

# Factors impeding successful engineering project management in a specialised global drilling services company

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Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Master* of Business Administration at the Potchefstroom Campus of the North-West University

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November 2016

## ABSTRACT

Projects that fail, for whatever reason, can impact negatively on society, organisations, and other stakeholders. In a competitive business environment, the use of project management can allow organizations to strategically structure themselves to achieve their business goals and needs. In this way, organizations can invest in more effective project management that is aimed at achieving better performance, maximizing the possibility of success, and minimizing the chance of failure. Within this context, organizations must know which critical factors are most responsible for the success of a project to manage these factors in the best possible manner. Several researchers have identified various critical success factors that can influence the outcome and success of a project. This research aims to identify the factors impeding successful project management within a global specialised drilling services company. The factors were identified through a literature review and applied in a qualitative study through looking at publications by various authors to narrow down the list of critical success factors by identifying them in different studies. Through analysis of the company the list of critical success factors were narrowed down to five factors which includes the following: Clear realistic objectives, Sufficient/well allocated resources, Skilled/suitably qualified/ sufficient staff/team, Adequate budget, Good communication/ feedback. Best practises in project management were analysed and four of the ten knowledge areas as paraphrased by the PMBOK® Guide were identified. Recommendations based on the findings of the study were offered to the company to improve the project management process and reduce the impact of the identified factor on project success.

**Keywords:** Project Management, Critical success factors, Project management process groups, Project Management Body of Knowledge, Successful Project management.

## DECLARATION

I declare that this mini-dissertation, submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the North-West University, is my own work. It has not been submitted before for any degree or examination in any other university.

A handwritten signature in black ink, appearing to read 'De Klerk Viljoen', written in a cursive style.

De Klerk Viljoen

November 2016

## **ACKNOWLEDGEMENTS**

My sincerest appreciation goes to:

- My wife, Elvira, for her patience and support throughout the MBA journey.
- My children, Rettie, De Klerk and Rogan, for enduring the long study hours and limited quality time.
- My parents for believing in and supporting me.
- Mr. Johan Jordaan, my study leader, for his advice, patience and understanding throughout the year.
- My immediate colleagues for their support and understanding during the MBA journey.
- My employer for affording me the opportunity to further my studies.
- My MBA group for the help and support,, especially when I had to travel abroad.
- The Potchefstroom Business School of the North-West University for extending my thinking during the MBA.

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# **CHAPTER 1: NATURE AND SCOPE OF STUDY**

## **1.1 Introduction**

Project management, used increasingly by businesses of all sizes, is a growing field. As entrepreneurs and Company executives deal with the daily responsibilities of managing an organisation, it is important to use dedicated project managers to oversee projects from conception to completion. Completing large-scale projects on time, within budget and with minimal disruption to the rest of the business is aided by making use of effective project management techniques. A project is a temporary venture aimed at producing a unique product, service or process, while a business is a continuous and ongoing operation. In many cases, this uniqueness means that there are no blueprints or processes in place to develop the end-product. Project managers have expertise and experience in creating plans to deliver these items. In addition, they seamlessly integrate resources across an organisation's departments and utilise communication, planning and budgeting skills to bring projects to completion. (Harbour, 2016)

Project management plays a critical role in the success of organisations. According to Adrian McKnight ,(Anon, 2010:1) in the value of project management, the delivery of business outcomes is realised through the success of projects, and in essence that is the way that project management strategies drive organisational success. With the ever-changing markets, effective project management is essential for global organisations to stay ahead of the competition and maintain the competitive advantage. Due to this all levels of operation should be re-evaluated to meet the organisation's goals and objectives. Thus, organisations are becoming more project-driven; that is, they are budgeting, planning and gauging business success through the success of the projects and processes that drive their business.

## **1.2 Background to the study**

By answering the question of what factors impede the successful management of projects is of relevance and the findings would be key to the management of the specialised drilling services Company to ensure that projects can be managed successfully. According to Fortune and White (2006:54) the search for critical success factors began in the 1960's where project management is concerned. Since then, lists of factors sometimes related to specific problem domains and types of activity were published by many authors. Comparing sets of factors and trying to identify the definite list of factors pointing out the need to match the list used to the project being undertaken were emphasised by a significant number of studies.

### **1.3 Problem Statement**

Project managers are faced daily with challenges in successful completion of projects. For this study, the focus will be on a global specialised drilling services Company. Due to the competitive environment, the company finds itself in the name will not be mentioned and herein after will be referred to as the company. In project management, the following risks are usually encountered when managing projects in the dynamic (ever-changing) business environment:

- Schedule (time) delays,
- Cost overruns, and
- Performance (quality) deficiencies. (Smith, 2002:3)

Since the company has shown an exceptional growth over the past few years and expanded its global footprint, the above mentioned has a great impact on the successful completion of projects within the Company. There is a great difficulty to mitigate these risks. To be able to do this there is a need to determine the critical success factors impeding successful completion of projects within the Company. For the reasons mentioned above the main issue to be addressed by this study can be seen in the research questions stated below.

### **1.4 Research questions**

The research questions that will be used as guideline during the study is the following:

- What factors impede successful management of projects in general?
- What factors impede successful management of projects within the Company?
- How can the findings of this study improve the success of project management in the Company?

### **1.5 Expected contributions of the study**

The results of this research will assist in providing greater insight to the factors impeding the success of project management. The findings of this study will help to identify recommended solutions to reduce the impact of these factors so that the Company can manage projects more successfully.

### **1.6 Objectives of study**

The objectives of this research will be divided into primary and secondary objectives.

#### **1.6.1 Primary objective**

The primary objective of the research is to determine which factors impede project management in a specialised global specialised drilling services Company.

## **1.6.2 Secondary objectives**

The secondary objectives of the study are the following:

- Identify the factors that impede project success.
- Compare the factors identified in the literature review to recent studies done on the same topic.
- Narrow the list of factors by doing research to saturation on studies done in the same field.
- Identify factors impeding project success in the Company through a semi-structured interview with key role players.
- Provide recommendations to reduce the impact of the factors identified on successful project management to allow the Company to retain a competitive advantage.

## **1.7 Research Design**

### **1.7.1 Research approach**

The approach of the study will be qualitative of nature as the sample size is too small to yield accurate results. First a thorough literature review will be done to determine the factors impeding the successful management of projects. By analysing the content to saturation of publications by various authors on studies done in the same field, the list of critical success factors will be narrowed down. Semi-structured interviews will be conducted with key role players and the information obtained in the interviews will be summarised to determine what top factors impede successful management of projects within the Company.

### **1.7.2 Literature study**

During the 1st phase of the study a thorough literature review will be performed, focusing on the following:

- Projects and project management.
- Project management process groups.
- Successful project management.
- The ten knowledge areas as paraphrased by the PMBOK®

Just as with many other professions and industry groups, project management has professional organisations. The biggest of these by far is the PMI (Project Management Institute). The PMI was founded in 1969 and has grown rapidly since the 1990's with well over 300 000 members worldwide as of January 2010. A guide to the Project Management Body of knowledge (PMBOK® Guide) is published by the PMI and regularly updated. PMI established a professional certification called Project Management Professional (PMP). To acquire this, one needs to have the required experience, education and pass an examination

on the PMBOK® Guide. Once the exam is passed one needs to sign, and will be bound to a code of professional conduct.

- The factors impeding the success/ failure of projects.

### **1.7.3 Ethical considerations**

Per Walliman (2010:43) there are two aspects of ethical issues in research:

- The values of the researcher relating to honesty, frankness and personal integrity.
- The researcher's treatment of other people involved in the research, relating to informed consent, confidentiality, anonymity and courtesy.

### **1.8 Limitations of the study**

The limitations of the study are that it will be company specific and the number of respondents used in the study may thus be limited.

### **1.9 Layout of the study**

#### **Chapter 1: Nature and Scope of Study**

This chapter sets the context and background for the proposed research study. The problem statement is formulated and the research objectives, research methods, and limitations are stated.

#### **Chapter 2: Literature Study**

In this chapter projects and project management are introduced. All elements of a project will be discussed and typical reasons for success and failures of projects will be looked at. This will then be narrowed down to determine the factors impeding successful management of projects.

#### **Chapter 3: Empirical Study**

The empirical study will investigate the theory described from the literature survey by doing research to saturation on studies done in the same field, and address the objectives of the research study.

#### **Chapter 4: Company Analysis**

The results of the empirical study and the application on the Company will be discussed in this chapter giving the feedback on the interviews done.

## **Chapter 5: Conclusions and Recommendations**

Based on the results and analysis in chapter 4 conclusions will be drawn and recommendations made.

# CHAPTER 2: LITERATURE STUDY

## 2.1 Introduction

A project is any planned, temporary endeavour undertaken to create a unique product, service or other complete and definite outcome (deliverable). This is done within a limited time frame and with limited resources- a limited budget. Projects normally require the mobilisation of resources which form a number of different functions or disciplines (Steyn, 2008:3). To expand on the objectives of this research, as explained in Chapter 1, a thorough literature study needs to be done to determine the factors impeding the successful management of projects in the specialised drilling services Company. The following will be discussed in this chapter:

- Projects and project management.
- Project management process groups.
- Successful project management.
- The ten knowledge areas as paraphrased by the PMBOK®.
- The factors impeding the success/ failure of projects.
- Summary of factors to be investigated in Chapter 3.

## 2.2 Projects and Project Management

To better understand project management, a good starting point would be the definition of a project. According to Kerzner (2009:3) a project can be considered to be any series of activities and tasks that:

- Have a specific objective to be completed within certain specifications
- Start and end dates are defined
- Have funding limits (if applicable)
- Consume human and non-human resources (such as money, people and equipment)
- Are multifunctional.

## 2.3 Project management process groups

Project management involves five process stages as identified in the PMBOK® guide, and will be explained below as the following:

### 2.3.1 Project initiation

- Selection of the best project given limited resources,
- Benefits of the project recognised,
- Document preparation for approval of projects,
- Assigning the project manager.

### **2.3.2 Project planning**

- Definition of the work requirements,
- Defining the quality and quantity of work,
- Definition of the resources needed,
- Scheduling of activities,
- Risk assessment done on project.

