea is to combine the strengths and the non-overlapping shortfalls of each of the methods. It is also a fact that some research problems cannot be adequately addressed by a single method of enquiry hence, the use of mixed methods becomes imperative, as indicated by Putnam (1990) who noted that social reality is both contextual and causal hence, the mixed method approach is necessary. In view of this, the researcher collected quantitative data, which helped in identifying participants to respond to the in-depth interviews. The idea was to allow the qualitative data to help explain in an in-depth way, the quantitative data (McMillan & Schumacher, 2010). Figure 3.1 illustrates the explanatory sequential mixed methods design model.



**Figure 3.1: The explanatory sequential mixed methods design model**

Source: Adapted from Creswell (2014)

### **3.4.1. The quantitative approach**

Maree (2010:145) noted that “quantitative research is a process that is methodical and objective in its method for utilizing numerical information from just a chosen sub-gathering of a universe to sum up the discoveries to the universe that is being contemplated”. Maree (2010: 257) further argues that:

*...in quantitative research, an examiner depends on numerical information to test the connections between the factors. A quantitative analyst tests speculation about reality, searches for circumstances and end results, and uses quantitative measures to accumulate information to test the theory or inquiries.*

White (2005:85) provides a more detailed analysis, arguing that:

*quantitative research is typically in light of what is known as a positivist rationality, which accepts that there are social certainties with a solitary target reality, which is isolated from the sentiments and convictions of people. This target reality can be clarified, controlled and anticipated by common (cause/impact) laws.*

The above descriptions indicate that quantitative research emphasises objectivity (McMillan & Schumacher, 2010). It is therefore about measuring associations between variables (Hopkins, 2008). For Hopkins, the role of the analyst in quantitative research is to decide on the link between dependent and independent variables in a population. The descriptions pointed above indicate that the quantitative approach was appropriate for this study. the quantitative approach used is thus described in the sections which follow, in this chapter.

### **3.4.2. The qualitative approach**

The most appropriate approach for research that is rooted in interpretivism is the qualitative method, as it seeks to provide in-depth information on social processes and in certain settings as well (Harvard, 2016). The importance of the qualitative approach is that it presents the participants’ own perspectives of their behaviour, attitudes and motivations. It also provides rich descriptions of the participants’ perceptions, feelings, belief systems, as well as interpretations. Qualitative data thus define people’s attitudes and feelings, as they make sense of their own personal experiences (Harvard, 2016). In this way, the best way for collecting qualitative data include focus groups, participant observation, interviewing and case studies. For this particular study, the researcher interviewed participants through in-depth individual interviews, as well as the use of the qualitative questionnaire with open ended questions.

Participant observation was also part of data collection, as the researcher is linked with the engineering department of the eThekweni Municipality. These are described in detail in the section under data collection methods.

### **3.5. Target population**

For research purposes, the population entails the whole group of people or elements from which the participants are drawn. In this case, all the people in the engineering unit formed the population for the study. However, the target population were those who were from the architecture department, which is the implementing department for all projects around eThekweni Municipality and is one of the 7 department branches of engineering unit. Every department around eThekweni submits its request for projects to the architecture department for implementation. In other words, these are the people who are directly involved with the engineering processes for the municipality. Below is the description of the sampling and the sample size for the study.

### **3.6. Sampling strategies**

Sampling entails the actual selection of the research participants to answer the research questions. It is the objectives, as well as the research questions, which determine the sample to be drawn from the population. There are two broad types of sampling: probability and non-probability (Saunders et al, 2012). In the former, which is based on the random selection concept, gives every element in the population an opportunity to be included in the sample. Probability sampling can be simple or stratified, whereby the population is divided into homogenous subgroups (strata) then the participants are drawn from each stratum. This study employed the simple random sampling, which, for Joan (2009: 1):

*...is a standout amongst the most well-known sorts of random or probability sampling. In this strategy, every individual from the populace has an equivalent possibility of being chosen as a subject. The whole procedure of examining is done in a solitary stride with each subject chose freely of alternate individuals from the populace. Louis, Lawrence and Keith (2002:100) express that in simple random sampling, every individual from the population under review has an equivalent shot of being chosen and the likelihood of an individual from the population being chosen is unaffected by the choice of different individuals from the population.*

For the quantitative phase, sixty (60) randomly selected contractors and their respective counterparts from the department were recruited to participate in the study. These were contacted through emails and where convenient, questionnaires were hand delivered. These participants work on every project from the 7 department branches of the engineering unit (Surveying and Land Information, Infrastructure management and Socio-Economic Development, Development Engineering, Coastal, Storm water and Catchment Management, Architecture, Roads & Storm water Maintenance, Roads Provision) and are involved in project activities design and the day to day operations. The people include project works controllers, consultants, project administrators, quantity surveyors (QS), technologists and architects.

On the other hand, non-probability sampling is not random, but entails the careful selection of the participants, based on several factors, for instance, the ability of the participants to answer the research questions, which is also determined by their knowledge of the subject under discussion (Creswell, 2014). Types of non-probability sampling include purposive, snowball, convenience and quota sampling (Saunders et al, 2012). For this study, purposive sampling was the most appropriate.

Sekaran and Bougie (2013: 252) noted that purposive sampling “is confined to specific types of people who can provide the desired information, either because they are the only ones who have it, or they conform to some criteria set by the researcher”. In the same way, Welman et al. (2005: 69) argued that in purposive sampling, “researchers rely on their experience, or previous research findings to deliberately obtain units of analysis in such a manner that the sample that they obtain may be regarded as being representative of the relevant population”. The above statements influenced the researcher’s purposive sampling. From the 7 department branches of the engineering unit, each branch comprises more than 4 managers. Thus, for the sampling frame, the researcher purposively selected 5 officials from the managers, the majority of them being from the infrastructure management department. The reason for choosing those five was because they were the ones available at the time of data collection. Thus, convenience sampling was also employed. The reason for selecting them was that they were involved in the construction projects or were busy executing engineering projects within the municipality. It is important to note that the sample size should be big enough to ensure valid inferences to be

made about the participants. The sample size should also adequately respond to the research questions, while at the same time it also depends on the boundaries of the phenomenon to be studied (Creswell, 2014). For this study, the data collection techniques are described in the next section.

### **3.7. Data Collection**

Data for this study were gathered from both primary and secondary sources. The sources are described below.

#### **3.7.1. Questionnaire**

The questionnaire was the main research instrument for the data collection. Godwin and Harry (2009:1) pointed that:

*...a questionnaire is an arrangement of deliberately organized inquiries utilized by a researcher to get required data from respondents... is any composed instrument that presents respondents with a progression of inquiries or articulations to which they are to respond either by working out their answers or choosing from among existing answers. The questionnaire may be self-administered, posted or displayed in a meeting position. A questionnaire may incorporate check records, mentality scales, projective procedures, rating scales and an assortment of other research strategies. As an essential research instrument and an apparatus for information accumulation, a questionnaire has its principle work as estimation.*

The above description makes the questionnaire the most used procedure for data collection from the research participants (McMillan & Schumacher, 2010:195). This study employed the close-ended questionnaire, which provided the participants with responses to choose from. For the quantitative phase, 60 randomly selected contractors were recruited to participate in the study. These were contacted through emails and where convenient, questionnaires were hand delivered. These participants work on every project from the 7 branches of the engineering department and are involved in project activities design and the day to day operations. They work closely with and supervise contractors and consultants on the design and day to day activities of the projects from all of the 7 branches of the engineering department. These people

include project works controllers, consultants, project administrators, quantity surveyors (QS), technologists and architects.

### 3.7.2. In-depth individual interviews

Semi-structured, face to face in-depth interviews were done with relevant officials from the different branches of the engineering department. The reason for doing so was to get in-depth insights into the issues affecting engineering projects within the municipality. In that view, 5 managers from the infrastructure management and socio-economic development department were purposively selected to participate in the interviews. These people were knowledgeable about the subject matter, hence, it was necessary to probe them with regards to the factors affecting engineering projects. The participants were the top managers involved in the strategic planning of projects, so, their experience and expertise were deemed necessary for the qualitative perspective of the study. In that view, the researcher had a series of questions for the participants, who answered them fully and the researcher also had the opportunity to probe them further for more information, where he needed clarification. The open-ended questions allowed the respondents to bring in their narrative accounts of how they experienced the implementation of engineering projects, thus, it also provided a multiplicity of responses which provided rich data for analysis. The interview process took at least 30 minutes with each respondent. The researcher asked for permission to record the interviews, to which the respondents agreed. Table 3.1 shows the participants for the in-depth interviews.

**Table 3.1: Participants for the in-depth interviews**

<b>Designation</b>	<b>Department</b>
Manager: Project Administration	Infrastructure management and socio-economic development (IMS)
Senior Manager: Assets Management	IMS
Deputy Head	Roads provision
Senior Manager	Electrical engineering
Manager: Asset management	IMS

### **3.7.3. Secondary data**

Secondary data were collected from sources like the organisation's financial reports, as the researcher is an accountant in the organisation's department of engineering. Other relevant data were collected from various company reports, journals on engineering, as well as unpublished dissertations on the subject matter.

### **3.8. Pilot testing**

Prior to distributing the questionnaires and conducting the interviews, it was necessary to do a pilot study, which entails the pretesting of the research instruments. Edwin and Vanora (2001:1) argued that "the term pilot study is used in two different ways in social science research. It can refer to so-called feasibility studies which are small scale version[s], or trial run[s], done in preparation for the major study". In this study, it refers to the trial run. The main reason for the pilot study was to check for any ambiguities in the questioning. Thus, the questionnaire was distributed to 10 respondents who did not form part of the main participants for the study. Out of those 10, five of them also reviewed the interview schedule. The researcher noted a few hitches pointed by the participants in the pilot study and corrected them accordingly.

### **3.9. Ethical considerations**

The issue of ethical considerations is imperative in every study, to ensure that no harm is done on the research elements, be they people or animals. Prior to data collection, the researcher gathered the relevant documents which included the gatekeepers' letters, as well as the informed consent forms. The next step was to be granted ethical clearance, which was done by the University of KwaZulu-Natal's Research Committee. This means permission to collect data was granted to the researcher. On that note, the researcher initially explained the purpose of the study to the research participants, then asked them to participate, to which they agreed by signing the informed consent forms. It was made clear to the research participants that participation in the study was voluntary and no monetary reward was provided for participating. The participants were also informed of their rights to withdraw from participation at any point of the study, without any negative consequences. The researcher also promised the participants that confidentiality and anonymity would be maintained during and after data

collection. As a result, the researcher makes no mention of the participants' names in the data analysis chapter.

### **3.10. Data Analysis**

Quantitative data were analysed using the Excel spreadsheet. The data were then presented through the use of graphs, pie charts and tables. The qualitative data were handled more differently. After transcribing the data, the researcher went on to identify and classify the data into themes and categories, known as data coding. This was important to enable content analysis of the managers' experiences of engineering projects in their organisation. After data coding, thematic content analysis was employed. Textual descriptions of the individual managers were constructed to afford the essence of their experiences (Creswell, 2014). Since this was phenomenological data, it was important for the researcher to re-examine the transcripts, as well as the categories, to identify the data related to each category and link the themes where applicable. In the presentation of the data in the next chapter, the researcher makes use of the respondents' direct words, to validate the findings and the analysis.

### **3.11. Validity and reliability**

Lawrence and Keith (2002:105) indicated that ““validity is a showing that a specific instrument measures what it implies to quantify. In quantitative research, validity may be enhanced through cautious sampling, suitable instrumentation and fitting statistic handling of the information”. In the same vein, White (2005:193) also pointed that:

*by validity, it is comprehended that the researcher's conclusion-true or correct-correspond to the genuine state in all actuality. Internal validity is how much the outline of an investigation controls incidental factors. External validity concerns whether the consequences of the research can be summed up to another circumstance: population, distinctive subjects, settings, times and events.*

Creswell (2014) noted that validity in quantitative research does not mean the same in qualitative research. In qualitative research, validity is about checking for accuracy in the findings, while using certain procedures. Reliability, on the other hand, is about the researcher's approach being consistent in different studies by different researchers (Creswell, 2014). In the qualitative design, validity is addressed by credibility, dependability and transferability (Lincoln & Guba, 2011). In view of the above, to ensure validity in the quantitative phase, the

researcher chose the most appropriate methodology to answer the research questions. In the qualitative approach, which draws from the interpretivist paradigm, it is difficult for the researcher and or the participants to completely distance themselves from the study, meaning that their belief systems, interests and values might influence their opinions.