### **2.3.3 Project execution**

- Negotiating for the project team members,
- Managing and directing work to be done,
- Working with the team members to help them improve project execution.

### **2.3.4 Project monitoring and control**

- Tracking progress,
- Comparing actual outcome to predicted outcome,
- Analysing variances and impacts,
- Adjusting.

### **2.3.5 Project closure**

- Verifying that all the work has been accomplished,
- Contractual closure of the contract,
- Financial closure of the charge numbers,
- Administrative closure of the paperwork.

## **2.4 Successful project management**

Successful management of projects can be defined as having achieved the following project objectives:

- Within time,
- Within cost,
- At the desired performance/technology level,
- While utilising the assigned resources effectively and efficiently.
- Accepted by the client and / or management.

### **2.4.1 Within time**

The objective of completing a project within time may be the oldest, but trickiest goal in the book. The reason for this is that requirements often change during the project with the original schedule being optimistic to begin.

The scope needs to be managed carefully to accomplish this goal. Changes to the scope must be properly managed by the implementation of a change control process. The actual vs. planned progress must be tracked and the plan kept up to date. Identify any deviations from the plan and fix them quickly.(Westland, 2010)

### **2.4.2 Within cost**

A project budget needs to be prepared at the start of each project to ensure that project costs don't spiral and to have a benchmark to compare the cost against. All costs that will accrue for the project need to be included in this budget, whether they are applicable to people, equipment, suppliers or materials. Divide the cost between all tasks in your plan and track any deviations from this plan.

When tasks are over-spending one needs to ensure that some of the other tasks are under-spent. In this manner, control can be kept on what is spent and what you deliver under or within budget.(Westland, 2010)

### **2.4.3 At the desired performance/technology level**

The purpose of performance measurement is to help organisations understand how decision-making processes or practices lead to success or failure in the past and how that understanding can lead to future improvements. Key components of an effective performance measurement system include:

- Clearly defined, actionable, and measurable goals that cascade from the organisational mission to management and program levels;
- Cascading performance measures that can be used to measure how good mission, management, and program goals are being met;
- Established baselines from which progress toward the attainment of goals can be measured;
- Accurate, repeatable, and verifiable data; and
- Feedback systems to support continuous improvement of an organisation's processes, practices, and results.(Anon, 2005)

#### **2.4.4 While utilising the assigned resources effectively and efficiently**

When resources are not utilised effectively for maximum project execution, an organisation can face losses in time and money in just getting things done. Effectively managing resources can change an organisation's ability to be profitable. Here are a few best practice tips to help you manage resource capacity planning more effectively:

- Streamline Resource Demand Planning – Different projects call for different levels of resource demand<sup>1</sup> It is crucial for executives to have the visibility to make changes when they see fit. Without being able to see project resources in real-time, valuable time and money could be lost.
- Optimize Resource Allocation – When resource allocation is optimised, the right people are working on the right projects, avoiding incomplete or late projects. It allows management to strategically assign resources for efficient project completion.
- Real-time view of resource utilisation levels – Project managers are empowered by making use of dashboards that provide real-time status updates of projects and resource allocation; to visually track the need for project or resource changes based on time and budget constraints.
- Drive team collaboration – One solution to centralise all project information is important for team collaboration and communication. The solution makes for easy sharing of project related tasks and status reports for the ultimate collaboration station.

Start managing your resources with these practices, and see the difference in efficiency and profitability.

#### **2.4.5 Accepted by the client and / or management**

According to Watt (2014) a project is successful when it meets and exceeds the expectations of the stakeholders and when it achieves its objectives. But who are the stakeholders? Stakeholders are individuals who either care about or have a vested interest in your project. They are the people who are actively involved with the work of the project or have something to either gain or lose because of the project for example a client or manager.

The potential benefits of project management are:

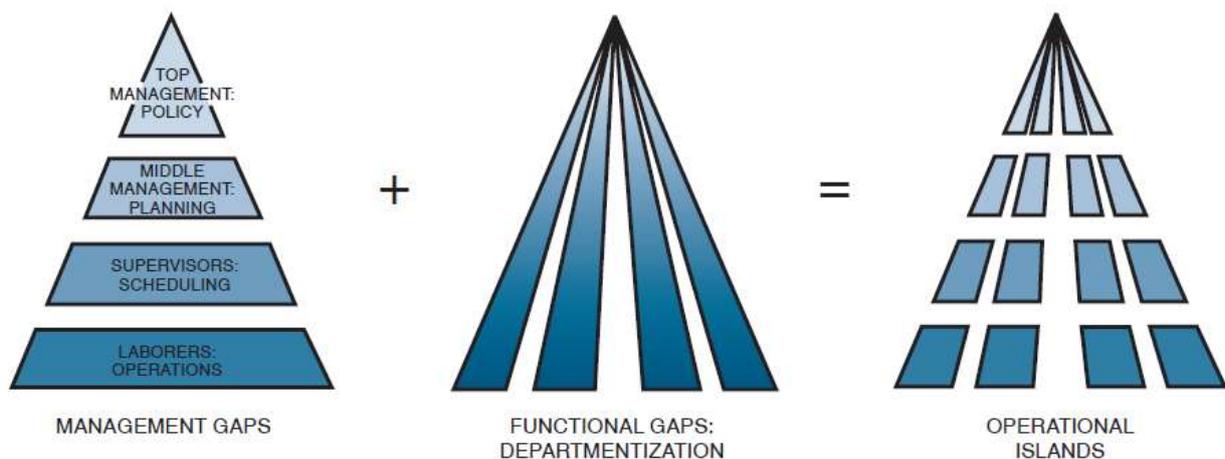
- Identification of functional responsibilities to ensure that all activities are accounted for, regardless of personnel turnover.
- Minimising the need for continuous reporting.
- Identification of time limits for scheduling.
- Identification of a methodology for trade-off analysis.

- Measurement of accomplishment against plans.
- Early identification of problems so that corrective action may follow.
- Improved estimating capability for future planning.
- Knowing when objectives cannot be met or will be exceeded.

Unfortunately, the benefits cannot be achieved without overcoming obstacles such as:

- Project complexity.
- Clients special requirements and scope changes.
- Organisational restructuring.
- Project risks.
- Changes in technology.
- Forward planning and pricing.

Project management is designed to make better use of existing resources by getting work to flow both horizontally as well as vertically within the Company. This approach does not destroy the vertical, bureaucratic flow of work but simply requires that line organisations talk to one another horizontally so work will be accomplished more smoothly throughout the organisation. The vertical flow of work is still the responsibility of the line managers. The horizontal flow of work is the responsibility of the project managers, and their primary effort is to communicate and coordinate activities horizontally between the line organisations. The figure below shows how many companies are structured.



**Figure 1 - Why are systems necessary**

There are always “class or prestige” gaps between various levels of management. There are also functional gaps between working units of the organisation. If we superimpose the management gaps on to the functional gaps, we find that companies are made up of small operational islands that refuse to communicate with one another for fear that giving up information may strengthen their opponents. The project manager’s responsibility is to get these islands to communicate

cross-functionally toward common goals and objectives. The following would be an overview definition of project management:

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 utilises the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy).

The above definition requires further comment. Classical management is usually considered to have five functions or principles:

- Planning.
- Organising.
- Staffing.
- Controlling.
- Directing.

You will notice that, in the above definition, the staffing function has been omitted. This was intentional because the project manager does not staff the project. Staffing is a line responsibility. The project manager has the right to request specific resources, but the final decision of which resources will be committed rests with the line managers. We should also comment on what is meant by a “relatively” short-term project. Not all industries have the same definition for a short-term project. In engineering, the project may be for six months or two years; in construction, three to five years; in nuclear components, ten years; and in insurance, two weeks. Long-term projects, which consume full-time resources, are usually set up as a separate division (if large enough) or simply as a line organisation. Figure 2 shows representation of the overview of project management. The objective of the figure is to show that project management is designed to manage or control company resources on a given activity, within time, within cost, and within performance. Time, cost, and performance are the constraints on the project. If the project is to be accomplished for an external client, then the project has a fourth constraint: good client relations. The reader should immediately realise that it is possible to manage a project internally within time, cost, and performance and then alienate the client to such a degree that no further business may be forthcoming. Executives often select project managers based on who the client is and what kind of client relations will be necessary. (Kerzner, 2009:6)



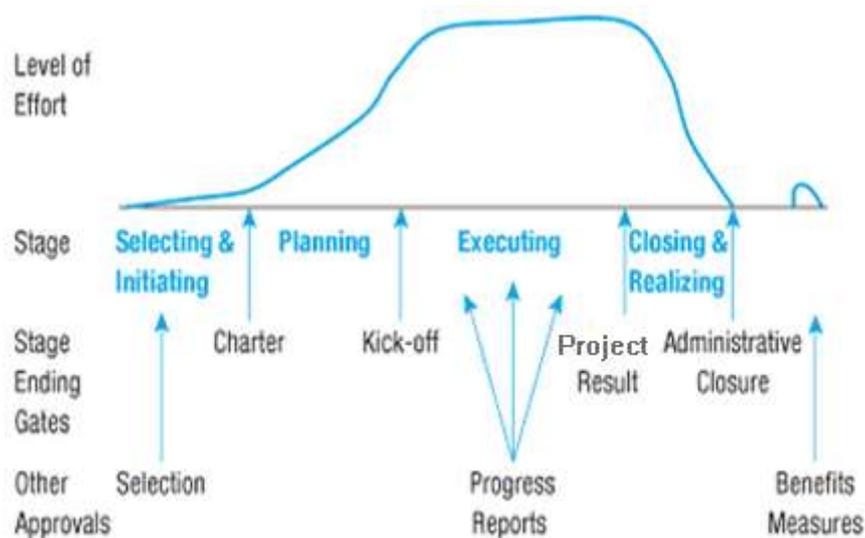
**Figure 2 - Overview of project management.**

## 2.5 The ten knowledge areas as paraphrased by the PMBOK®

Several frameworks that can assist to better understand project management are described below:

### 2.5.1 Project Management Body of Knowledge (PMBOK®)

The Project Management Body of Knowledge consist of a project life cycle as can be seen in Figure 3 below, five process groups, and ten knowledge areas.



**Figure 3 - Project Life Cycle with Measurement points (Source: Kloppenborg, 2011)**

A project management process group can be defined as a logical grouping of project management inputs, tools and techniques and outputs. The five process groups were mentioned earlier in the chapter and the 10 knowledge areas as paraphrased from the PMBOK® Guide, are as follows:

**Table 1 - Overview of Project Management Knowledge Areas.**

Knowledge Area	Includes processes to ensure that:
<b>Integration management</b>	Comprises of plan development, plan execution and an integrated change control process, to ensure all elements of a project are successfully coordinated integration management which is the range of processes are used. Integration management means assessing objectives and offering alternatives to meet the expectations of the project stakeholders as the scope of a project changes.
<b>Scope management</b>	The project includes all work required, and only the work required to complete the project successfully. Successful projects must meet strict deadlines and resource allowances, if not managed correctly scope creep has a detrimental effect on projects.
<b>Time management</b>	Depending on the nature of the project Time restrictions may vary, but a well-structured plan and schedule plays an essential part. The development of a timeline, decisions of project milestones and the structuring of schedules and activities are included in time management.
<b>Cost management</b>	The estimating, budgeting and controlling of costs are in place so that the project can be completed within the approved budget.
<b>Quality management</b>	The processes and activities of the performing organisation that determines the quality policies, objectives and responsibilities are in place so that the project will satisfy the need for which it was undertaken.
<b>Human resources management</b>	The project team size may vary but all team members must be managed, organised and lead effectively.
<b>Communications management</b>	The timely and appropriate generation, collection, distribution, storage, retrieval and ultimate disposition of project information is captured and relayed.

Knowledge Area	Includes processes to ensure that:
<p><b>Risk management</b></p>	<p>Risk management planning is conducted. Response planning, monitoring and control is to increase the probability and impact of positive events and decrease the probability and impact of negative events in a project.</p> <p>Effective risk management maximises the realisation of opportunities.</p>
<p><b>Procurement management</b></p>	<p>The purchasing or acquisition of products, services, or results from outside the project team is covered.</p> <p>External specialists are often required on more complex and large scale projects and outsourcing is commonplace.</p>
<p><b>Stakeholder management</b></p>	<p>Entails the identification of participants – groups, people, organisations - involved and affected by a project and were added in the fifth edition of the PMBOK.</p> <p>This process includes analysing stakeholder expectations and the impact these may have on the project; engaging and communicating with stakeholders in decisions and the execution of tasks.</p>

(People, 2016)

### 2.5.2 The 47 PMBOK Processes of Project Management and mapping of process groups and knowledge areas

A process is “a set of interrelated actions and activities performed to create a pre-specified product, service or result” as defined by the PMBOK® Guide. Further it goes on to say that “project management processes ensure the effective flow of the project throughout its life cycle.” Processes get things done.

Each process has requirements known as inputs, tools and techniques you can use to do the process; and then outputs, one or more things that you get because of having performed the process. You know the process is completed when the above mentioned is achieved.

Figure 4 below shows Table 3-1 in the PMBOK® Guide which explains the project management process groups and knowledge areas mapping. This table shows the Knowledge Areas down the side, the Process Groups along the top and then maps the difference processes in the relevant boxes where those two axes cross. For example, at the junction of Project Cost Management and the Monitoring and Controlling Process Group you have the process to ‘Control Costs’.

There are some blanks in the process map which means that there are no processes associated with that specific stop along the project journey. (Fichtner, 2015)

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

**Table 3-1.** Project Management Process Group and Knowledge Area Mapping  
*A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition.* ©2013 Project Management Institute, Inc. All rights reserved.

**Figure 4 - Project Management Process Group and Knowledge Area Mapping as per PMBOK guide**

## 2.6 Factors impeding the success and failure of projects

Critical success factors are a limited number of key variables or conditions that have a tremendous impact on how successfully and effectively an organisation meets its objectives of a program or project. In order to achieve a competitive advantage and intended objectives, activities must be performed associated with critical success factors at the highest possible level (Margaret & Rouse, 2014).

The factors that impede the success and/or failure of projects will be investigated in this section. In a study done by Rolstadås *et al.* (2014) to understand project success through analysis of the project management approach they found that within the field of project management the search for critical success began in the 1960s. The term success factor in relation to the management information crisis that was brought about by an organisation growing rapidly. Furthermore, studies on project success in the 1970s focused on measuring time, cost and functionality improvements, implementation and delivery systems. In the 1980s academic discussions started on “What leads to project success?” During this period, intense research was performed allowing factors beyond the above mentioned. Critical success factor lists were produced by many authors. Pinto and Slevin’s (1987) list of ten success factors which is now a classic piece of work. Müller and Jugdev (2012) recently published a review of the research on critical success factors where they claimed that project success is now more broadly viewed. Another author that early broadened the view on critical success factors was Turner (1999) who published the seven forces model for project success:

- Context
- Attitude
- Sponsorship
- Definition
- People
- Systems
- Organisation.

Christenson and Walker (2008) added that a well-communicated and convincing project vision has a strong impact on perceived project success. Shenhar *et al.* (2002) argue that different factors influence different kinds of projects and that we must adapt a more project-specific approach to identify the causes of project success or failure. They studied 127 projects in Israel and recorded 360 managerial variables. They presented these in a list of 22 factors critical for project success independent of the project’s characteristics. Their conclusion is that success factors are dependent on contextual influence. This view is supported by Müller and Turner (2007) who observed that the importance attached to project success criteria and project success rates differ by industry, project complexity, and the age and nationality of the project manager (Rolstadås *et al.*, 2014:641).

According to a study done by Fortune and White (2006:55) in the table below summarizes the 27 critical success factors identified by a number of authors with an indication on the number of citations in decreasing order of frequency of occurrence.

**Table 2 List of Critical Success Factors**

Critical Success Factors	Number of Citations
Support from senior management	39
Clear realistic objectives	31
Strong/detailed plan kept up to date	29
Good communication/ feedback	27
User/client involvement	24
Skilled/suitably qualified/ sufficient staff/team	20
Effective change	19
Competent project manager	19
Strong business case/ sound basis for project	16
Sufficient/well allocated resources	16
Good leadership	15
Proven/familiar technology	14
Realistic schedule	14
Risks addressed/assessed/ managed	13
Project sponsor/champion	12
Effective monitoring/control	12
Adequate budget	11
Organisational adaptation/ culture/structure	10
Good performance by suppliers/ contractors/consultants	10
Planned close down/review/ acceptance of possible failure	9
Training provision	7
Political stability	6

Critical Success Factors	Number of Citations
Correct choice/ past experience of project management methodology/tools	6
Environmental influences	6
Past experience (learning from)	5
Project size (large)/level of complexity (high)/number of people involved (too many)/ duration (over 3 years)	4
Different viewpoints (appreciating)	3

**(Fortune & White, 2006)**

This study was based upon a review of 63 publications that focused on critical success factors. These publications were reviewed and a variety of data sources included theoretical and empirical studies of successful and unsuccessful projects. One thing that Fortune and White (2006:54) noted is that in a number of papers, the factors definitions were unclear. For example, the factors board sponsorship support and upper management buy-in have been categorised under the heading support from senior management but they could also have been categorised under the heading of project sponsor/champion. The table shows that there is only limited agreement among authors on the factors that influence project success. The three most cited factors are:

- Receiving support from senior management.
- Having clear realistic objectives.
- Producing an efficient plan.

Although 81% of publications include at least one of these three factors and only 17% cite all three.

## **2.7 Conclusion**

The factors impeding project success were identified in the literature review done above and will now be applied in the qualitative study through looking at publications by various authors to narrow down the list of critical success factors by identifying them in the different studies.

## **2.8 Summary**

In the literature review done in this chapter a background to projects and project management were given. The process groups in project management were explained in detail including the ten knowledge areas as paraphrased by the PMBOK®. Successful project management were discussed and the factors impeding the success and failure of projects were identified.

## CHAPTER 3: EMPIRICAL STUDY

### 3.1 Introduction

Since the research is done on a single company, the sample size too small to justify a quantitative study. A qualitative study approach will be followed as mentioned earlier by looking at publications by various authors to narrow down the list of critical success factors to saturation.

During the research five articles were identified where the above mentioned critical success factors were investigated. All five will be discussed below in more detail with a summary on each study. The studies will be coded as study 1, study 2 etc. and at the end of the chapter an overall summary will be given in table form on all the critical success factors identified in the studies. The below table indicates the study code with the title of the study and the year in which it was published.

**Table 3 - Summary of Studies**

Study number	Title	Year of Publication
Study 1	Success Criteria and Factors for International Development Projects: A Life-Cycle-Based Framework	2008
Study 2	Extended Critical Success Factor Model for Management of Multiple Projects: An Empirical View from Transnet In South Africa	2011
Study 3	Project Management Practices and Critical Success Factors–A Developing Country Perspective	2013
Study 4	Critical Success Factors in Project Management: An Exploratory Study of an Energy Company in Brazil	2014
Study 5	An Empirical Study on The Critical Success Factors Of Small- To Medium-Sized Projects In A South African Mining Company	2014

### 3.2 Study 1

The study identifies different sets of success criteria and factors in the project life-cycle phases that are presented in a new conceptual model for not-for-profit international development projects. It further provides the dynamic linkages among these criteria and factors. The model can serve as a basis to evaluate the project status and to forecast the results progressively throughout the stages. Prioritising of attention and scarce resources to ensure successful project completion by the project management team and key stakeholders is helped on by this model. Empirical data from a field survey conducted in selected Southeast Asian countries confirm the model's validity and illustrate important managerial implications. (Khang & Moe, 2008:72)

The table below shows the success criteria and factors used in the study.