### **3.12. Limitations of the study**

This study focused on the engineering projects by the eThekweni Municipality in KwaZulu-Natal. Thus, the results from this study cannot be generalised to similar contexts or studies.

### **3.13. Summary**

This chapter discussed the philosophical underpinnings of the study. The research design, research paradigms, the mixed methods approaches were discussed. The target population, sampling strategies, as well as the research instruments were also described. The data analysis procedure, ethical considerations and the issues of validity and reliability were discussed. The next chapter presents and analyses the data gathered as described in this chapter.

## **CHAPTER 4**

### **DATA PRESENTATION AND ANALYSIS**

#### **4.1. Introduction**

The previous chapter discussed the methodology implemented to answer the research questions. The purpose of this chapter is to present and analyse the findings of the study, based on the collected data. The analysis will thus endeavour to show how the findings of the study have answered the research questions. On that note, the first section of the chapter presents the findings of the quantitative study, while the discussion of these findings is detailed in the next chapter. The second section of the chapter presents the results of the qualitative analysis. However, it is imperative to indicate that the findings from the semi-structured interviews are presented and analysed or discussed concurrently, as it is often difficult to divorce the qualitative findings from the ensuing discussion.

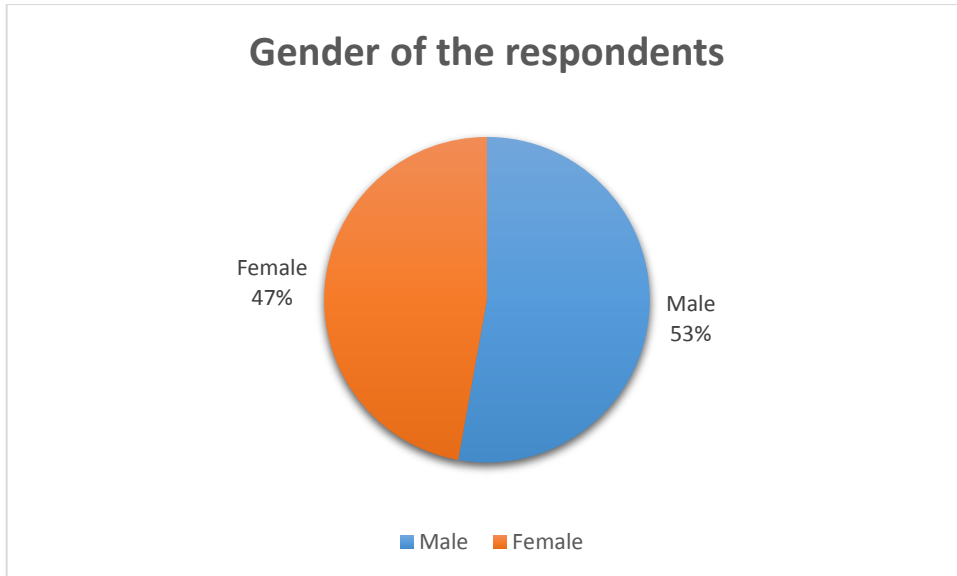
#### **4.2 Results from the quantitative data analysis**

##### **4.2.1 Response rate**

Out of the 60 distributed questionnaires, 53 were returned to give a response rate of 88.3%. The high response rate was achieved through follow-up through friendly email reminders and in person office visits.

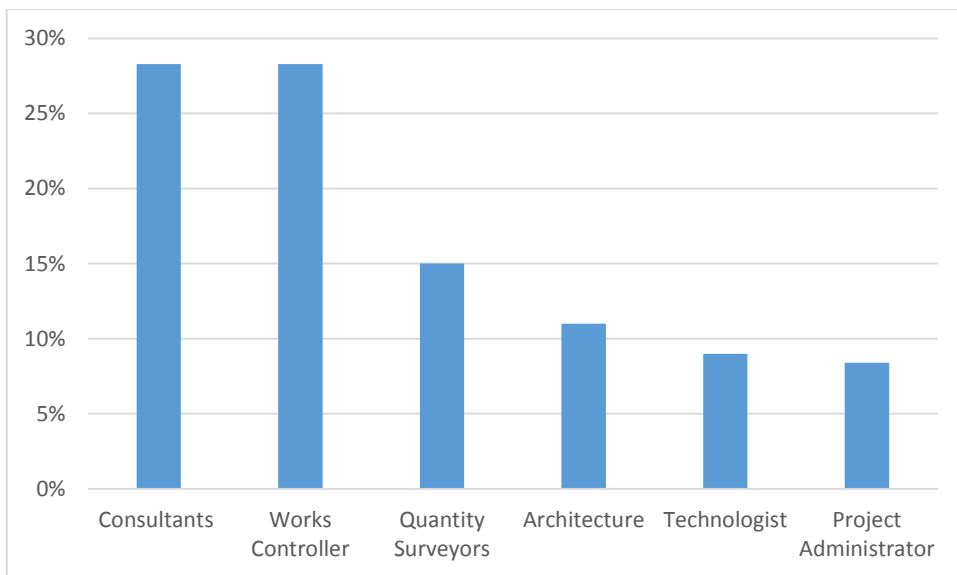
##### **4.2.2 Profile of the respondents and scope of budget**

This section provides the gender, job titles and the project management experience of the respondents. The gender of the respondents is presented in Figure 4.1. The results shows that 53% of the respondents were males and 47% were females. These respondents include project works controllers, consultants, project administrators, quantity surveyors (QS), technologists and architects. Figure 4.2 indicates the job titles of the participants of the study.



**Figure 4.1: Gender of the respondents**

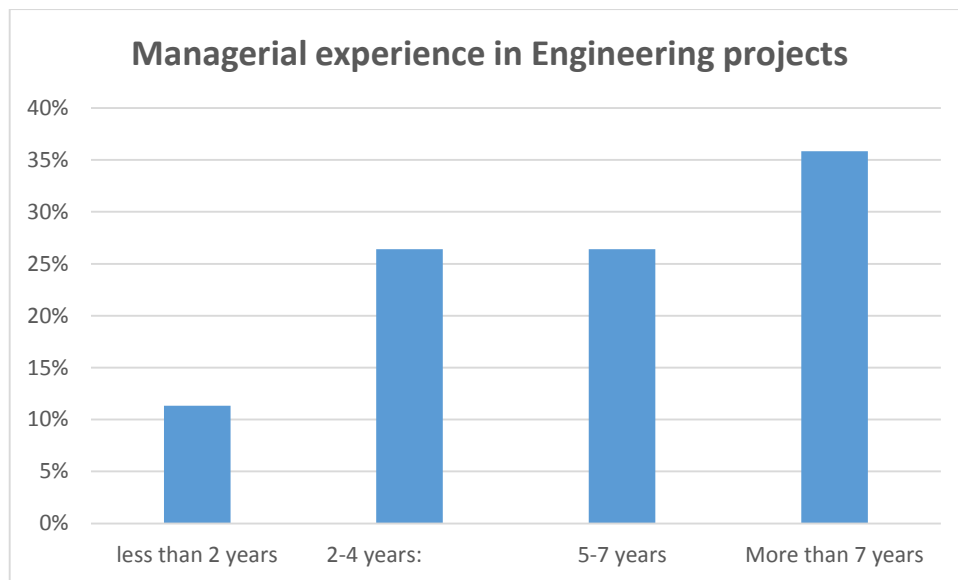
From Figure 4.2, it is evident that most of the participants were employed as consultants and works controllers, each represented by 28.3%. The number of quantity surveyors was 15%, followed by architecture (11%), technologists (9%) and project administrators (8.4%) in each category.



**Figure 4.2: Participants' job titles**

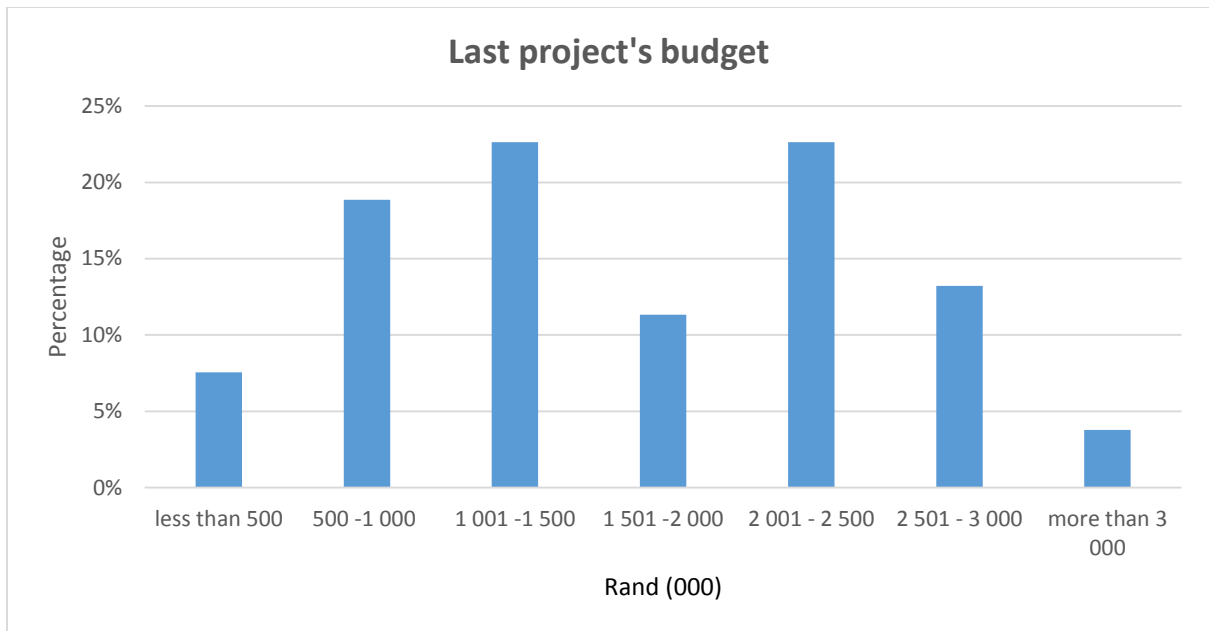
The participants' information regarding their project management experience is presented in Figure 4.3. From the results presented in Figure 4.3, 11% of the participants had less than 2 years of managerial experience, 26% had between 2 to 4 years managerial experience in engineering projects, another 26% had between 5 to 7 years of relevant experience, while the largest group (36%) had more than 7 years of managerial experience in the field of engineering projects.

Experience is a critical success factor in any organisation. The general assumption is that the more experienced the personnel, the better the results in terms of delivering the objectives of the organisation.



**Figure 4.3: Managerial experience in engineering projects**

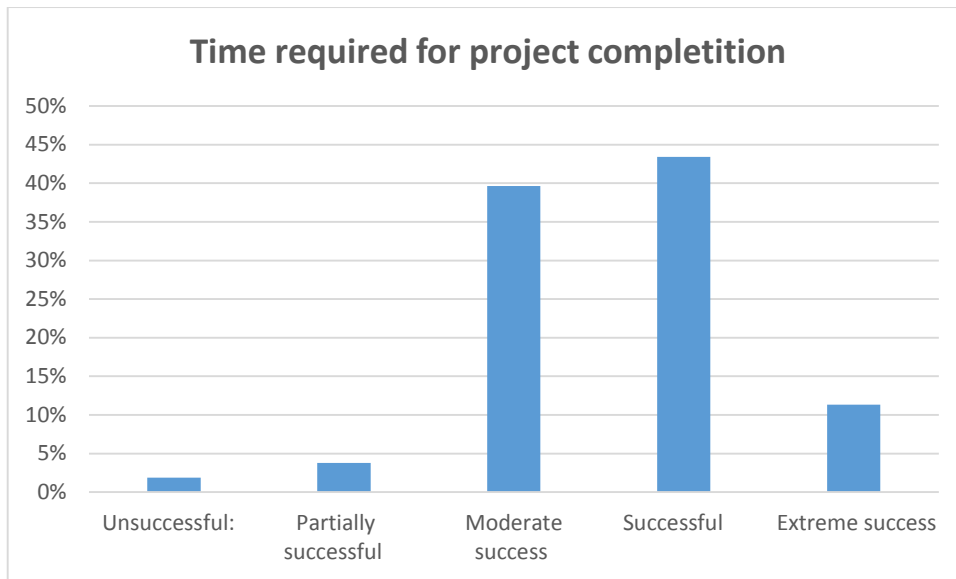
In order to have some insights into what goes in some projects in terms of budget, the researcher asked the participants about their budget for the most recent projects that they had engaged in. Figure 4.4 illustrates the budget estimates as indicated by the respondents. From the results presented, it was gathered that about 8% of the participants had a small budget of less than 500 000, 19% had between half a million to a million, about 23% had between a million and a half, 11% had 1,5 to 2 million, another 23% had 2 to 2,5 million, 13% had 2,5 to 3 million and 4% had more than 3 million.