**Table 4 - Success Criteria and factors for International Development projects**

Life-Cycle Phases	Success Criteria	Critical Success Factors
<b>Conceptualizing</b>	<ul style="list-style-type: none"> <li>Addressing relevant needs of the right target group of beneficiaries</li> <li>Identifying the right implementing agency capable and willing to deliver</li> <li>Matching policy priorities and raising the interests of key stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Clear understanding of project environment by funding and implementing agencies and consultants</li> <li>Competencies of project designers</li> <li>Effective consultations with primary stakeholders</li> </ul>
<b>Planning</b>	<ul style="list-style-type: none"> <li>Approval of, and commitment to, the project by the key parties</li> <li>Sufficient resources committed and ready to be disbursed</li> <li>Core organizational capacity established for PM</li> </ul>	<ul style="list-style-type: none"> <li>Compatibility of development priorities of the key stakeholders</li> <li>Adequate resources and competencies available to support the project plan</li> <li>Competencies of project planners</li> <li>Effective consultation with key stakeholders</li> </ul>
<b>Implementing</b>	<ul style="list-style-type: none"> <li>Resources mobilized and used as planned</li> <li>Activities carried out as scheduled</li> <li>Outputs produced meet the planned specifications and quality</li> <li>Good accountability of resources utilization</li> <li>Key stakeholders informed of and satisfied with project progress</li> </ul>	<ul style="list-style-type: none"> <li>Compatible rules and procedures for PM</li> <li>Continuing supports of stakeholders</li> <li>Commitment to project goals and objectives</li> <li>Competencies of project management team</li> <li>Effective consultation with all stakeholders</li> </ul>
<b>Closing/ Completing</b>	<ul style="list-style-type: none"> <li>Project assets transferred, financial settlements completed, and team dissolved to the satisfaction of key stakeholders.</li> <li>Project end outputs are accepted and used by target beneficiaries.</li> <li>Project completion report accepted by the key stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate provisions for project closing in the project plan</li> <li>Competencies of project manager</li> <li>Effective consultation with key stakeholders</li> </ul>
<b>Overall Project Success</b>	<ul style="list-style-type: none"> <li>Project has a visible impact on the beneficiaries.</li> <li>Project has built institutional capacity within the country.</li> <li>Project has good reputation.</li> <li>Project has good chance of being extended as result of success.</li> <li>Project's outcomes are likely to be sustained.</li> </ul>	<ul style="list-style-type: none"> <li>Donors and recipient government have clear policies to sustain project's activities and results.</li> <li>Adequate local capacities are available.</li> <li>There is strong local ownership of the project.</li> </ul>

(Khang & Moe, 2008:78)

The different sets of success criteria and conditions for the different stages of the project life cycle were recognised during this study. For each phase of the project, the explicit list of the success criteria is developed based on analysis of the results typically expected at the end of the phase to provide a result-based framework to evaluate the project management performance. A more specific description of the conditions to be evaluated were allowed for by separating the success criteria and conditions by life-cycle phases. The prediction of the project results and forecasting of the future status will be assisted by evaluating the critical success factors at each stage and from a practical point of view the results help to clarify the weak areas that require attention and support to complete projects successfully. By looking at the results obtained in the study the following ten factors had a significant, or moderately significant impact on the partial project management success factor scores:

- Effective consultation

- Understanding the environment
- Compatible development priorities
- Adequate resources during planning
- Effective consultation with planning
- Adequate supports during implementation
- High motivation and interest
- adequate resources during implementation
- Effective consultation during implementation
- Effective consultation during closing

### **3.3 Study 2**

During this study, Transnet Freight Rail in South Africa was looked at. This organisation has faced project delays in their multi-project environment. South Africa was taken as being representative of developing countries. During the study a Critical Success Factors (CSFs) model was developed for multiple projects success. The goal was to expand the conventional model by adding the demographic characteristics of the business units involved in the multiple projects. It is argued that project participants may have different viewpoints regarding the success criteria for project success.

The empirical analysis of this study consisted of two parts. In the first part the focus was on identifying ten critical success factors for multiple project success. The findings on these factors identified that people factors played the biggest role and made up five of these ten factors. In the table below it can be seen per the ranking that the two most important factors fall within the people category. (Nethathe *et al.*, 2011:200)

**Table 5 - Extended CSFs Model for Multiple projects**

Focus areas	Critical success factor (Rank)	Significant criticality to demographic characteristics
Organisational structure	Encouraging functional managers' support (Rank 3)	Business unit with more than 1,000 employees
Communication type	Monthly review meetings (Rank 9)	Business unit with more than 1,000 employees
	Using email as a type of communication during project life (Rank 10)	Business unit with average employee experience of less than 10 years; Projects initiated by a single source
People characteristics	Selection of an adequate team to run the project (Rank 1)	Same criticality for any demographic characteristic
	Commitment of the project manager, project team, and top management to the project (Rank 2)	Same criticality for any demographic characteristic
	Developing knowledge of new team members on the organisation (Rank 5)	Employee experience of less than 10 years
	Importance of a project manager's communication skills (Rank 7)	Business unit with more than 1,000 employees
	The competence of the project leader and project team in the field where the project is conducted (Rank 8)	Same criticality for any demographic characteristic
Type of project	Design reviews with all stakeholders involved (Rank 4)	Engineering business units
Type of environment	Economic standing of the organisation in funding large projects (Rank 6)	Same criticality for any demographic characteristic

(Nethathe *et al.*, 2011:201)

Certain limitations remain although this study revealed certain critical success factors for multiple projects. The first limitation is that this study is restricted to Transnet Freight Rail in South Africa and similar studies should be done on other project-based businesses in South Africa. Although it is believed that success factors cannot be generalised for all projects, the factors identified in other cases may benefit in identifying possible focus areas for South Africa as a representative of an emerging economy. This study only focused on the identification of critical success factors and not the relationship among these factors. The factors may have positive or negative influences on other factors. (Nethathe *et al.*, 2011:202)

### 3.4 Study 3

The purpose of the study was to identify the quality of project management practices, but more important to the current study the critical success factors for projects in Ghana. This was an exploratory study and surveying was utilised to collect the data within Ghanaian organisations to determine the factors that facilitate project success. Examples of the factors considered were:

- Clarity of project mission and goals
- Top management support

- Effective communication
- Lack of support and finance
- Lack of effective communication.

The study also indicated the importance of attention to be paid to the 4C's to improve project quality, which included:

- Communication
- Commitment
- Competency
- Coordination

Despite the various definitions of what constitute project success and failure factors, drawing conclusions on reasons for the success or failure is as complex as project management itself. It is worth noting from the definitions of critical success factors given by various authors; that the well-known project management “iron triangle” is not the only benchmark for measuring success or failure of projects. The table below indicates the critical success factors as identified by authors. (Ofori, 2013:18)

**Table 6 - Summary of literature reviews on Critical Success Factors**

Critical Success Factors	Authors								
	Pinto & Slevin (1987, 1989)	Kerzner, (1992, 2001, 2003)	Yeo, (2002)	Boyd (2001)	Andersen <i>et. al</i> , (2002)	Hyvari (2006)	Turner & Muller (2005, 2007)	Khang & Moe (2008)	Frese & Sauter (2003)
Clear Project Management objectives	√		√		√			√	√
Top Management Support	√		√		√	√	√	√	√
Information/Communication	√			√	√	√			√
Client Involvement	√	√		√	√	√		√	
Competent Project Team	√					√	√	√	
Authority of the Project Manager/Leader	√				√				
Realistic Cost and Time Estimates	√	√	√	√					
Adequate Project Control	√				√				√
Problem Solving Abilities	√					√			
Project Performance and Quality		√		√					
Adequate Resources	√	√			√	√		√	
Planning/controlling	√	√	√		√		√	√	√
Monitor performance and feedback			√	√		√	√		
Project mission/common goals	√				√	√			
Project ownership	√	√					√	√	√

Source: Critical Success Factors (CFS) identified across publications.

(Ofori, 2013)

Looking at the results obtained from the surveys completed the respondent's selection of critical success factor was based on what they considered to be the most important factors. The respondents were not allowed a multiple selection of factors. In the analysis of the data and as shown in the table below the top seven ranked factors had a frequency of occurrence above 50%, hence the reason why these seven factors will be considered during the current study carried out.

**Table 7 - Ranking of Critical Success Factors for project success**

Variable	Frequency (%)	Rank
Clear mission & goals	75.5	1
Adequate resources	67.1	2
Top management support & commitment	66.3	3
Competency of project personnel	59.0	4
Effective communication	55.2	5
Well-laid out specifications	54.2	6
Leadership	51.8	7
Client acceptance/ satisfaction	45.9	8
Client involvement/ consultation	45.6	9
Teamwork	43.3	10
Monitoring & feedback	40.8	11
Realistic cost & time estimates	39.9	12
Appropriate technology	38.0	13
Standards & regulations	33.3	14
Total (N =156)		

(Ofori, 2013:25)

### 3.5 Study 4

The focus of the study was to understand the relationship between critical success factors in project management and the project's outcomes. In developing the critical success factors the following questions need to be answered.

- What factors lead to success in project management
- What factors lead to successful projects
- What factors lead to consistently successful projects (Osorio *et al.*, 2014:42)

It must however be emphasised that projects recognised by success are still rare despite the growing lists of critical success factors. It should also be noted from this study that critical success factors are general and do not contain sufficiently specific knowledge to support better decision making by the project manager. Factors critical for the success of project are distinguished for different categories of projects and industries.(Osorio *et al.*, 2014:43)

During this study the same critical factors, as indicated in Table 2, were identified and incorporated into this study's questionnaire. To allow better understanding and conceptual unity without losing comprehensiveness and meaning some of the descriptions, were duly adjusted. In

this study the respondents believed the following critical success factors to have the greatest influence on project success:

- Support from upper management
- Efficient communication systems
- Involvement and commitment of stakeholders
- Effective process for hiring suppliers
- Effective control of changes
- Clear and realistic objectives
- Clearly defined and detailed scope
- Project monitoring and control
- Competent and experienced project manager
- Sufficient and well allocated resources
- Realistic budget

It should be noted that the Critical Success Factors analysed herein may be insufficient to guarantee a project's success given the complex scenario in which a project may be inserted. But, as noted in this study, these Critical Success Factors have been considered the most relevant by scholars and project managers. (Osorio *et al.*, 2014:48)

### **3.6 Study 5**

Several researchers have identified various critical success factors that can influence the outcome and success of a project. This study aimed to determine the critical success factors that influence the success of the projects on small to medium sized projects; at a South African mining company, Exxaro Resources' Grootegeluk Coal Mine.. The intention of this study is not to determine a success criteria of projects but to determine the factors that results in success or failure of projects. After the evaluation of responses received from the 236 respondents in this study, over 16 different types of projects and the aspects of those projects, the following criteria for measuring project success can be seen in the table shown below. (du Randt *et al.*, 2014:16)

With the results obtained from this study through multivariate regression analysis the critical success factors which had the most influence on the success of projects in the mining company were as follows:

- Competent project manager
- Project front-end loading
- Political Stability
- Applying project methodologies
- Technical background of the team of a project

Furthermore, the results of an additional investigation suggested that there were correlations among some of the critical success factors; and that certain will have a greater impact on projects than others. This research finds that the single most important critical success factor for small- to medium-sized projects is the selection of a competent project manager. The competent project manager is characterised by a group of interrelated critical success factors such as:

- Good leadership
- Commitment
- Learning from past experiences

It is expected that other mining companies will have similar for their small- to medium-sized projects. Future research should investigate this, and whether parallels can be drawn with other industries executing small- to medium-sized projects in South Africa. (du Randt *et al.*, 2014:27)

**Table 8 - Critical Success Factors for Study 5**

Variables	
CSF 1	Competent project manager
CSF 2	Applying project methodologies
CSF 3	Technical background of the team
CSF 4	Sufficient/ well-allocated resources / No vacancies
CSF 5	Project support in administration
CSF 6	Proven/ familiar technology
CSF 7	Clear, realistic objectives
CSF 8	Project front end loading
CSF 9	Organisational support
CSF 10	User / client involvement
CSF 11	Good performance by suppliers/contractors and consultants
CSF 12	Legislation
CSF 13	Environmental influences
CSF 14	Political stability

(du Randt *et al.*, 2014:22)

**3.7 Summary of Critical Success Factors**

When examining the final summarised critical success factors from the studies obtained, above only 20 of the 27 factors were found to have an influence on the success / failure of projects. The two factors that stood out the most and occurred in 4 of the 5 studies were:

- Support from senior management
- Sufficient/well allocated resources

The following 10 factors occurred only once in the 5 studies and will not be considered further during the study:

- Strong/detailed plan kept up to date
- User/client involvement
- Effective change
- Effective monitoring/control
- Planned close down/review/ acceptance of possible failure
- Training provision
- Political stability
- Correct choice/ past experience of project management methodology/tools
- Environmental influences
- Past experience (learning from)

The table shown below summarises the 20 critical success factors and their occurrence in the studies. The 10 remaining factors will be discussed in more detail below.

**Table 9 - Summary of Critical Success Factors identified in the studies**

Critical Success Factors	Study 1	Study 2	Study 3	Study 4	Study 5
Support from senior management	X	X	X	X	
Clear realistic objectives	X		X	X	
Strong / detailed plan kept up to date				X	
Good communication / feedback		X	X	X	
User / client involvement				X	
Skilled / suitably qualified / sufficient staff / team		X	X		X
Effective change				X	
Competent project manager		X		X	X
Strong business case / sound basis for project			X		X
Sufficient / well allocated resources	X	X	X	X	
Good leadership	X		X		X
Effective monitoring / control				X	
Adequate budget		X		X	
Good performance by suppliers / contractors / consultants	X			X	
Planned close down / review / acceptance of possible failure		X			
Training provision		X			

Critical Success Factors	Study 1	Study 2	Study 3	Study 4	Study 5
Political stability					X
Correct choice / past experience of project management methodology /tools					X
Environmental influences	X				
Past experience (learning from)					X

The 10 factors found in the study with the greatest number of occurrences is summarised in the table below from highest number of occurrences to the lowest.

**Table 10 - Critical Success Factors to be applied on the Company**

Critical Success Factors	Number of Occurrences
Support from senior management	4
Sufficient / well allocated resources	4
Clear realistic objectives	3
Good communication / feedback	3
Skilled / suitably qualified / sufficient staff / team	3
Competent project manager	3
Good leadership	3
Strong business case / sound basis for project	2
Adequate budget	2
Good performance by suppliers / contractors / consultants	2

### 3.8 Conclusion

By analysing articles by various authors, the five studies as discussed in this chapter were identified. From these five studies the list of critical success factors impeding project success were narrowed down from the twenty-seven initial factors to the ten factors as indicated in the table above. These factors will be considered and applied on the company in this study in the analysis of the company in Chapter 4.

## **CHAPTER 4: COMPANY ANALYSIS**

### **4.1 Introduction**

In this chapter the company will be discussed in more detail; and a general background will be given of project management within the company in general. A summary will be provided of the interviews held with key role players involved in project management within the company. The influence of the ten factors as identified in Chapter 3 will be discussed with a ranking given on to each of the ten factors. In Chapter 5 a recommended action plan will be proposed to improve current project management practises within the company to reduce the influence of the top identified factors that impedes the successful management of projects. The layout for this Chapter will be the following:

- General background into project management within the company
- Example of a project and the complete life cycle
- Summary of interviews with key role players
- Influence of the top-rated factors on project management success within the company
- Conclusion

### **4.2 Background into project management**

To be diverse and keep a competitive edge over competitors the Company is forced to enhance site safety, increase efficiency and lower cost of services supplied. Hand in hand with this the Company implemented a strategy with four key strategic pillars and initiatives to support the strategy. The strategic pillars of the Company are as follows:

- Sustainable Growth
- Optimisation and Increased profitability
- Technology Optimisation and Development
- People Capacity and Development

Looking at strategic pillar Technology Optimisation and Development, project management plays a critical role and is key to implementing the initiatives within this strategic pillar. Since the Company is an OEM which manufactures and supports its own equipment there are some advantages and disadvantages in managing research and development projects. Due to the nature of the business and the fact that the Company is production driven, it requires a very flexible project management process that is developed and cultivated in-house.

Project management tools used are tailor-made to suit the Company project management style and includes the following:

- Specification / needs sheet.

- Concept selection matrix.
- Integrated ROI / Capital cost tracker.
- Gantt charts.
- Checklists to ensure all steps are covered in the duration of a project.

The next section of this chapter will explain the process in more detail by giving an example of one completed project with a detailed explanation of each step within the process.

### 4.3 Example of completed project

Identified potential projects will begin by having a kick-off meeting with key role players in the project such as a top management representative, the project leader, representatives from the resource stream and the client. The client in this case for the Company would be the general manager from a specific country, operations managers, or a representative from the mining company, in the case of special or specific projects. During this meeting the specification / needs sheet will be completed to ensure all requirements are clear and that the scope of work to be done could be determined. In the figure below a template for the specification sheet is shown.

General Product Specification Sheet	
<b>Project Name</b>	
<b>Description</b>	
<b>Specifications</b>	
<b>Additional Requirements</b>	
<b>Quality Specifications</b>	

**Figure 5 - Project Specification Sheet**

A desktop study follows the kick-off meeting during which research is done to identify possible concepts per the information obtained from the specification sheet. The criteria for the project is established from the specification sheet. This typically includes the specific requirements, for example must be operated hands free, weight and size limits and method of transportation. Each criterion has a weight assigned of 0 to 5, where 0 is not important and 5 is of very high importance. For each item on the criteria list a score is given as well. The score is from 0 to 3, where 0 does

not satisfy the criteria and 3 fully satisfies the criteria. A weighted total is then calculated per criteria and a total score is given to each concept. From this total score the top 4 concepts will be investigated in more detail. As shown below Concept D was ranked number 1 and Concept B number 4.

	Concept A			Concept B		Concept C		Concept D		Concept E		Concept F		Concept G	
Criteria	Weight	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted
Criteria 1	5	3	15	2	10	3	15	1	5	1	5	1	5	2	10
Criteria 2	3	3	9	2	6	1	3	3	9	1	3	3	9	2	6
Criteria 3	5	2	10	1	5	3	15	3	15	2	10	1	5	2	10
Criteria 4	3	3	9	2	6	2	6	3	9	2	6	3	9	0	0
Criteria 5	4	1	4	3	12	3	12	3	12	2	8	2	8	2	8
Criteria 6	3	3	9	3	9	0	0	3	9	3	9	0	0	0	0
Criteria 7	2	3	6	3	6	2	4	3	6	3	6	0	0	0	0
Criteria 8	1	1	1	0	0	3	3	2	2	3	3	0	0	3	3
Criteria 9	1	3	3	0	0	3	3	3	3	1	1	0	0	3	3
Criteria 10	2	3	6	3	6	3	6	3	6	3	6	2	4	2	4
Criteria 11	4	1	4	3	12	2	8	3	12	3	12	0	0	2	8
Total	3	26	76	22	72	25	75	30	88	24	69	12	40	18	52
Score			76		72		75		88		69		40		52
Rank			2		4		3		1						

<b>Weight</b>	<b>Meaning</b>	<b>Score</b>	<b>Meaning</b>
5	Very high importance	3	Fully satisfies
4	High importance	2	Substantially satisfies
3	Medium importance	1	Partly satisfies
2	Low importance	0	Does not satisfy
1	Very low importance		
0	Not important		

**Figure 6 - Concept selection matrix example**

A concept review meeting is scheduled after further investigation of the top ranked concepts and a final one will be chosen. The return on investment (ROI) is then calculated with the project budget called the ROI tracker. Contained in this document is the following:

- ROI summary sheet
- Capital forecast
- Revenue forecast.
- Assumptions made to do calculations

The figure below shows the return on investment calculated over a 4-year period. The target return on investment percentage for all projects is a minimum of 35%. Indicated in yellow this specific project has a potential ROI of 56%.