**Figure 4.4: The budget of your last project (in Rand)**

### **4.2.3 The critical success and failure factors of engineering projects**

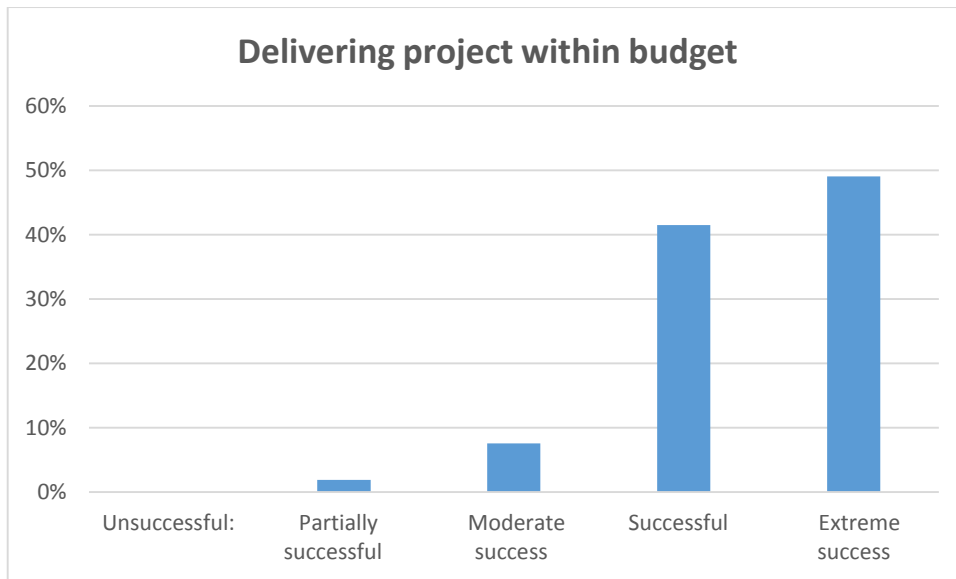
In order to establish how the participants rated the success or failure of their last projects, the researcher asked them to describe the projects in terms of the time required to complete the projects, of delivering the project within the stipulated budget, in terms of the quality requirements, in terms of achieving stakeholders' satisfaction, as well as in terms of achieving the purpose of the project. The following section is a representation of how the participants ranked these variables on a scale of 1 (unsuccessful) to 5 (extremely successful). Figure 4.5 presents the results of the analysis in terms of the time required to complete their last projects. The results show that 2% of the participants indicated that their projects were unsuccessful, 4% said their projects achieved partial success, 40% said their success was moderate, 43% indicated success of their projects, while only 11% was confident that their projects were extremely successful.



**Figure 4.5: Time required for project completion**

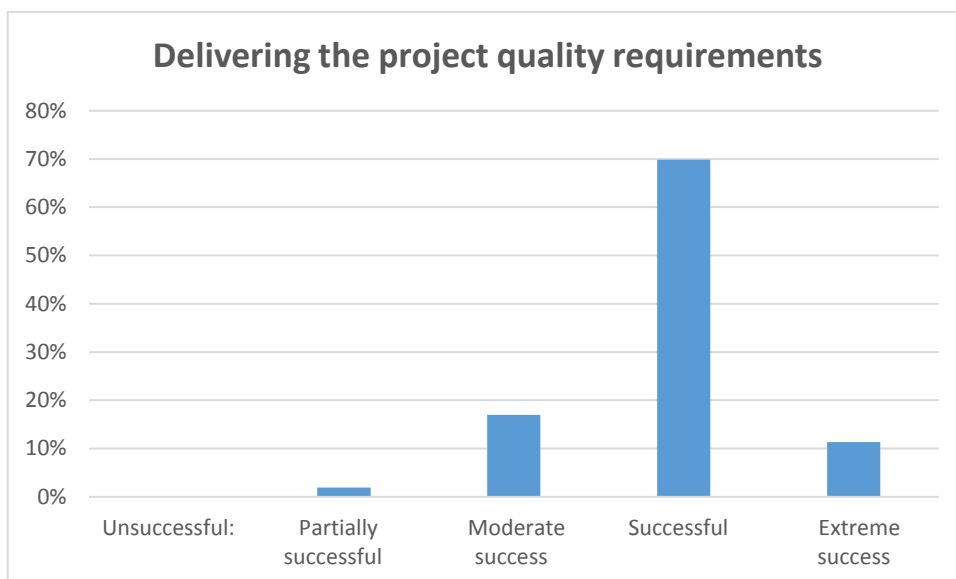
The results from the above description clearly indicate that time is one of the critical success factors of projects and the findings indicate that a number of projects fail to meet the time deadlines, which is a matter of concern in terms of cost overrun.

Figure 4.6, presents the results of conforming to the budget. With regards to delivering projects (last project) within the stipulated budget, none of the participants indicated “unsuccessful”, a small percentage (2%) indicated partial success in this regard, while 8% achieved moderate success in working within the given budget. It was interesting to note that a substantial percentage of 42% was successful in completing their projects within the specified budget and 49% was extremely successful in completing their projects within the budget.



**Figure 4.6: Delivering the project within budget**

Figure 4.7 indicates how the participants ranked the success of their projects in terms of delivering the required quality. From Figure 4.7, it is indicated that none of the participants had failed to deliver projects in terms of the required quality, but a small number (2%) indicated that they had partially succeeded in delivering the required quality. In the same way, 17% achieved moderate success in this regard, with the majority of them (70%) having successfully delivered the projects in the required quality. A substantial number of them (11%) had extremely done well in meeting the quality requirements of their last projects.



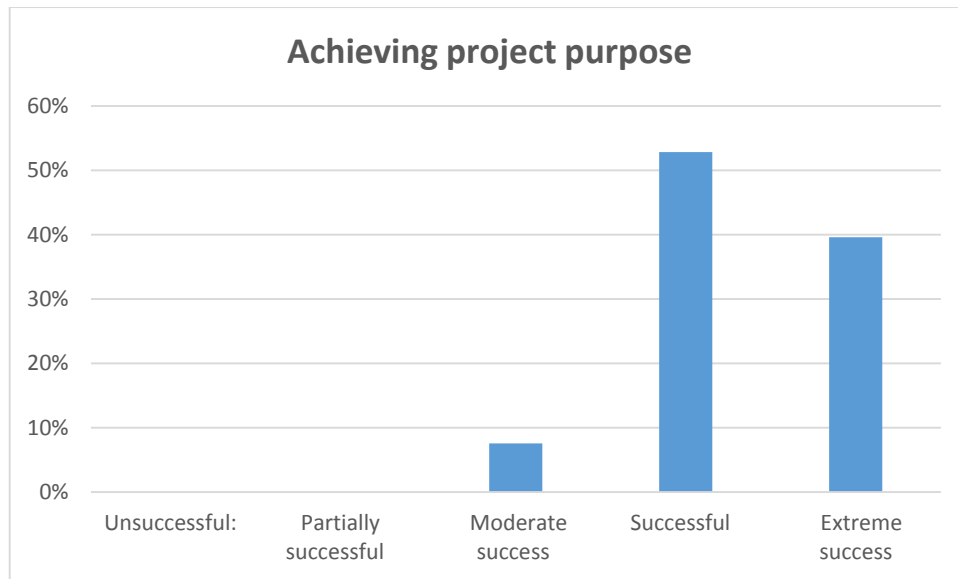
**Figure 4.7: Delivering the project quality requirements**

Figure 4.8 indicates how the participants of the study ranked their success in terms of satisfying the relevant stakeholders. The results presented in Figure 4.8, 19% of the respondents indicate that they had moderately managed to satisfy the expectations of the different stakeholder, 58% pointed that they had successfully achieved stakeholder satisfaction, while 23% was extremely successful in terms of satisfying the needs and expectations of their stakeholders. Measuring and achieving stakeholder success can be the most difficult thing to do, considering the need to satisfy each of the stakeholder's expectations. However, the results show that none (0%) of the respondents were partially successful or unsuccessful in satisfying the project stakeholders.



**Figure 4.8: Achieving stakeholders' satisfaction**

Lastly, Figure 4.9 highlights the participants' rankings in terms of how they managed to achieve the purpose of the projects. Achieving the purpose of the project entails successfully completing the projects in terms of fulfilling some of the variables described above. From Figure 4.8, it is indicated that 8% of the participants were moderately successful in achieving the purpose of the project, while 53% successfully achieved the purpose of the projects and 40% was extremely successful in achieving the purpose of the projects.



**Figure 4.9: Achieving project purpose**

#### 4.2.4 Project management

Essentially, the researcher also asked the participants, a couple of questions regarding the management, management processes, as well as project success. In this view, the respondents were asked to choose the most appropriate response, which ranged from 1 (never) to 4 (always). On that note, Table 4.1 illustrates the findings from these questions.

**Table 4.1: Management, management processes and project success**

	Never	Strongly Disagree	Strongly Agree	Always
<b>Based on the Management</b>				
Unit managers decide the projects that have to be developed.	8%	4%	52%	36%
Unit managers have an active role when defining projects' success criteria	0%	2%	66%	32%
Unit managers are frequently informed about the progress of projects	0%	0%	34%	66%
<b>Based on Project Management Processes</b>				
Project management processes are well documented and controlled.	0%	4%	60%	36%

Project management processes are standardized and subject to improvement.	0%	2%	70%	28%
Project management processes are updated continuously	2%	8%	47%	43%
<b>Based on the Project Success:</b>	<b>Never</b>	<b>Strongly Disagree</b>	<b>Strongly Agree</b>	<b>Always</b>
Projects meet their operational performance goals.	2%	2%	81%	15%
Projects stay within budget limits.	13%	13%	62%	12%
Projects meet stakeholders' expectations	0%	10%	75%	15%

On the question of whether the unit managers made decisions regarding the projects to be developed, the findings of the study indicate that 8% of the participants pointed that it was never the case, 4% strongly disagreed with the notion, 52% were in the affirmative, meaning that they strongly agreed that unit managers determine the projects to be developed, while 36% also agreed with the notion by choosing “always” as the most appropriate response to the question.

The next question sought the participants' perceptions on whether the unit managers assumed an active role in defining the projects' success criteria. To this end, the following responses emerged: none of the participants chose the option “never”, meaning that they all agreed that unit managers do indeed actively determined the projects' success criteria, though to varying degrees. A few of the participants (2%) strongly disagreed with the notion, meaning that their argument was that unit managers had nothing to do with determining projects' success criteria. The largest group of the respondents, 66%, strongly agreed that it is the management that defines the projects' success criteria. Lastly, a substantial majority (32%) also argued that the unit managers “always” define the success criteria of the projects.

On whether the unit managers were frequently updated about the progress of the projects, the respondents provided the following responses: 34% strongly agreed, while 66% argued that

the unit managers are always informed of the progress of the projects. These findings give a hint of the important role of managers in project implementation, the fact that they should always be on their toes and up to date, with regards to the progress of the projects.

In terms of project management processes, the researcher posed three questions to the participants. The researcher aimed to establish whether project management processes were well-documented and controlled. To this effect, some of the participants (4%) strongly disagreed with this notion, while 60% and 36% strongly agreed and “always”, respectively. The fact that the majority of the participants agreed with the notion implies that most of the projects were indeed well-documented and controlled, except a few, represented by the 4%, which could have not been documented. The other question on project management processes sought to establish whether the projects were standardised and subject to improvement. In responding to this question, 2% of the participants strongly disagreed with the view, 70% strongly agreed, while 28% argued that the project management processes were standardised and open to improvement.