Year	0	1	2	3	4
Outflow	- 17 670 146,67	- 3 534 029,33	- 1 767 014,67	- 883 507,33	-
Project revenue stream	2 581 340,53	17 093 760,00	17 057 920,00	17 048 960,00	17 040 000,00
Cost of project	- 4 150 682,73	- 3 766 682,73	- 3 510 682,73	- 3 446 682,73	- 3 382 682,73
Income tax (27%)	423 722,39	- 3 598 310,86	- 3 657 754,06	- 3 672 614,86	- 3 687 475,66
Recoupement (value after project)					5 000,00
Tax rebate depreciation		1 979 056,43	989 528,21	989 528,21	989 528,21
Cash flow	- 18 815 766,48	8 173 793,50	9 111 996,75	10 035 683,28	10 964 369,82
<b>Total project value</b>	<b>19 470 076,87</b>				
<b>Cost of capital</b>	<b>10,25%</b>				
<b>NPV</b>	<b>R9 981 374,97</b>				
<b>ROI (Target 35%)</b>	<b>56%</b>				

**Figure 7 - Return on investment summary**

The capital forecast includes all costs that will be incurred during the project life cycle and is used as a measuring tool during the project lifecycle by comparing the actual cost vs. budget cost. The revenue forecast is done in the same manner and both the capital and revenue forecast used to calculate the ROI is shown in the figures below.

Expenses forecast: (Insert project number)							
Part	Supplier	Qty	Unit Price	Budget	Actual	Date	Notes
Machine	In-house	1	R 6 000 000,00	R 6 000 000,00			
Auxiliary equipment to machine	In-house	2	R 120 000,00	R 240 000,00			
Hydraulic power pack with drive motor	In-house	1	R 561 427,00	R 561 427,00			
Carrier (ADT)	Bell	1	R 5 928 000,00	R 5 928 000,00			
Skid-steer and attachments, 262D	CAT	1	R 823 400,00	R 823 400,00			Still need attachments
Certification and PR Sign-off	External Engineer	1	R 100 000,00	R 100 000,00			
Transport	Jacobs	1	R 50 000,00	R 50 000,00			
Critical spares (10% of total hardware)	Various	1	R 1 260 942,70	R 1 260 942,70			
% Buffer	10	%		R 1 496 376,97			
<b>Totals</b>				<b>R 16 460 146,67</b>	<b>R 0,00</b>		

**Figure 8 - Capital forecast**

Revenue forecast: (Slot Boring Machine)							
Income generating items	Year	Qty	Unit Price	Forecast	Actual	Date	Notes
Tax reclaim for R&D	0	1	R 2 411 940,53	R 2 411 940,53			
Slot drilled at 1m DIA	1	1200	R 14 200,00	R 17 040 000,00			
Tax reclaim for R&D	1	1	R 53 760,00	R 53 760,00			
Slot drilled at 1m DIA	2	1200	R 14 200,00	R 17 040 000,00			
Tax reclaim for R&D	2	1	R 17 920,00	R 17 920,00			
Slot drilled at 1m DIA	3	1200	R 14 200,00	R 17 040 000,00			
Tax reclaim for R&D	3	1	R 8 960,00	R 8 960,00			
Slot drilled at 1m DIA	4	1200	R 14 200,00	R 17 040 000,00			
Tax reclaim for R&D	4	1	R 0,00	R 0,00			
<b>Totals</b>				<b>R 70 652 580,53</b>	<b>R 0,00</b>		

**Figure 9 - Revenue forecast**

The project life cycle actions are tracked by making use of a Gantt chart in Microsoft Excel where the work breakdown structure is done. All actions are indicated on chart with specific start and end dates. The chart is also used to track the progress of the project. Once a project gets to the final implementation stage a commissioning is done off-site where the initial sign-off is done

including a project review. Following this is an on-site commissioning where operation is tracked and changes made if required. The figure below shows a sample Gantt chart drawn up for a project.

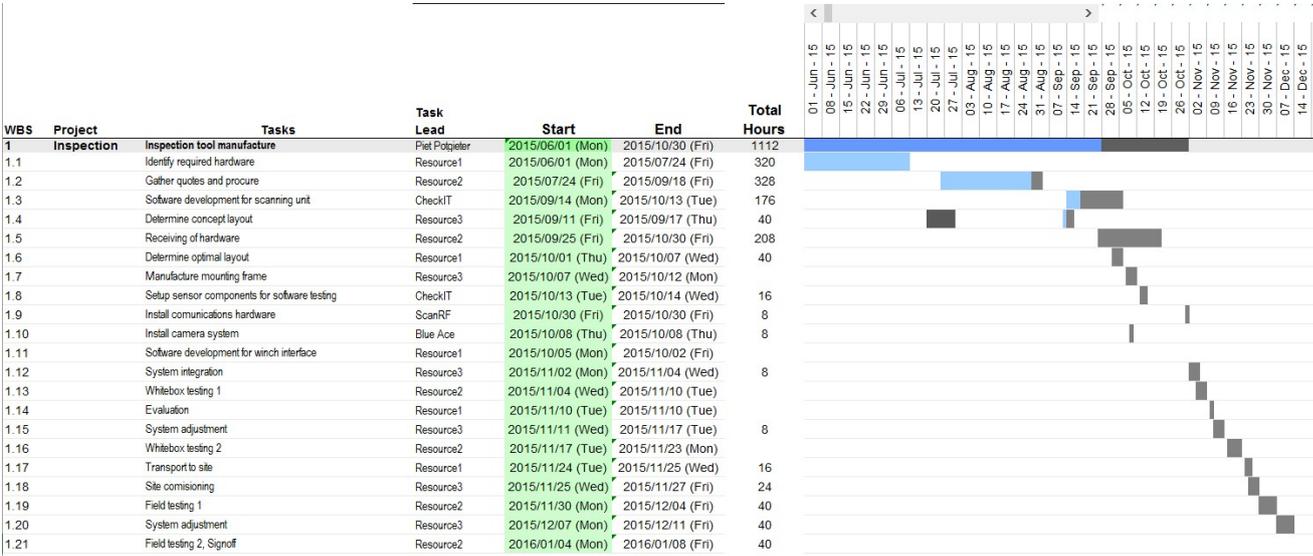


Figure 10 - Sample Gantt Chart

4.4 Summary of interview with key role players.

Although the Company is very project driven, the central project pivot in the Company is one person. This key player in the project execution function at the Company was targeted for an in-depth discussion to test whether the issues that emerged from the literature are also specific to the Company. At the time that was scheduled for this in-depth interview, the individual was required to visit one of the foreign subsidiaries of the Company for a considerable period of time. Due to the time and availability constraints the interview had to be conducted via e-mail correspondence. Questions were sent to the respondent and, based on the answers received, follow-up questions were sent to the respondent. This section will give a summary of the feedback obtained from the respondent.

The role of the respondent within the Company is to manage projects through the process of conceptualising, developing, building and implementing new technologies in the field. As mentioned earlier the nature of the business requires a flexible project management process that is developed and cultivated in-house. As mentioned in the section above, project management tools used are a self-developed tool-set that is tailor made to suit the company project management needs.

The respondent classifies a successful project as follows:

*“One which fulfils the needs and goals stated in the start of the project, with feedback from the field for improvements that become new projects”*

The response given as to which factors have the biggest influence on success of projects are as follows:

- *An effective command structure*
- *Clear goals and objectives*
- *Well defined budgets*
- *Timelines and operating parameters*
- *Access to resources and material*

The respondent's reason given as to why the above-mentioned factors have the biggest influence can be summarised as follows:

Effective command structure

*“Any successful endeavour that involves more than two people, requires an effective command structure to be successful. This ensures clear communication channels, effective autonomous decision making and an easy approval process”*

Clear goals and objectives

*“One cannot set out to resolve a problem before not knowing what the problem is. The problem definition phase of a project is crucial. Without properly defined goals and objectives, a project can easily go on indefinitely, or fail prematurely.”*

Well defined budgets, timelines and operating parameters

*“Parameters and set rules need to be decided upon before the project commences. This serves to guide the project team and serves to empower them by making the allowable operational parameters clear to them. Within these, decisions can be made correctly and swiftly on the correct level of command.”*

Access to resources and material

*“You can't bake a cake if you are not allowed to go to the store for eggs and milk. And you need the right eggs and milk if you want to bake a fancy cake”*

With all the information received from the respondent, the table of the ten factors identified in Chapter 3 were presented and the respondent was asked to rate these ten factors on a scale from 1 to 5, with one being the lowest ranking and five being the highest. As can be seen from

the results obtained in the table below the factor with the highest ranking were good performance by suppliers/ contractors/consultants which can also be linked to the above-mentioned factor identified as access to resources and material. Good leadership was the lowest ranked factor out of the ten factors presented which within the Company doesn't have an influence on the success or failure of projects. The table below gives an indication of the ranking given to the ten factors and will be discussed in the next section.

**Table 11 - Critical success factors rated by Respondent 1**

Critical Success Factors	Rating 1 to 5 (1=lowest, 5=Highest)
Support from senior management	2
Sufficient/well allocated resources	4
Clear realistic objectives	2
Good communication / feedback	3
Skilled / suitably qualified / sufficient staff / team	3
Competent project manager	2
Good leadership	1
Strong business case/ sound basis for project	2
Adequate budget	3
Good performance by suppliers/contractors/consultants	5

During the analysis of the feedback provided by the respondent, there was a need for a more in-depth investigation into project management within the Company. Interviews were conducted with five more role players, also employed in the Company, involved in different phases of project management within the Company. The first respondent above will be referred to as Respondent 1 and the interviews with the next five respondents will be summarised below with the key responses obtained. They were also asked to rate the ten factors as indicated above which will be summarised and discussed in the next section.

#### 4.4.1 Respondent 2

Respondent 2 is a design engineer, involved in the majority of the research and development projects. When asked which process is followed to manage projects within the Company, he responded with the following:

*“The requirement is usually set, then there is worked on a concept, with a few iterations and a design review held. The first proto type is then built and sent for field testing, after which changes and improvements are done if required. Then the project is signed off for production.”*

The respondent classified a successful project as one which enables the stakeholders to improve production and work safer, smarter and improve efficiency of production. Once this is verified and signed off by all stakeholders the project is successful. Per the respondent, the factors having the biggest influence on project success are:

- *Support from senior management*
- *End-user training and support*
- *Reasonable timeline to complete projects*
- *Proper defined scope*

He also responded with the following comments:

*“The operator or end-user can make a project work or fail if they are not willing to use the part or product they will find way to make the successful implementation fail. Without training material or training the end-user can only assume how the product works and might have the wrong understanding of the functions of the part or product. When you rush to finish something, you might not take all the factors into consideration and get the necessary input from all the involved parties.”*

From the table below the respondent regarded sufficient / well allocated resources and good communication / feedback as the top factors influencing project success with Good performance by suppliers/contractors/consultants as the factors with the lowest influence.

**Table 12 - Critical success factors rated by Respondent 2**

Critical Success Factors	Rating 1 to 5 (1=lowest, 5=Highest)
Support from senior management	3
Sufficient/well allocated resources	5
Clear realistic objectives	4
Good communication / feedback	5
Skilled / suitably qualified / sufficient staff / team	3
Competent project manager	4
Good leadership	4
Strong business case / sound basis for project	2
Adequate budget	3
Good performance by suppliers/contractors/consultants	1

In addition to the rating provided by the respondent, the following comments and recommendations were also made:

*“For a project to be successful most of the above-mentioned criteria is crucial, thus giving more attention to one that the other will also be the downfall of a project. What I have found on our project that have struggled to perform is that they are mostly due to lack in training and support documentation and the roll-out of certain projects to the rest of the group is not followed through causing repetitive delays in production.”*

The respondent recommended that training, support material and a revision control register to be added to the above ten factors.

**4.4.2 Respondent 3**

Respondent 3 is involved in projects for one of the South American offices in the group. For the most part the respondent is involved in the implementation portion of projects and from the

interview it was clear that the respondent is not 100% sure what process the Company follows when managing projects to proceed to the final implementation stage. In summarising the interview, planning of resources, clear defined steps to reach objectives and follow up meetings to track project progress were some of the biggest influences on project management per the respondent. Looking at the ratings given to the top ten factors as identified in Chapter 3 the top-rated factor influencing the success of projects is Clear realistic objectives with Strong business case/ sound basis for project given the lowest rating.

**Table 13 - Critical success factors rated by Respondent 3**

Critical Success Factors	Rating 1 to 5 (1=lowest, 5=Highest)
Support from senior management	3
Sufficient / well allocated resources	4
Clear realistic objectives	5
Good communication / feedback	4
Skilled / suitably qualified / sufficient staff / team	3
Competent project manager	3
Good leadership	3
Strong business case / sound basis for project	2
Adequate budget	4
Good performance by suppliers/contractors/consultants	3

**4.4.3 Respondent 4**

Respondent 4 is a mechanical engineer involved in new product development projects and has the responsibility to manage a selected project from start to finish. It was clear from the interview that Respondent 4 knows and understands how the project management process within the company works. *“A project is successful when all the objectives are met inside the budget and*

*within the deadline*”, was the response received when asked what was classified as a successful project.

The following factors that have the major influence on the success of projects, were identified by the respondent. The main reason that these factors have the major influence on the success of the project were due to delays and cost overrun during the project life-cycle.

- Equipment Compatibility
- Delivery times of equipment
- Limited budget

**Table 14 - Critical success factors rated by Respondent 4**

Critical Success Factors	Rating 1 to 5 (1=lowest, 5=Highest)
Support from senior management	2
Sufficient/well allocated resources	3
Clear realistic objectives	4
Good communication / feedback	2
Skilled / suitably qualified / sufficient staff / team	4
Competent project manager	3
Good leadership	3
Strong business case / sound basis for project	4
Adequate budget	3
Good performance by suppliers/contractors/consultants	2

**4.5 Influence of the top-rated factors on project management within the Company**

The responses from the respondent on the critical success factors are summarised in the table below. From the table, the five factors impeding success of projects from high to low is the following:

- Sufficient/well allocated resources
- Clear realistic objectives
- Good communication / feedback
- Skilled / suitably qualified / sufficient staff / team
- Adequate budget

These factors will be referred to in the matrix to follow as CSF1, CSF2, CSF3, CSF4 and CSF 5 in order as mentioned above.

**Table 15 - Critical Success Factors Rated by Respondents Summarised**

Critical Success Factors	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Total
Support from senior management	2	3	3	2	10
Sufficient/well allocated resources	4	5	4	3	16
Clear realistic objectives	2	4	5	4	15
Good communication/ feedback	3	5	4	2	14
Skilled/suitably qualified/ sufficient staff/team	3	3	3	4	13
Competent project manager	2	4	3	3	12
Good leadership	1	4	3	3	11
Strong business case / sound basis for project	2	2	2	4	10
Adequate budget	3	3	4	2	13
Good performance by suppliers/contractors/consultants	5	1	3	2	11

The factors proved by the respondents before they had the list of factors identified from the literature were:

- An effective command structure
- Clear goals and objectives
- Well defined budgets
- Timelines and operating parameters
- Access to resources and material
- Support from senior management
- End-user training and support
- follow up meetings to track project progress

In the matrix to follow, the above-mentioned factors will be referred to in the order as mentioned above as RF1, RF2, RF3, RF4, RF5, RF6, RF7 and RF 8.

**Table 16 - Matrix table showing relation between factors**

Critical Success Factors	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8
CSF1					X			
CSF2		X						
CSF3								X
CSF4					X			
CSF5			X					

From the matrix, above it can be noted that, between the respondents identified, the five critical success factors before they were asked to give a rating on the factors identified during the review of studies as were done in Chapter 3 which indicates that the factors identified although coming from different types of projects impedes the successful management of project to some extent. The top 5 factors that will be compared to the best practices in project management identified in Chapter 2 is the following; with an explanation, why it impedes the successful management of projects within the Company:

- Sufficient/well allocated resources.

*“Four years ago, the Company used to have a flat structure which from an engineering point of view meant that no-one was tasked to specifically be responsible for, for example project / design office, product support, continuous improvement and research and development. Everybody got a piece of the pie. With the Company growing at least 20% per annum management were forced to add some structure to the engineering department. The functions were split between the abovementioned areas in the engineering department and resources were allocated to specific areas. The engineering department grew from 5 people initially to 19 people today with 13 of the 19-people assigned to the project / design office. This was done only in South Africa since it is the head office and most projects are initiated from SA and due to the unique products used by the Company there is a huge challenge when outsourcing specifically the design work.”* This was the response given by Respondent 2 when he was asked why this factor was seen to have the biggest influence on the success of projects.

- Clear realistic objectives.

It was found by summarising the responses from the interviews that in some projects, clear realistic objectives were not set and agreed to during the initial stages of the projects. This meant that time went into concept selection and planning. During concept reviews the objectives changed which impeded most projects by at least a month or two. The other influence with regards to objectives not being realistic was the time frame in which these objectives must be reached. A popular quote used within the Company says: *“The train is moving and not standing still”*.

- Good communication / feedback.

Communication is key to the success of projects. Running multiple projects at the same time with only a limited resource pool is very challenging. Priorities change daily within the Company depending on requirements. The execution of certain projects are required to be fast tracked at stages. This results in another project falling behind schedule. Running projects from South Africa, for other countries has its own challenges. This makes it very difficult to communicate, and to obtain the required feedback when needed. Another restriction is the language barrier influencing communication. Currently there is not visibility on a system such as SharePoint or a Dashboard where all projects are tracked and made visible to all stakeholders. Deviations from the project plan are not formally loaded on a system as a non-conformance and investigated properly; with preventive actions put in place to reduce the influence of deviations and or to ensure there is no reoccurrence of the same deviations.

- Skilled/suitably qualified / sufficient staff / team.

This factor has a strong link to the first factor identified. This is an indication that resource management is the most critical part of project management within the Company. An exercise needs to be done to determine the ability of resources within the Company.

- Adequate budget.

The description “adequate budget” explains itself. If the budget allowed by management is not sufficient, the influence on the success of a project is almost certain. Almost all factors have an influence on the budget. For example, if you require additional resources to complete the project earlier than agreed, which will cost a lot of money as it will be mostly outsourced. If the objectives change during the project life cycle it will influence the initial budget. Looking at the responses obtained, a smaller project does not follow the complete life cycle as mentioned above. In some cases, a budget will be estimated, based on previous experiences. 90% of the time the actual cost exceeds the budget.

During the interviews, there was a need to establish if any of the above factors impeding the success of projects and project management were listed on a system within the Company as non-conformances. No concrete evidence was available to support the findings of the interviews, which either indicates a lack of proper control on the deviations, or the fact that the non-conformance system is not properly utilised within the Company.

By looking at the best practices as discussed in Chapter 2, the above factors identified fall within the following four knowledge areas as paraphrased by the PMBOK® Guide:

- Integration management
  - Clear realistic objectives
- Human resource management
  - Sufficient / well allocated resources
  - Skilled / suitably qualified / sufficient staff / team
- Cost management
  - Adequate budget
- Communications management
  - Good communication / feedback

The focus should be placed on improving the management of these four knowledge areas. The recommended action plan to improve the management of the below mentioned will be discussed in more detail in Chapter 5.

## **4.6 Conclusion**

One of the secondary objectives of this study was to identify the factors impeding project success in the Company through semi-structured interviews with key role players within the Company. Project management within the Company were explained in more detail and the top 5 factors were identified in this chapter. The next chapter will present the recommended action plan to reduce the influence of the identified factors and improve the successful management of projects.

## **CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

The primary objective of the research was to determine which factors impede successful project management in a specialised global drilling services company. A literature study was conducted in Chapter 2 to determine the factors impeding the success of projects and the management thereof. This sets the context for the case study analysis in Chapter 3 to narrow the 27 identified critical success factors. Chapter 4 summarises the analysis of project management within the Company. A background was given into project management within the Company and semi-structured interviews with key role players were conducted. The 10 critical success factors as identified in Chapter 3, were narrowed down to 5 factors that had the greatest influence on project success.

The aim of the final chapter is to present the recommended action plan to improve project management within the Company; and reduce the impact of the 5 identified factors by focusing on the 4 knowledge areas as discussed at the end of Chapter 4. The research will be critically evaluated against the primary and secondary objectives that were established in Chapter 1. The limitations of the study will be discussed and recommendations will be for further studies related to the same topic. In summary, the layout for Chapter 5 will be as follows:

- Recommended action plan
- Evaluation of the research
- Limitations of the study
- Recommended future research
- Overall conclusion of the research

### **5.2 Recommended Action plan**

Based on the results obtained from Chapter 4, the focus needs to be placed on the following 4 knowledge areas as paraphrased by the PMBOK® Guide:

- Integration management
- Human resource management
- Cost management
- Communications management

However, one needs to look at the “Quick Wins”, which are actions that can be carried out immediately to reduce the impact of the above-mentioned factors, and increase the probability of project success.