The last question in this category aimed at establishing whether project management processes were continuously updated. A total of 2% said “never”, arguing that their projects lacked continuous updates, 8% of the participants strongly disagreed with the notion as well, while the largest group amongst the participants (47%) was in the affirmative, meaning that they strongly agreed with the assertion. Lastly, the second largest group amongst the participants (43%) pointed that the management processes are “always” continuously updated.

In the category of project success, the researcher posed another three questions to the participants of the study. The researcher asked them whether their projects met their operational performance goals. In this regard, the following responses emerged: 2% of the participants said “never”, the projects never meet their operational goals. Another 2% shared the same sentiments by strongly disagreeing with the notion. Conversely, the majority of the participants (81%) strongly agreed that yes, their projects did meet their operational performance goals. Lastly, 15% of the participants pointed that the projects were always meeting their operational goals.

Another important question that the researcher asked was whether the projects stayed within the allocated budget limits. In this regard, 13% of the participants never agreed with the view, another 13% also disagreed. However, the largest number of the participants (62%) strongly agreed that their projects were completed within the stipulated budget, which is a positive response, considering the repercussions of failing to work within the allocated budget. 12% also agreed, arguing that their projects were always completed within their budget limits. The last question in this category was on whether the projects met the stakeholders' satisfaction. To this end, 10 strongly disagreed that they met stakeholders' satisfaction, while 75% strongly agreed with the notion and 15% said they always met the stakeholders' requirements.

#### 4.2.5 The perceptions of project contractors and project managers relating to critical success and failure factors

The researcher prompted the participants to rank, on a score of 1 (not at all important) to 5 (very important), the factors which they thought had impacted more on their previous projects, as well as which they thought were more important for project success. The findings presented in Table 4.2 indicate how they ranked the factors.

**Table 4.2: Factors leading to project success**

<b>Factors leading to project success</b>		
<b>Success factors related to project characteristics:</b>	Percentage	Rank
• type of the project	79,2	20
• project scope/ size	90,6	10
• clear objectives of project	98,1	1
<b>Success factors related to project management:</b>		
• proper planning/ scheduling	92,5	6
• monitoring/ control	84,9	16
• communication	90,6	10
• decision making abilities	90,6	10
<b>Success factors related to people:</b>		
• PM's competence/leadership	90,6	10
• PM's experience	94,3	4
• PM's authority	92,5	6
• qualification of project team	98,1	1
• client's type, size	58,5	25
• client's knowledge and experience	66,0	24
• contractors' competence	83,0	17
• relations with sponsor/ project champion	81,1	18
• user involvement	79,2	20

• team spirit between project key players	94,3	4
<b>Success factors related to general management and organisation</b>		
• top management support	92,5	6
• change management	81,1	18
• organizational structure	88,7	15
<b>Success factors related to procurement:</b>		
• purchasing	79,2	20
• tendering	92,5	6
<b>Success factors related to environment:</b>		
• social environment	71,7	23
• political environment	56,6	26
• economic environment	90,6	10
• technical and technological environment	96,2	3

Data from the questionnaire were extracted and percentages reported by the respondents are presented in Table 4.2. The data are presented as a “percentage”. In fact, in this study, the respondents were evaluating their projects (most recent project) against the chosen factors using the Likert scale (five-point scale). However, to keep this study in line with the previous studies, the study adopted the same categories for key success factors related to project (such as project characteristics, procurement and environment), for comparative purposes as shown in Table 4.2. As can be seen from the table, clear objectives of the project and qualification level of the project team (98.1%) are the two factors with the highest percentage given by all of the respondents, followed by technical and technological environment risk (96.2%) and project manager’s experience and team spirit between project key players (94.3%). Top management support, project manager`s authority and technical and technological environment and tendering process, were the four factors that followed closely which ranked sixth with a percentage score of 92.5%. The lowest was the political environment (56.6%). In fact, two of the factors, political environment and client’s type, size (58.5%) received less than 60%. These were the rankings according to their previously implemented projects.

### 4.3. Qualitative data presentation

The following section presents the results of the qualitative analysis.

#### **4.3.1 Participants' positions in their company**

The five participants drawn from the engineering unit for the interviews occupied different positions. Indicated below is what they said their roles included, as well as who are their main clients:

*Ok, my current position is that of a deputy head: roads provision department which is under engineering unit... I am more involved as a program manager over multitude of projects within my department... my role is to oversee that whole program of projects...our main clients are effectively the rate payers of Durban. So, we do construction of new roads, we build structures, we build sidewalks, and we also have a preventative maintenance program to rehabilitate our road networks... (Interviewee 1, 59, Male, Deputy Head)*

*My current position is I am a Senior Manager Electrical Engineering for Architecture buildings, and in parallel I am an acting deputy head for IMS department. My role in project is to make sure the planning and the strategy setup and program establishment and that the projects are executed as per the plan. This is done in consultation with relevant client departments and stakeholders... my main clients will be firstly my staff internally and externally the public. (Interviewee 2, 58, Male, Senior Manager)*

*I am the Manager (Asset Management) together with policy making for the municipality. My role with regards to the projects is maintaining and filling system and to keep records of the projects from the start to its completion and with regards to keeping records with administration... project's approval, budgets then we have implementation of projects... our main clients were the Parks department which we have taken over some functions from them / with them but prior to that we had, when we were doing the MIG (municipal infrastructure grant) grant funding we used to get a pool of money coming to council in from the national government. (Interviewee 3, 62, Male, Assets Manager)*

*... I am a Senior Manager Assets Management as a title, I am responsible for infrastructure assets management standards and procedures in the council, so the idea being that our section will generate standard assets management procedures and processes also provide standard database information system for all assets management performance data. My role...we run our own projects but they are mainly training and mentoring projects... my role in council projects is what you want to do*

*with your research is to make sure that good decisions are made about selecting the project, prioritizing the project and then capturing data from the project particularly into the assets register, so it will also include lessons learned ... so my role is helping people to justify the project in decision making and capture data at the end of the project. Our role is involved at the beginning and the end of each project...our client is the whole of municipality electricity, water, engineering unit and every other unit. (Interviewee 4, 61, Male, Senior Manager)*

*Manager, Administration. The thing that I am personally involved is the liaison with the different asset groups to keep them in contact and make sure that we are going in the right direction that is one of the aspect, and the other aspect is the computer system on where do we store all this information about the assets life cycle and maintenance. It is all the assets groups in the municipality everybody I think we got it down to seventeen assets group or maybe there is eighteen depending on how you split them up. All the units and all the assets groups are our clients. (Interviewee 5, 61, Male, Project Admin manager)*

#### **4.3.2. Participants' roles in project management**

Having gathered the above information, the researcher went on to ask the participants about some of the projects that they were involved in, in the past, which were quite diverse and ranged from “big projects like 2010 world cup, where we did the FLYOVER BRIDGES projects and the road works that involved structures a lot of services in municipal style. We obviously build hundreds of kilometers of our upgraded roads in the former township areas we have done an exceptional work there from 1994”, “The community gardens EPWP community gardens”, “Architectural projects where there is a new development and the existing refurbishment of assets Energy efficiency demand cycle project”, “computer systems, V Smart system and upgrade of V Smart to CAM System and the JDE E1 project”. The reason for asking such questions was to get a sense of the extent of their involvement in project, which then led to discussions about success or failure factors. Probing them further as to whether their previous projects were successful, in terms time frames, budgets, quality requirements, stakeholder’s satisfaction and project purpose, the following responses emerged:

*...if I have to look back on one of the last projects, it would be the warren Flyover Bridges (for traffic) construction prior to 2010. And there was outbound FLYOVER*

*BRIDGES and inbound FLYOVER BRIDGES and those were two examples of projects that I think were executed very well and if I am looking at all your criteria when we look at the time, we were on time and we had a set time to be completed before the start of the world cup, there were enormous constraints however, we constructed on time, we came up with some innovative methods with the contractors to be able to finish on time. In terms of budget, yes, we finished on budget on those projects, quality requirements one of the FLYOVER BRIDGES that we built was designed totally in-house by our in-house teams. And those projects actually received awards from the South African Institute of Civil Engineers, from a static point of view, from the innovative point of view, we really tick the right boxes ok, that we met those requirements in terms of stakeholders' satisfaction. I think our stakeholders were satisfied with the total construction of those FLYOVER BRIDGES projects, they made an enormous difference in Durban in the way that people come in and out of the city, there used to be a traffic coming in to Durban by under road now there are flyover coming into Durban. And if you talk of our main stakeholders are motorists of Durban were totally satisfied ... um in terms of that time, other stakeholders were FIFA world cup organizing committee, that was one of the requirements to finish on time because the motorists' easy access to the city was more important during the world cup, and they felt the benefits was for much longer-term then just for the world cup. It is a good example of stakeholder's satisfaction has been met. Also, what it did other stakeholders were the traders because they were left at the bottom and could expand the trading because they didn't have the conflict between the motorists and them. And the pedestrians are another stakeholder that were satisfied during that project and the citizens of Durban, it is a much more pleasant environment for them now. I think the project purpose was achieved as well.*

*Our last project was the community gardens ... yeah it was successful, we started with nothing we ended up with five successful hubs.*

*I guess one point I can highlight for Energy efficiency project where the funding comes from the National Energy office and there is a contract that is signed by eThekweni Municipality and department of energy office where there are terms and conditions on how the work should be carried out... we are required to establish a base line and that base line is very fine by the independent measuring and verification...The close-up*

*report was done. We are now looking at the ROI (return on investment) as the other critical part, now the next step is to maintain the project success.*

*Ok in most aspect yes. from the time point of view, systems project takes longer than expected and most of the time it is the interaction between the human factors of the project that causes delay. Budget is not a problem, most of the time we normally finish within the given budget. Stakeholder satisfaction is normally 80% happy, but the purpose of the project is in overall achieved. You never seem to get 100% satisfaction for the stakeholders. But it serves the purpose as it met the GRAP compliance and Auditor General approved.*

*Look I have been involved in a real program which involved information sharing and mentorship so to some extent that project...cause it ends after, it was a program that ended in every three years and to some extent that was acceptable and was successful, it difficult to actually measure it...I would say it was successful. But the previous repairs and maintenance of the prison's buildings was not successful, it didn't finish on time, it didn't finish within budget, costs escalated, there was costs overrun... But I think the client was happy because the job was finished. (Interviewee 1, 59, Male, Deputy Head)*

The response from the last respondent above prompted the researcher to probe further and below is how the conversation proceeded:

*Interviewer: yeah...that's where I am going, part of the confusion with determining the project success or failure (I have done lot of literature review and I came across this confusion) what I have picked up DL is that the challenge is when a project is time frames were not met, and the costs overruns but at the completion of the project the quality requirement was met and the customer was satisfied, would you categorize the project as failed or a success in that we did not meet the time frames and we exceeded the budget but at the end of the project the quality was met and the customer was satisfied, how do we categorize that one?*

*Respondent: I agree with you and you better be careful if the client is paying for the project and he says he is going to pay a R100 000 and we ask him to pay R150 000, meaning we overran by R50 000 and he was part of the reasons for the escalations he*

*understood the reasons, it was government we were government doing a project for the benefits of another government, so we were external and we overran the budget by R10 or R15 million, which was about 25% (I am just taking figures) of the original budget, that was a big chunk of overrun, now these guys were getting crossed because they had to wait for further budget the money to be approved by national treasury and they were not happy, everybody was not happy. Let's say that project ended in three years, but we were supposed to end the phase of repairs two years earlier and it just couldn't be done, there were many reasons and the client agreed with them. So, we didn't finish the repaired phase to give him the maximum use of facilities. But after it had been repaired, he was happy with the quality, but I don't think that can make a satisfied client. It would make him more satisfied that he got the quality he had a long-term view that he fixed the prison's, that was the Department of Correctional Services. And now I have these prisons in good conditions, he has taken a life cycle view of the assets, so now it's a "sorry about the money" "sorry about the time we took so long to finish the project" but the benefits are there, but I can't say he was satisfied. It's like buying a loaf of bread from the shop that's more or less a project and on the shelves the price is R10, but when you get to the till the cashier for some reasons that you understand you have to pay R15 and the bread is fresh for your consumption liking, that will not make you a satisfied bread customer. (Interviewee 4, 61, Male, Senior Manager)*

*Interviewer: ...So it means to me what I am picking up from what you are saying is that, the fact that the benefits of the project do satisfy you at the end does not outrun or outweigh the pain of the costs overrun?*

*Respondent: if you were on your way from the shelves to the till and somebody stops you and say hey, Sbonga, we must feed a million more people now for the bread you will have to pay another R10, you will not be happy, but you will understand. So, it is communication that is important. The pain that he is going to face is the costs pain. And the backfire is that he might not even get paid if the costs overruns were too much...*

*Interviewer: they might not even choose you for the next project...*

*Respondent: but he might, if you have communicated the reasons all the way through the project, and he has been part of the problems and solution you did not come up with the escalated prices by surprise.*

*Interviewer: So, we can categorize it as a failed project rather than a successful one?*

Respondent: *We can categorize it as partial success project. ...you asked about time, budget and other factors...*

Interviewer: *yeah, it was quality requirements and stakeholder satisfaction and project purpose.*

Respondent: *That is the always important thing that you have to come back to ... are you meeting the project's purpose, the other thing to be aware about is that the project purpose might be to build the prison building...and did the client really like that building... so he got to be sure that he is getting what he thought he wanted in the first place. Somebody got to do that check and I don't think it's the project manager's job it is a program manager's job. To make sure that a client wanted a two storey building and not a one storey car park, or maybe he wanted a two storey buildings with lecture rooms ... but he might have not known how to ask for it at the time ..So you said to him yeah I am going to give you two storey building with a lecture room and they're going to be offices and kitchens ... ok and when he gets there is only lecture rooms and no offices and he will ask where my offices are and then he is unhappy. (Interviewee 4, 61, Male, Senior Manager)*

Interviewer: *Ok, that is done during project specifications phase?*

Respondent: *Yes, someone must talk to the client during that phase in the language that the client will understand about specifications ... because you may not be talking to a technical person and we have that problem often.*

Interviewer: *Ok, what I am picking up from that is another term... there is program manager and a project manager. Is the program manager at the planning stage...?*

Respondent: *The program manager has got that broader role during planning, but at the same time, it doesn't relieve the project manager from making sure that he understands the begging of the project because he has to do the project charter and scope. We must spend time with that, certainly we need to spend time with that ... and I don't think we did because we rushed to get the project started so we just go...go... go... but if you arrive and you are a contractor you are often given the scope. So, to say right, go and build that road there and then you build it and it's a wrong road, wrong specification, wrong place and there is nothing the contractor can do about it ...but the guy that planned it should have made sure that it's the right road for that*

*particular service and the program manager. It's like when we do the upgrade of roads in the city, it's the job of the program manager to say right, we must upgrade the roads and we are doing the right ones at the right time. And he is going to make sure that he coordinates that ...so when the contractor gets on site, he just does things according to specifications and make sure that the people in his immediate facilities understand what's going on. (Interviewee 4, 61, Male, Senior Manager)*

The conversation above highlights a lot of important issues regarding project success or failure. One of the issues raised is the failure to stick to the project programme in terms of dates of project completion. The participant further indicated the implications thereof: time and cost overrun. The failure to complete projects within the stipulated time and budget often indicates poor planning, even though the participant indicated that the causes might be from the client as well, not always from those executing the project. Another possibility could be that the contractors take the assignment of implementing the project without careful pre-planning of how the project is going to be executed, as well as the amount of resources required to complete the project within the given time and budget. It also shows poor management skills on the part of the contractors, which often compromises the quality of the project.

### **4.3.3 Project success**

In his efforts to draw more insights about project implementation, the researcher asked the participants as to what they thought determined project success. In this view, interesting responses emerged from the participants:

*...I think project if I talk about it generally I would say project needs to be well defined, exactly what the purpose of the project, the scope of the project must be clear, and then ... you obviously got to have the right technical people to be able to perform, as important you must have the right management and leadership for that project, you have to get all the stakeholders on board, good leadership and communication would be one of the key determinants of the project success... you have the technical officials that are running the projects, the senior management from the municipality...they all have important roles to play so that is a key determinant, if I may too say one of the biggest reasons why we struggle now is we haven't got that alignment and there is too much, we are not on the same page. Um...in the municipality that is a key success factor*

*and then you got to have the right technical people there. The skills got to be there if not you are just short changing yourself that is a given. In the alignment of leadership, both officials and political that will make that technical team work, that's how I look at it.*

*...first I think communications is a big one and I would like to see the project meeting the long term objectives so I will say that if a project fit into a broader product specification or program if it doesn't fit into a broader program it going to be a standalone thing (white elephant type of affair)... And then of cause costs, time if you can finish the project on time within costs and at a correct quality, definitely its successful beyond meeting what the client wants, but there is a later version of contract management document that's when you are in a contract with the contractor as a client you share the pain and gain. So, if we agreed on the price of a R100 000 and we are not knocking each other all the time we work together we know that you are a contractor and skilled and we got our professional skills, and want to put up this building, we do all our exercises if I don't do that I have to put two cranes and save some costs, we come up with costs saving strategies. But while we are building we come across this problem or the possibility of saving... and our target is a R100 000 and if we exceed that target you the contractor will carry 60% of that costs and we the clients will carry 40% and we negotiate. So, we share the pain however if we agree we get what we want for less than a million the contractor get 60% of savings and 40% to me as a client. So, we work together all the way through the project and if I have to pay extra R5 000 as a client I will understand because I was involved all the way I know what's going wrong what's going right. What I mean is even when the costs were overrun and timeframes not met but I am still ok as a client because I was all the time involved.*

*See the success of any project to me is the "attitude of the project", mmm... manager and the staff determines a lot of success of a project can be, also the interference from politicians and the community also can either make a project successful or it can hinder it...*

*It is happy staff, empowered staff in their roles and job description, fundamentals and understanding of teamwork, institutional knowledge and the most part for me is the feasibility process of establishing the project success and consultation with relevant stakeholders and agreements on the program.*

*What I have noticed is the human factor when the role players do not give 100% commitment to the project and the skill of the role players is very important. (Interviewee 3, 62, Male, Assets Manager)*

The findings from the qualitative data collected simply confirm the findings from the quantitative data. In this instance, the participants mentioned the issues related to top management support, effective planning, institutional knowledge, consultation with relevant stakeholders, as critical project success factors. Another participant went deeper in explaining the essence of communication amongst the stakeholders, finishing the project within the stipulated timeframes and budget. All these have been discussed in the section where quantitative data are presented. Disputing the fact that planning does not necessarily determine project success, one of the participants emphasised that “good project planning produces better outcome, it’s not even necessary for individual role players to put extra effort if the work if the plan is good and effective”.

All of the participants pointed to the different projects in which they had been successful and were proud to indicate how the projects have benefitted the communities at large. From those conversations, what the researcher picked from one of the respondents was that when executing a project in the location, the benefits to the local community goes beyond the infrastructure that you build, it is also in the form of skills and job opportunities to those locals. The researcher went on to probe the participant in this regard, seeking explanation about project planning and communication between the community and the planning committee, which from his response, seemed to be lacking. In response to this, the participant clearly indicated that projects do not always directly benefit everyone, it is impossible,

*you must be able to control the expectations as well, let the community understand that only a certain number of people can benefit on a certain project at the time, the limited number of jobs and skills that the project can put out and maybe the expectation in this project...at the end of the day the benefits when you are building a project the number one objective is to put that infrastructure in the ground ok, the second objective is to try and utilize the local community as much as you can so that they benefit during the construction but you can't just make that the main objective ... The core objective of the infrastructure is to boost the economy...(Interviewee 2, 58, Male, Senior Manager)*

In the same way, the researcher probed the participants to explain whether they thought that project characteristics (type, scope/size and objective) are important for building and maintaining project success. Below are some of the responses that emerged:

*They are very important, but even before you come to type, scope, size and objective. The first step is feasibility study which is high on agenda which entails the consultation with the stakeholders. These characteristics must be informed by the outcomes of feasibility study.*

*When you are talking about time, if we are dealing with construction type whether it is electrical, civil or mechanical the skilled people to do that job are the key success factor. People with the right background to deal with any challenge that is brought by type, scope/size of the project. Qualified electrician, qualified civil engineers and so on. Even contractors and subcontractors can rob you if you do not know the job. And you will not be in the position to question if you yourself does not know the job. If the substation is built by someone who does not have necessary skills, the quality of the job can put the end users' lives in danger. There are people's lives at stake when engineering projects are done. (Interviewee 2, 58, Male, Senior Manager)*

The above responses indicate the extent to which human factors also influence project success. This issue of the 'people problem' has been extensively discussed in the earlier sections of this chapter, when the researcher described how people affect project success. The researcher went further and highlighted the different types of people and how they affect project success. With reference to this issue, some respondents had this to say:

*I would say that one of the biggest correlation to success factors would be in the leadership as I said through all spheres, and there is good political support, good senior management leadership, and good communication*

*...Absolutely, there is no question see if you do everything by the book and you are the wrong person with wrong attitude, you just not going to pitch up for that project it will be a terrible thing it just would not work... human factor is important because it's a*

*communication, if we don't communicate we've got a problem and that will make any good project to fail....look, if you don't know or don't have necessary skills of what you are doing ... like firstly when I started I didn't know what building of a road is about I knew the theory of materials and pouring concrete ... and if you don't know when to do what why you must do this, making a decision about letting something cure or letting a form work early when to use this team over there and communication with the people so they understand they have to do things quickly it's a mess, so definitely its human factors that important... One other important thing particularly about our people in the municipality to have more project management skills is because they are responsible to manage external projects managers ...remember that ... because it is pointless me although I didn't do the design direct with the project I must be able to manage that consultant or that manager on that project and the program, ... You haven't got time to do everything so you employ six project managers now you must manage those guys ... so you got to know what you are doing in terms of project management for you can start giving them instructions.*

*Yes, happy staff and empowered staff really get productive and to extent of giving them support and understand the aspect of organizational behavior both internal and external impact of staff the issue of merits and skills should be taken into considerations. Absenteeism should be managed and disciplinary action be taken where necessary, HR be consulted if there are external issues that hinder their performance on projects and must be diagnosed on merits...All project role players should have required skills to perform their duties and if there is a lack of then the further training and development should be recommended...The other important thing about human factor training is that it should be aligned with their duties.*

*That is the most important factor of the project success, as I have mentioned and it is not only about the right people with right skills, it is the number of people who are skilled that is also important...The challenge we have is there no long term thinking like succession plan. That is why the shortage of skills and knowledge is so much gap. (Interviewee 2, 58, Male, Senior Manager)*

Although the notion of succession planning is out of the bounds of this study, the response from the last participant above resonates with the researcher's personal experience when he had to take over from a senior employee who was retiring. From the researcher's perspective,

this senior employee had monopolised the knowledge of his duties as an architecture accountant and it was difficult to replace him because the knowledge of the processes and operations of architecture department was only familiar to him. In the context of this study, the point being made here is that human factors and succession plans are critical success factors for projects.

#### **4.3.4 The influence of corporate management on project success**

The research also sought to establish the extent to which general/corporate management was important for building and maintaining project success. In this view, the respondents had this to say:

*The corporate management is so important in the sense that they have an influence in the project's budgets. If the budgets are cut due to some reasons, the quality of the ground work will be compromised and the costs escalate, for example if we have R 400 million budget to rehabilitate the road in a certain period and for some reasons the budgets are cuts by corporate management, the rehabilitation will end up being covering of potholes...So the management planning and decisions really have a severe impact.*

*Ok yes, if we are bringing in corporate management, all the policies that are set by corporate management, I am not saying policies (i.e. SCM) are good or are bad, but when it comes to projects, they need to know that the policies they set make a huge difference in attaining the project success and affects the project managers on the ground. The more they put red tape policies, the more they make it so difficult for the project role players on the ground.*

*Just to add to program managers, we need support from corporate management, if we don't have support its doomed failure, if corporate management doesn't support what we want to do and particularly we are moving to that phase it could be applicable to us for building and maintaining project success, if they do not support the idea of project management, we can get the pocket excellence all over but we cannot get the corporate benefit of it. So, the corporation or the senior management must buy into the idea, and I think they do but maybe, not fully understand it yet and the benefits of it and that what it is all about.*

*I think yes, it is, one of the responsibilities of the management is to make sure that our planning and interventions are speaking to a structure, for example it must be able to speak to IDP and speak to SDBIP it must speak to NDP, must align all the programs to the city strategic planning. It is critical to have that sustainable structure. Management ensures that even at the departmental level, no one works in silos all programs are aligned to a structure of the city. The role of the management is to make sure that coordination and the connection of project dots in terms of a program. (Interviewee 5, 61, Male, Project Admin manager)*

The responses presented above indicate unanimous agreement with regards to the role of corporate management in project success. These findings concur with those presented in the quantitative phase, that project managers' leadership, competence, experience and authority, are attributed to project success.

#### **4.3.5 Procurement processes and project success**

In order to understand the extent to which procurement processes affect project success, the researcher posed this question to the interviews, who brought in interesting analysis, as indicated herein:

*It is something that is required, looking at the history of the country, the policy help the distribution of work to previously disadvantaged people and gives opportunity to the developing businesses. The contractors when they are procured have to be told upfront that if you do the job on a certain location you have to get the local communities on board to benefit from the project. You got to make sure that the right people are brought on board. In construction, there should be no bearer to professional quality standards of the projects, even if we want to correct some wrong and the close the skills gap but we have to make sure in that process, we do not compromise the quality of the infrastructure because there are people's lives at stakes since lot of people will be using the infrastructure. That brings the point of failed projects when we did not have right contractors for the jobs and projects were not finished and there were lots of defaults. Remember that the infrastructure is going to boost the economy so SCM policies should consider that not just to close the gap of income distribution.*

*The policy is supposed to allow the achievement of value for money, so the more the process is restricting the less value for money we will achieve. The more energy we spend and more time on ticking the SCM box the more we delay the projects commencements, so the procurement process must not be very long and delay.*

*Now let me tell you something, our procurement in a council we talking about council? ... is the best example you can use for failure ok... right because number one, they got everything in place but they don't know how to apply it, right... they have got, I will give a sample on this one supply and deliver of concrete products, they know that tender is expiring off in 36 months, come 36 months, the tender is not finished. Ok... the new tender should have been in place 6months before the old tender expires. I gave that as a one example. Toilet paper, it's a simple thing, but important thing in the building with the staffs... for day to day use. Photocopier paper, at some point there was no papers for photocopier because of the inefficiencies of SCM processes. The biggest issue is the time it takes to give the awarded contractor the letter of award, sometimes it takes more than six months. I think they should have strict time frames with the standard operation procedures that they have with SCM for certain functions. The documents go to bid special committee, bid evaluation committee and bid adjudication, but all these committees need strict turnaround times.*

*Yes, one reason is that procurement consist of 5 or 6 things SCM... (supply chain management), because it includes demand management, logistics, and procurement... ok procurement is procuring the person to do the correct job at the correct quality at the correct price. So, you should make sure you procure the right person to do the job at the right time, that person must do the job and must have enough information to do the job. It is easy to procure wrongly and particularly in our environment, remember in our environment we procure people to deliver...*

*Yes, very critical that we comply to SCM regulations to improve the room of efficiency which is SDISS. If we can implement that, there will be no need for Section 36 as an emergency to bypass SCM. And again, to really know that we are dealing with scarce resources that means the demand is high so the components of SCM are transparency, fair, the process must be costs effective, and be able to use our resources to the best of our ability to benefit as much as possible people. (Interviewee 5, 61, Male, Project Admin manager)*

#### **4.3.6. Effect of environment characteristics (political and business) on project success**

The researcher also asked the respondents if they thought that environmental factors were important in project success. To this effect, the participants highlighted the following:

*I think it is important because in what I do, I really need political support to get the projects approved and budget approved and in terms of business, we execute our projects by employing a large number of external businesses. So, the success in the construction business needs a balance of politics and business, because political instability can severely disturb the progress of the project on the ground. The public private partnership is the key to this point, since we depend on the private sector to deliver certain projects although we supervise them but there is a very important need for good relationship to ensure the project success.*

*They are very important, from our experiences during the 2010 World Cup, there were deadlines, where we said if there is a political will, there is success in the number of projects i.e. in Johannesburg where they built a Gautrain, the success was because of both business and political will. Another good political will in project success was demonstrated when we hosted the COP17 project. The political will behind hosting the ICC events such as World Economic Forums. And the political interventions with the Clean my City projects are successful and the Mayor is leading by example in these projects. This means that there is a direction from the political leadership and it will make the successful projects, the relationship between political and administration leadership is critical and to have skilled and knowledgeable executive management team members. And to really understand the Constitution and their boundaries when it comes to decision making that impact on projects. Even when they pass laws, they must do that with the understanding of building processes that are taken by administration and when we have that link between the politics and administration will be more successful. And that municipality is a government for private sector and really persuade to create that good relationship with private sector to create jobs.*

*Yes, because we are talking about the municipality, I am hesitant when I talk about this word “political environment” because political means different things, if I open up my dictionary it will mean something else, and when we talk about institutional, to me it means we have an institution that must work our institution is the municipality consist of a council or elected people that come from political parties, and if you mean politics*

*in that respect yes... So, politics from an institutional point of view doesn't matter who is in power, that person represents the community of that ward...Us as officials have a role to play or to do like my job is to do assets management so to do my job I need support from political leaders because if the paper to pay the consultants and contractors doesn't flow the job will not be done. We as officials must do our job properly so that the businesses on the private sector will prosper. If the private sector does not like what we are doing, they will come to our Port as a duress because they are forced to come here, and if they could they will go to other ports. They would go to Richards bay or Maputo. So those two make it important to do project management ...*

*It depends on whether they want to influence the policies for efficiencies or for personal gain reasons. The politician's personal interest affects the business positive outcome of the projects. In Germany, they don't take the cheapest tender bidder they take the average because that can be almost trustworthy. (Interviewee 1, 59, Male, Deputy Head)*

The findings presented above clearly indicate that indeed, the environmental factors do influence project success. The influence of politics on project success is evident in many projects, as highlighted by the participants in the responses above.

#### **4.4. Summary**

The findings of this study highlighted pertinent insights into project management, how certain variables affect project success. An important notion that emerged was that project success is very subjective hence, the definition of project success or failure depends on who is measuring the success. This means that the meaning of project success to the project manager does not mean the same to other stakeholders like the project sponsors and the consumers/users of the finished product. In this view, it is a difficult task to determine the success or failure of projects, as the different stakeholders attach different values to the project results. On that note, the following chapter discusses the findings that are presented in this chapter.

## CHAPTER 5

### DISCUSSION OF FINDINGS

#### 5.1. Introduction

The previous chapter presented the findings of the study. The data presented in the previous chapter were gathered using the mixed method approach, that is, the use of the questionnaire (quantitative), as well as the interview guide (qualitative). The purpose of this chapter is to discuss the findings presented in Chapter 4. In order to achieve this, each and every objective of the study is presented and discussed, in order to establish the extent to which the objective has been realised.

#### 5.2. Objective 1: To identify the critical success and failure factors of engineering projects

In view of the findings presented by Figure 4.2 to Figure 4.6, the section that follows discusses in detail, what project success means, in terms of the variables indicated above. The characteristics described in Chapter 4 are also known as the critical success factors in the implementation of projects (Kezner, 2003). As indicated, these include the ability to complete a project within the specified time period, within the allocated budget, the project having to be aligned with the expected specifications (quality requirements), achieving project purpose, as well as being acceptable to the client (stakeholder satisfaction). The findings of the study indicate that most of the participants admitted to failing to completely achieve those requirements, as indicated by their responses like moderate success, partial success, except for some instances in which the majority would choose the option that they had successfully managed to achieve certain variables. In supporting the findings of this study, Kerzner argue that in reality, it is practically impossible to achieve or fulfil the critical success factors, pointing that it is very rare for a project to be completed without some alterations, which speaks to quality requirements. When this happens, Kerzner (2003) argues that it affects the morale of the project personnel and might at times halt the whole project. In this view, it is the role of the project manager to ensure that that are managed within the stipulated time, procedures, guidelines, policies and rules. In addition, project success requires commitment from all the relevant participants in the project in order to achieve the purpose of the project. Achieving project purpose entails delivering the pre-defined objectives and functionality of the project,

completing the project on time and allocated budget, as well as meeting the expectations of the users. From this discussion, it is clear that defining project success or failure is very subjective, as it is based on the role players. For instance, project managers would define project success in terms of achieving stakeholder satisfaction, meeting the budget and timescales, as well as meeting the expected quality. From the stakeholders' (users) perspectives, even though meeting their requirements and budget can be regarded as critical success/ failure factors, what might be important (success factor) to them is their happiness. Thus, given the complex nature of what counts as "success" and "failure", it implies that all the relevant stakeholders should agree in this regard, prior the project implementation. In order to ensure that the project is still within the agreed upon factors, constant review of the projects should take place during the course of project implementation.

The subjective nature of project success criteria means that the criteria are also vulnerable to change at any time during the project implementation. In this view, Shenhar et al. (2001) highlighted what they regarded as descriptions of project success and these include meeting the timescales, budget and design objectives (project efficiency), meeting the technical requirements and functional performance, as well as achieving stakeholder satisfaction. In the same way, Horine (2005) indicated the fundamental principles for any project success and these include being aligned with the objectives of the organisation, having an effective support from top management, a leadership that is competent and effective, as well as clear communication between and amongst stakeholders, to mention but a few.

### **5.3. Objective 2: To establish and evaluate the management, management processes and the meaning of project success by eThekweni Municipality employees**

The information presented in Table 4.1 highlights management related factors in project implementation, as well as how management could influence the success or failure of projects. It has been indicated that insufficient senior management support and leadership is detrimental for project success (Glaster, 2005). The point being made here is the necessity of providing the most qualified personnel to drive project implementation. One of the questions asked by the researcher was whether the unit managers were constantly informed or updated on the progress of the projects, to which most respondents agreed. The essence of constant updates in this regard is that any slight changes in the direction of the project might have disastrous repercussions, which could thus disrupt the routine of the project work. In that view, if the

manager is up to date as regards the project progress, it makes it easier to quickly suggest a remedy to whatever changes that might have occurred in the implementation of the project. The discussion here provides some pointers as to the importance of communication in project management, amongst all the relevant stakeholders, which include those working on the project, the project managers, the consumers (clients) and the project sponsors. In this view, it is the responsibility of the project managers to communicate to the stakeholders, information about how much time the project needs to be completed, the resource allocation, to mention a few.

As indicated earlier in this chapter, that the concept of project success is very subjective, the findings of this study, as indicated in Table 4.1, clearly indicate the role of people in project success or failure. In this regard, Cooke-Davies (2003) acknowledged that “people perform every process, and it is the people who ultimately determine the adequacy. Thus the ‘people’ side of the success factors is woven into their very fabric.” In support of this assertion, Moynihan (2002) further provides a list of the ‘people problems’ that affect project success and these include unrealistic stakeholder expectations, project managers’ poor skills, disagreements on project goals, as well as lack of ownership of the project by those trusted with the implementation process. Describing the different types of people in the context of any organisation, Ray de Winter (Kippenberger, 2000) identifies five categories: the ‘overt saboteur’ who often protest against a project and try to change its direction, the ‘passive resister’ who tries to disrupt the project’s progress, the ‘non-committed’ who is neutral and observes from afar, only intervenes to save his own interests, the ‘well-wisher’ supports the project but only intervenes to assist when needed, as well as the ‘fully-committed’ who wants to see the project succeeding and dedicates whatever is required to see the success of the project.

The attribution theory has been used to describe how different people contribute to the success or failure of projects (Standing et al., 2006). According to the theory, people in project implementation do not influence the success or failure of project in the same way. For instance, top management which comprises the accountable and experienced personnel, attribute the failure of projects to themselves and associate the success of the project with contextual factors. In the same way, those in the middle management also attribute the success or failure of

projects to themselves. The point is that the most experienced and accountable people contribute more to the success or failure of projects, given their decision-making powers. In this view, the most common factors influencing the success of projects a conducive organisational environment, effective leadership, realistic timescales and budgets, realistic expectations, sufficient resources and, a synergic and diverse team (Standing et al, 2006). On the other hand, the most common factors causing project failure include poor project planning, incorrect assumption about the availability of resources (poor estimates) at the initial project planning stage, as well as the lack of top management support or involvement in the project.

In the other questions above, participants were asked whether their projects had been completed within the required time schedule and budget limits, to which some respondents strongly disagreed or they said that had never happened. These findings also reflect those of Whittaker (1999) who analysed a 1997 survey by KPMG. The findings of that survey revealed that most projects did not complete within the specified schedules and budget, which resulted in schedule and budget overrun. The fact is that if a project slips out of budget, then it is more likely to result in time or schedule overrun as well, but not necessarily the opposite. For Whittaker (1999) the factors contributing to time and budget overruns to project failure include the project team, project management, project accountabilities and risk management matters. Those issues that have to do with project team or project management include lack of proper, or poor project monitoring, in terms of the progress of the project, as well as the project manager's poor or illogical experience.

Other reasons that often lead to project failure include the failure to appreciate or acknowledge potential risks involved in the project management (Hinde & Bupa, 2005). In the same way, some project managers' rush to complete project implementation within a shorter space of time, insufficient stakeholder engagement inadequate human resources and poor skills of the personnel involved with project implementation. Other problems emanate from issues that have to do with the supply of the deliverables and procurement processes. These might be caused by a poor understanding of the industry in which the projects are being implemented, as well as the lack of project ownership, especially at management levels, as indicated earlier in this chapter.

Project management processes are related to issues of planning and the actual implementation of the project. In this view, the ways in which the whole project management process is planned often determines its success or failure as well. However, Dvir et al. (2003) dismisses any kind of relationship between the level of planning and project success or failure. This echoes Kippenberger's (2000) sentiments that emphasising on planning and sticking to the plan decreases the chance of project success. The point being highlighted here is that for instance, financial planning is aimed at avoiding cost overrun which often leads to delays and hence, schedule or time overrun. But in reality, the ability to execute a project as planned is not a norm but an exception. Over and above, project management processes often determine the success or failure of projects. Among other things, project failure factors include poor commitment, especially from top management, project managers' lack of the required knowledge or expertise in project management, miscommunication between stakeholders conflicting goals, overlapping of plans, designs, project implementation and operational phases. Most of the causes highlighted here are referred to as the strategic factors, which are important during the project life cycle. In view of project management processes, Kerzner (2003) indicated that ineffective planning, estimating, timing and cost control, are all project failure factors.

#### **5.4. Objective 3: To assess the perceptions of project contractors and project managers relating to critical success and failure factors**

The findings presented in Table 4.2. Indicated that clear objectives of the project and qualification level of the project team (98.1%) are the two factors with the highest percentage given by all of the respondents, followed by technical and technological environment risk (96.2%) and project manager's experience and team spirit between project key players (94.3%). Top management support, project manager's authority and technical and technological environment and tendering process, were the four factors that followed closely which ranked sixth with a percentage score of 92.5%. The lowest was the political environment (56.6%). In fact, two of the factors, political environment and client's type, size (58.5%) received less than 60%. These were the rankings according to their previously implemented projects. The point about political influence having the least impact on project success seem to contrast with the findings from the qualitative data with the project managers, who indicated the strong influence of the political environment on project success.

The participants who responded to the interviews argued that where there is a political will, project success would be guaranteed.

### **5.5 Summary**

Given the findings of this study, it is feasible to conclude that defining project success or failure is not an easy undertaking. However, a few things have been made clear with regards to project success, amongst them being the fact that project managers should define and establish the clear project objectives. In doing so, there is the need to identify and characterise the factors or all aspects which are likely to interfere with the implementation of the projects. This entails identifying the most crucial success/failure factors of the impending projects. It is essential to scrutinise these factors from a managerial, cultural and technical point of view, in order to devise the most effective strategy of dealing with them.

## CHAPTER 6

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1. Introduction

The aim of this study was to explore the determinants of success/failure of engineering projects by eThekweni Municipality in KwaZulu-Natal. In view of this, the first chapter laid the foundation of the study by highlighting pertinent issues which include the background of the study, the problem statement and rationale, as well as the aims and objectives. The second chapter reviewed the literature relevant to the study. The theoretical issues underpinning the study were also discussed. In Chapter 3, the methodology employed in order to answer the research questions is described. The mixed method approach is described alongside the population and sampling. Chapter 4 presented and analysed the findings of the study. The preceding chapter discussed the findings of the study, based on the objectives highlighted in the first chapter. On that note, this chapter concludes the study. The following issues are thus discussed: the summary of the main findings of the study, the recommendations, limitations of the study, as well as the areas for further research. Below is the description of the main findings of the study.

#### 6.2. Conclusions to the study

The findings of the study indicated that the participants had many years in the engineering project management, which perhaps clearly positioned them to know much about project management, what it entails, as well as the determinants of project success or failure. It was also revealed in the findings, the significance of project management and more especially the need to recognise the critical success/failure factors for projects. The participants of the study were able to identify some of the critical factors for project success and these include the time schedule for the completion of the project, the need to deliver projects within the allocated budget, the essence of delivering the project quality requirements, achieving stakeholders' satisfaction and essentially, the importance of achieving the project purpose.

From the qualitative data, it was revealed that failure to adhere to the critical success factors highlighted in the data analysis chapter implies many problems which include time and budget

overruns, as well as the failure to satisfy the stakeholders if the required quality is not met. Project failure thus indicates that the project has failed to meet the cost, quality, time and overall project purpose. In the responses presented in Chapter 4, some of the respondents indicated that their projects had never been able to meet most of these critical success factors, even though in most cases, the majority of the participants indicated that they were able to deliver their projects within the expected timeframes, within the budget, at the required quality and scope goals. As argued in Chapter 4, it is indeed common to realise projects failing to fulfil these critical factors for project success.

From the quantitative findings, the majority of the participants strongly agreed that their unit managers decided on the projects that have to be developed, they actively defined the project's success criteria and they were frequently informed about the progress of the projects. The participants also strongly agreed that the project management processes within their organisation were well documented and controlled, they were standardised and subject to improvement, as well as being continuously updated.

From both the quantitative and qualitative findings, common issues were noted, among them the causes of project success or failure, which included lack of support from top management, project managers' leadership, competence, authority, experience, as well as their qualifications. Poor planning was also highlighted to be a cause for project failure. Other factors affecting project success or failure were related to procurement, as well as the political environment.

When the participants were asked to rank these factors in terms of their most recent projects, it emerged that the need for clear project objectives and the qualifications of the project team were ranked as the most important factors in project success, followed by technical and technological environment risk and project manager's experience and team spirit between project key players. Top management support, project manager's authority and technical and technological environment and tendering process, also followed closely in terms of the ranking. The lowest was the political environment and client's type, size. Given these findings, the following recommendations are thus made.

### **6.3. Recommendations**

The findings of the study indicated the role of project managers in determining project success or failure. This means that project managers should be cautious on how they attribute to project success or failure. In that view, it is recommended that project managers' abilities and

characteristics are developed through continuous workshops and training programs to enhance their skills and knowledge in the field of project management. Project managers should also be encouraged to enrol in courses on leadership and project management, for them to enhance their effectiveness in project management. On that note, academic institutions like universities should therefore design curricula that are responsive to the managerial and leadership needs of engineers.

The findings of the study indicated that the complex nature of project management presents some problems which hinder project success. In this view, it is recommended that the critical success/failure factors described in the preceding chapters be reviewed at each and every phase of the project life cycle. This is important to avoid project failure.

The participants of the study indicated technical and technological environment risk in project management. With regards to this, it is imperative for project managers and all the relevant stakeholders to be able to identify and evaluate potential risks to project success, in order to ensure success project implementation. This implies the need to identify the turbulent external factors which might endanger projects and therefore devise a risk management plan.

#### **6.4. Limitations of the study**

This study was limited to one organisation, the scope of the study was KwaZulu-Natal's eThekweni Municipality Engineering Department. This covers the greater Durban area. Therefore, the findings of the study cannot be generalised to other cities.

#### **6.5. Areas for further research**

The findings of this study can potentially benefit other industries which are not engineering related. Thus, the study can be the stepping stone for other sectors to investigate the determinants of success or failure in their respective projects. For instance, the researcher strongly believes that other governmental organisations could assess the critical success/failure factors affecting them. Again, this study investigated the determinants of success or failure of projects from the project implementers. Further research could take another perspective, for instance, from the project sponsors or the final consumers/users of the finished project, to establish their thoughts in this regard.

## Reference List

- Abdullah, A. A., Mukmin, M. N. & Samad, Z. A. (2011). Application of project management methods in the construction of bungalow house project: A case study in Kuala Terengganu, Malaysia. *International Journal of Economics and Management Sciences*. 1 (2). 42-58
- Ahadzie, D.K., Proverbs, D.G. and Olomolaiye, P.O. (2008). Critical success criteria for mass house building projects in developing countries. *International Journal of Project Management*. 26 (6) 675-687.
- Ahmed, S. M., Azhar, S., Castillo, M. and Kappagantula, P. (2002) Construction delays in Florida: An Empirical Study. *Research Report [online]*. Available at: <http://www.cm.fiu.edu>  
Accessed: 23 August 2017
- Aibinu, A. & Odeyinka, H. (2006). Construction delays and their causative factors in Nigeria. *Journal of construction and engineering management*. 132 (7) 667-677.
- Bakar, A., Razak, A. A., Abdullah, S., & Awang, A. (2009). *Project Management Success Factors for Sustainable Housing: A Framework*. Accessed from [http://eprints.usm.my/16076/1/ICCI09-\\_14\\_aidah\\_awang.pdf](http://eprints.usm.my/16076/1/ICCI09-_14_aidah_awang.pdf)
- Belassi, W. and Tukel, O.I. (1996) A new framework for determining critical success/failure factors in projects. *International Journal of Project Management*. 14(3). 141–151.
- Bryman, A. (2008). *Social research methods* (3rd ed.). Oxford: Oxford University Press.
- Carnell, N. (2008). *Causation and delay in construction disputes*. 2nd Ed. [E-book] Available at: [www.onlinelibrary.wiley.com](http://www.onlinelibrary.wiley.com) . Accessed on 26 August 2017
- CIDB, (2014). *Construction Industry Development Board*. Available at: <http://www.westerncape.gov.za/public-entity/construction-industrydevelopment-board>. Accessed 20 July 2017.
- Cleland, D. I., & Gareis, R. (2006). *Global Project Management Handbook: Planning, Organizing and Controlling International Projects* (2nd Ed.). USA: The Mc-Graw Hill Companies Inc.
- Cooke-Davies, T. (2002) The ‘real’ success factors on projects. *International Journal of Project Management*. 20 (3) 185-190.

- Creswell, J.W. (2014). *Research design: Quantitative, qualitative and mixed methods approach*. Thousand Oaks, CA: Sage Publications.
- Creswell, J.W., & Plano Clark, V.L. (2011). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.
- Department of Provincial and Local Government (2006). *Municipal Infrastructure Roles and Responsibilities of National Sector Departments, Provincial Counterparts and Municipalities*.
- De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*. 6 (3)164-170.
- Di Sivo, M.L.D. (2011). Decision-support tools for municipal infrastructure maintenance management. *Procedia Computer Science* 3: 36-41.
- Dlungwana, S., Nxumalo, X., Van Huysteen, S., Rwelamila, P. and Noyana, C. (2002). “Development and implementation of the South African Construction excellence model (SACEM)”. *International conference on construction in the 21st century (CITC2002): Challenges and opportunities in management and technology*. 25 – 26 April, Miami, Florida, USA.
- Dubem, I. (2014). Analysis of Project Failure Factors for Infrastructure Projects in Saudi Arabia A Multivariate Approach. *Journal of Construction in Developing Countries*. 19 (1) 35–52.
- Edwin, R. V. T. & Vanora, H. (2001). *The importance of pilot studies*. [Online] available at [www.http:// http://sru.soc.surrey.ac.uk/SRU35.html](http://sru.soc.surrey.ac.uk/SRU35.html). Accessed: 05-05-2017.
- El-Sabaa, S. (2001). The skills and career path of an effective project manager. *International Journal of Project Management*. 19 (1)1-7.
- Enshassi, A., Al-Najjar, J., Kumaraswamy, M. (2009). Delays and cost overruns in the construction projects in the Gaza Strip. *Journal of Financial Management of Property and Construction*. 14 (2). 126 – 151
- Faridi, A. S. and El-sayegh, S.M. (2006). Significant factors causing delay in the UAE construction industry. *Construction Management and Economics*. 24 (11) 116776.

- Frese, R., & Sauter, V. (2003). *Project Success and Failure: What Is Success, What Is Failure, And How Can You Improve Your Odds For Success?* Available at: [http://www.umsl.edu/~sauterv/analysis/6840\\_f03\\_papers/frese/](http://www.umsl.edu/~sauterv/analysis/6840_f03_papers/frese/). Accessed: 13 August 2017.
- Gepp, M., Hellmuth, A., Schäffler, T. & Vollmar, J. (2014). Success Factors of Plant Engineering Projects. *Procedia Engineering*. 69: 361-369.
- Godwin, V. O. & Harry O. O. (2009). *Questionnaire as a data collection instrument*. Available at [www.http://onganya.blogspot.com/2010/0/](http://www.onganya.blogspot.com/2010/0/). Accessed: 12-06-2017.
- Guba, E.G. (1990) *The paradigm dialogue*. Sage Publications. Incorporated
- Hopkins, W. G. (2008) *Quantitative Research Design*. Available at <http://www.sportsci.org>. Accessed: 07-08-2017.
- Industrial Development Corporation. (2016). *Economic overview: Recent developments in the global and South African economies*. Department of Research and Information.
- Joan, J. C. (2009). *Simple Random Sampling*. Available at <http://www.Experiment-resources.com>. Accessed 06-07-2017.
- Kaliba, C., Muya, M. and Mumba, K. (2009). Cost escalation and schedule delays in road construction projects in Zambia. *International Journal of Project Management*. 27 (5) 522-31)
- Keane, P. J. & Caletka, A. F (2008). *Delay Analysis in Construction Contracts*. UK: John Wiley & Sons Inc.
- Kerzner, H. (2003). *Project Management: A Systems Approach to Planning, Scheduling and Controlling*. New Jersey: John Wiley & Sons, Inc.
- Kerzner, H. (2006). *Project management: A system approach to planning, scheduling and controlling*. 9<sup>th</sup> edition. New Jersey: John Wiley & Sons Inc.
- Khang, D. B. and Moe, T. L. (2008). *Success Criteria and Factors for International Development Projects: A Lifecycle-based framework*. Thailand: School of Management, Asian Institute of Technology (AIT).
- Lawrence, M. and Keith, M. (2002). *Research Methods in Education*. Fifth edition. London. Sage.

- Liyin, S. (2011). Key Assessment Indicators for the Sustainability of Infrastructure Projects. *Journal of Construction Engineering and Management*. 137 (6) 441-451
- Majid, I. A. (2006). *Causes and effects of delays in Aceh construction Industry*. Master of Science Dissertation. Aceh, Malaysia: University of Malaysia.
- Maree, K. (2010). *First Steps in Research*. Sixth Impression. Pretoria: Van Schaik Publishers.
- Matar, M., Maged Georgy, Azza Abou-Zeid, Moheeb El-Said (2015). *A system engineering approach for realizing sustainability in infrastructure Projects*. Housing and Building National Research Center.
- Maseko, M. (2014). *Analysis of critical success factors for public-private partnerships in infrastructure development in South Africa*. Master's dissertation. University of Witwatersrand.
- McMillan, J. H., & Schumacher S., (2006). *Research in Education*. 6<sup>th</sup> ed. America: Pearson Education, Inc.
- McMillan, J. H. & Schumacher, S. (2010). *Research in education: Evidence-based inquiry*. Seventh Edition. Virginia Commonwealth University: Pearson Education, Inc.
- Memon, H. A., Rahman, I. A, Abdullah, M. R., Azis, A. A. A. (2011). *Assessing the Effects of Construction Delays on MARA Large Projects*. International Conference on Advanced Science, Engineering and Information Technology.
- Melkonian, T. & Picq, T. (2010). Opening the “black box” of collective competence in extreme projects: Lessons from the French Special Forces. *Project Management Journal*. 41(3) 79-90.
- Meredith, J. R., & Mantel, S. J. Jr. (2000). *Project Management: A Managerial Approach* (4th Ed.). New York: John Wiley & Sons.
- Neringa, G. A. B., Nerija B. and Jorge L. (2013). Development of a Conceptual Critical Success Factors Model for Construction Projects: a Case of Lithuania. *Procedia Engineering*. 57: 392-397.
- Newton, R. (2005). *The project manager*. London: Pearson Education.
- Neuman, W. L. (2011). *Social Research Methods - Qualitative and quantitative approaches*, Boston. Allyn and Bacon.

- Okumbe, J. and Verster, J. (2008). *Construction industry's perspective on causes and effects of delays in South Africa*. Available at: [www.rics.org](http://www.rics.org). Accessed: 26 August 2017.
- Orwig, R. A. and Brennan, L. L. (2000). An Integrated View of Project and Quality Management for Project-Based Organizations. *International Journal of Quality & Reliability Management*. 17(4/5). 351–363.
- Pathirage, C.P., Amaratunga, D.G. and Haigh, R.P. (2007). Tacit knowledge and organisational performance: Construction industry perspective. *Journal of Knowledge Management*. 11(1). 115-126.
- Pinto, J. K. and Slevin, D. P. (1988). Critical Success Factors across the Project Life Cycle. *Project Management Journal*. 19 (3). 67–75.
- Pinto, J.K. & Covin, J.G. (1989). Critical factors in project implementation: A comparison of construction and R&D projects. *Technovation*. 9 (1) 49-62.
- Pinto, J.K. & Slevin, D.P. (1989). Critical success factors in R&D projects. *Research Technology Management*. 32 (1) 31-35.
- Project Management Institute (2008). *Guide to the Project Management Body of Knowledge*. 4<sup>th</sup> edition. Pennsylvania.
- Project Management Body of Knowledge Guide (2013). Available at: [www.pmi.org](http://www.pmi.org). Accessed: 26 August 2017.
- Pourrostam, T., Ismail, A., Mansounejad, M., (2011). Identification of Success Factors in Minimizing Delays on Construction in IAU-Shoushtar-Iran. *Applied Mechanics and Materials*. 94-96: 2189-2193.
- Ramanathan, C., Narayanan, S.P and Idrus, A.B. (2012) Construction delays causing risks on time and cost – a critical review. *Australasian Journal of Construction Economics and Building*. 12 (1) 37-57
- Sandra Mišić<sup>a</sup>, M. R. (2015) Critical drivers of megaprojects success and failure. *Procedia Engineering*. 122: 71-80.
- Senoucia, A. & Eldina, N (2016). Time Delay and Cost Overrun in Qatari Public Construction Projects. *Procedia Engineering*. 164: 368-375.

- Swan, W. & Khalfan, M.M.A. (2007). Mutual objective setting for partnering projects in the public sector. *Engineering, Construction and Architectural Management*. 14(2).119-130.
- Steyn, H., Carruthers, M., du Plessis, Y., Kruger, D. Kuschke B., Sparrius A. van Eck, S. & Visser K. (2013). *Project management: A multi-disciplinary approach*. 3<sup>rd</sup> edition, FPM Publishing.
- Sweis, G., Sweis, R., Hammad, A. A., Shboul, A. (2008). Delays in Construction Projects- The case of Jordan. *International Journal of Project Management*. 26 (6). 665-674
- Teddie, C., & Tashakkori, A. (2010). *Foundations of mixed methods research: Integrating qualitative and quantitative approaches in the social and behavioural sciences*. California: Thousand Oaks, Sage
- Thwala W. D. and Phaladi, M. J., (2009). *An Exploratory Study of Problems Facing Emerging Contractors in the North West Province of South Africa*. Livingstone, Zambia, Proceedings 4th Built Environment Conference.
- Thwala, W. D. and Mvubu, M. (2008). “Current challenges and problems facing small and medium sized contractors in Swaziland”. *African Journal of Business Management*. 2 (5) 093 – 098.
- Tishler, A., Dvir, D., Shenhar, A. and Lipovetsky, S. (1996). Identifying critical success factors in defense development projects: A multivariate analysis. *Technological Forecasting and Social Change*. 51 (2) 151-171.
- Toakley, A. R. and Marosszeky, M. (2003). Towards Total Project Quality—A Review of Research Needs. *Engineering, Construction and Architectural Management*. 10 (3) 219–228.
- Treasury (2012). *Budget Review*. Available at: [www.treasury.gov.za](http://www.treasury.gov.za). Accessed: 19 July 2017.
- White, C. J. (2005). *Research: A practical guide*. First edition. Pretoria: Ithuthuko Investment.
- Wysocki, R. K., Beck, Jnr. R., and Crane, D. B. (2000). *Effective Project Management* (2nd Ed.). New York: John Wiley & Sons, Inc.
- Young, R. and Jordan, E. (2008). Top management support: Mantra or necessity? *International Journal of Project Management*. 26 (7) 713-725.

## APPENDICES

Mr. SB Xaba (215080720)

### Appendix 1: Questionnaire Design

Please, provide information about yourself and your department's background

1. Gender: Male..... Female.....
2. The title of my current job position is:.....
3. How successful was your last project comparing to other projects in your department in terms of:

*Please rank according to the scale of 1- unsuccessful to 5-extremely successful.*

Time required for project completion	1	2	3	4	5
Delivering the project within budget	1	2	3	4	5
Delivering the project quality requirements	1	2	3	4	5
Achieving stakeholders' satisfaction	1	2	3	4	5
Achieving project purpose	1	2	3	4	5

4. What was the budget of your last project (in Rands) R.....

*For the following section please select the most appropriate:*

Based on the Management:

5. My work experience in Engineering projects field (managerial position) is:
  1. less than 2 years
  2. 2-4 years

3. 5-7 years
  4. More than 7 years
- 
6. Unit managers decide the projects that have to be developed.
    1. never
    2. strongly disagree
    3. strongly agree
    4. always
  
  7. Unit managers have an active role when defining projects' success criteria.
    1. never
    2. strongly disagree
    3. strongly agree
    4. always
  
  8. Unit managers are frequently informed about the progress of projects.
    1. never
    2. strongly disagree
    3. strongly agree
    4. always

*Based on Project Management Processes:*

9. Project management processes are well documented and controlled.
  1. never
  2. strongly disagree
  3. strongly agree
  4. always
  
10. Project management processes are standardized and subject to improvement.
  1. never
  2. strongly disagree
  3. strongly agree
  4. always

11. Project management processes are continuously updated.

1. never
2. strongly disagree
3. strongly agree
4. always

Based on the Project Success:

12. Projects meet their operational performance goals.

1. never
2. strongly disagree
3. strongly agree
4. always

13. Projects stay within budget limits.

1. never
2. strongly disagree
3. strongly agree
4. always

14. Projects meet stakeholders' expectations

5. never
6. strongly disagree
7. strongly agree
8. always

15. For the following question please grade each factor basing on its **impact** on your **last** project success. Assign grades according to following scale: 1 – not at all important, 2 –unimportant, 3 – neutral, 4 – important and 5 – very important.

<b>Factors leading to project success</b>	1	2	3	4	5
• type of the project					
• communication					
• PM's experience					
• proper planning/ scheduling					
• project scope/ size					
• economic environment					
• decision making abilities					
• PM's competence/leadership					
• monitoring/ control					
• PM's authority					
• purchasing					
• clear objectives of project					
• client's knowledge and experience					
• social environment					
• relations with sponsor/ project champion					
• tendering					
• team spirit between project key players					
• top management support					
• client's type, size					
• organizational structure					
• qualification of project team					
• user involvement					
• contractors' competence					
• political environment					
• change management					
• technical and technological environment					

Any success factor not mentioned above which you consider important:

## Appendix 2: Semi-Structured interviews question guide

### 1. Questions about interviewee:

- a) What is your current position in the company?
- b) What is your role in projects?
- c) In which type of projects you were working before?
- d) Who is the main client in our company?

### 2. Questions about success in projects:

- a) Please describe you last project (type).
- b) What in your opinion make project successful?
- c) Was your last project successful (considering time, budget, quality requirements, stakeholder satisfaction and project purpose)?
- d) Do you have a real example of successful project in your experience? Please describe it.

### 3. Questions about groups of success factors and their influence on project success:

- a) Do you think project characteristics are important for building and maintenance project success? Please specify which and why.
- b) Do you think factors related to project management are important for building and maintenance project success? Please specify which and why.
- c) Do you think human factor is important for building and maintenance project success? Please specify which and why.
- d) Do you think general/corporate management is important for building and maintenance project success? Please specify which and why.
- e) Do you think procurement is important for building and maintenance project success? Please specify which and why.
- f) Do you think environment characteristics are important for building and maintenance project success? Please specify which and why.

### 4. Please comment about understanding and interpretation of the questionnaire.

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