**Figure 11 - Success or Failure**

The “Quick Wins” will be to focus on improving Cost management and Communications management after implementing the recommended actions that will be discussed in more detail below. In-depth focus should be placed on Integration management and human resource management.

### **5.2.1 Cost Management**

It is said that a project is more of a shape shifter than being static. The project budget can start to overspend as the project progresses through its life-cycle. This makes it very important for the person tasked to control the cost of the project to stop the over-expenditure before it happens. A project can be satisfactory to the Company and completed within time. But if the project overspends it will not be successful. Hence the reason why the project budget must be managed carefully to stop overspending. How can overspending be stopped? The following 4 action points will assist in managing the budget of projects. (Kildrummy, 2014)

#### **5.2.1.1 Keep Tabs on Scope Change**

Scope creep is a primary reason for project overspends. Once unplanned work begins to accrue, man hours that should have been billed can begin to spiral out of control. By creating budget revisions to cover over expenditure not initially anticipated, and getting it authorised by the project lead, can assist in keeping scope change under control and ensure that it is correctly sanctioned. It is critical that the project lead in the Company be aware of all the changes to scope, to ensure that project overspending is limited by ensuring budget revisions are done on a regular basis.

### **5.2.1.2 Communicate with Your Team**

According to Kildrummy (2014) a project is only as good as its team, and a team with poor communication is a team doomed for failure. Of course, this means that a team that talks is more likely to see success and take ownership of their project. This ownership will fuel a sense of belonging, causing them to keep a better eye on their aspect of the project. Communication can be in the form of:

- Informal chats
- Formalized weekly meetings
- Monthly progress meetings.

The above mentioned will assist to help glue the project team together, for future projects to succeed. A practical approach to achieve this would be to separate projects within the Company, down into different tasks that could be applied to a reporting structure. This gives a more 'real world' feel to the tasks that the project is dependent on. A group or single cost engineer could then be assigned to a 'branch' of the structure. Each branch would communicate their results and issues in each meeting as the project progresses.

### **5.2.1.3 Regularly Forecast Your Budget**

Never approach forecasting by only looking at it during the initiation stage of the project. Updating and managing an evolving forecast is a requirement for any project and should be actioned as soon as possible by the respective project teams within the Company. Make it a point to discuss budget management and forecasting at your team meetings. Without control, your project will likely be destined for failure or at least major overspends. Talking to your team about upcoming spends frequently can stop it from getting out of hand before it starts and usually there would be recommendations from project team member to reduce the cost overspending. After all, a small and controlled overspend is better than a larger, unexpected one.

### **5.2.1.4 Plan for Future Resources**

Similarly, to updating your budget forecasts, it is important to keep track of your resource usage. The people working on a project, such as contractors, may well have their own costs associated with the project. Cost control teams should frequently review the number of staff and contractors working on a project, as the changes in their numbers will feed into future resource requirements. This information will help feed into other potential forecasts and further inform you of any future overspends on your project.

Whilst the use of the above tips does not guarantee that your project will be a success, it will assist the project team within the Company to understand and control it. Remember to regularly

review with the project team, keep tabs on scope creep, forecast your budgets, plan for future resources and manage progress to ensure your project, has the best possible chance of success.

All the above-mentioned can assist in controlling cost and by looking at previous projects and applying the above it will assist in ensuring an adequate budget can be done for future project to be signed off the project lead and management involved in project management within the Company.

## **5.2.2 Communication management.**

One of the common problems executives and team members face within the Company is poor project communication. According to Gurunathan (2016) in a study conducted by the PMI, “Ineffective communications is the primary contributor to project failure one third of the time, and had a negative impact on project success more than half the time.” Communication gaps exist not only within projects but even at an organisational level. A 2012 study by Salesforce says, 86% of the executives cite ineffective communication as a reason for workplace failures. Gurunathan further states that it is no surprise that communication gaps further lead to undesirable consequences such as:

- Incorrect assumptions within teams
- Unnecessary friction
- Increased churn
- Rumour mongering
- Lack of trust
- Low morale

When executives are posed with these challenges, their immediate reaction is to deploy a tool. Ironically, there are more communication tools at our disposal now than ever before. Yet we are less communicative. For the Company to improve the management of communication within the project environment the following is recommended and will be discussed in more detail below:

- Clearly define meeting objectives
- Ensure the correct people is invited
- Encourage Participation
- Manage Conflict
- Assign Action items.(Ferguson, 2010)

### **5.2.2.1 Clearly Define Meeting Objectives**

The first step for improving a project manager's communication with teams, is to define clear meeting objectives. Are you trying to solve a problem, decide, brainstorm a new idea, or provide

a project update? The objective for the meeting should determine the setting and tone for the meeting.

Include meeting objectives to the correspondence when inviting team members to participate. This enables potential attendees to decide if the meeting is appropriate for them. Provide enough information for the team to prepare adequately for the meeting. In doing so, the project manager will not need to devote as much time at the beginning to explain the purpose for the meeting. Providing the meeting objectives in advance will also give the team members time to think about the objectives.

Providing team objectives to the meeting invitation creates structure for the meeting. Without structure, the group may deviate from the topic at hand, wasting valuable time for the participants. Objectives provide the framework required to focus and stay on track.

#### **5.2.2.2 Invite the Right People**

Once the project manager determines the meeting objective, it is important to invite the right people to the meeting. If the project manager fails to invite the people required to complete the objective for the meeting, an extra meeting might result. This is unproductive for the project manager and the participants.

When making decisions in a group meeting, be sure to include representation from all major stakeholders. Involving the right people helps create buy-in to decisions. Involving the correct people early in decision-making will more likely produce support for the decision instead of causing resistance at a point down the road. To identify major stakeholders, break the meeting objective into smaller sections, and identify the people needed to address each section.

Ask the meeting invites if they have recommendations for people who should also attend. If the right people are not able to attend the meeting, consider rescheduling, or look for alternative ways to communicate with them.

#### **5.2.2.3 Encourage Participation**

Having the right people in the room is not enough. Once the project manager involves the right people, another key role for an effective project manager is to encourage participation. The project manager must facilitate the discussion in such a way that people are comfortable sharing ideas during the discussion. Everyone should have an opportunity to speak.

Encourage open dialog between the participants, but ensure the conversations stay on track. Be watchful of controlling individuals. Those with dominant personalities can quickly control conversations. The project manager should foster open communication between the participants.

Conducting a “round-robin” is one approach to encouraging participation. Ask each meeting participant to express their view on the topic. This will provide less dominant people an opportunity to speak.

#### **5.2.2.4 Manage Conflict**

Whenever you gather a group of people together to work on a problem, the possibility of conflict between the participants exists. Conflict between members of a group can negatively affect the productivity of the group. It is important for a project manager to anticipate and manage conflict between group members.

The project manager should listen for the underlying messages during the conversations. Personal agendas will create conflict if not carefully managed. The project manager should seek to understand where each person’s opinion, and encourage participants to expand on their view so others can understand.

The project manager should encourage all to listen to each person’s opinions without passing judgment. Doing so will assist each participant in respecting each other’s opinion.

#### **5.2.2.5 Assign Action Items**

The purpose of meeting as a group is to make decisions and to assign resources to work on identified tasks. Ensure everyone has clear understanding about what you expect individuals to do. The project manager should assign action items to specific people, not to groups of people. Doing so will increase the accountability for the assigned task. The task should be descriptive, and should include an agreed to due date. Quickly summarise at the end of the meeting. Send meeting notes and assigned tasks to all meeting attendees within 24 hours.

In summary by focusing on the actions above it will assist the project team in preparing, collaborating, and focussing. Each member involved will know and understand the expectations of a project.

### 5.2.3 Integration Management

Integration management ties together components from all other project management knowledge areas: scope, cost, time, quality, risk, human resource, communication, and procurement management. Ultimately, this integration is focused on completing the project. During the planning stages, however, integration management focuses on drafting a viable project plan.

The project plan is a critical juncture through which projects pass. In creating the project plan, quantitative and qualitative information is integrated into a document describing how a project should progress. It puts processes in place to move through the implementation and close-out of a project. As these processes are executed, further integration is necessary to successfully complete the project.

The above scenario assumes a project goes as planned. If changes are introduced into a project, it is necessary to coordinate these modifications. Change control is another important aspect of integration management. (Anon, 2016)

The project plan is the point to which all planning converges and from which all implementation diverges. In this sense, it is a clear picture of the project at one instance in time. The project plan may undergo extreme revisions during its concept and development. Similarly, the project itself may change drastically during its implementation and close-out. Projects managers should recognise that projects can be flexible and dynamic, but must also be as well defined as possible. The project plan is an important document to define the project at a critical instance.

The project plan may be composed of several components that can be quite specific to an organisation. A project plan might include the following parts:

- Project overview
- Project organisation
- Management practices (project monitoring, status reporting, communications, change management)
- Project scope (tasks, methodology, deliverables)
- Project schedule
- Project budget
- Quality plan
- Risk plan
- List of deliverables
- Summary

According to Warner (2011) Integration management is the project management knowledge area that includes processes that are required to ensure that all the projects components are co-ordinated correctly in order to achieve the project goals. To help you better co-ordinate and manage the various elements of the project, may I suggest four keys to integration management:

- Obtain Buy-In
- Create a Plan of Attack
- Be Willing to Make Trade-offs
- Learn from Your Mistakes (And Successes)

### **5.2.3.1 Obtain Buy-In**

For integration management to be effective, you need to obtain buy-in from key stakeholders and team members. Obtaining buy-in from the start will ensure that your project receives the support and funding needed for it to be successful.

To obtain buy-in, start by creating a project charter and a preliminary scope statement. The project charter initiates the project and includes the necessary approvals and sanctions. It gives the project manager authority to act and apply organisational resources to the project. The charter defines the objectives and participants in a project, with the preliminary delineation of roles and responsibilities.

Together with the project charter, you will need to develop a preliminary scope statement. This is a high-level definition of the project scope and defines the reasons for undertaking the initiative, the objectives and constraints of the project, directions concerning the solution, and identifies the main stakeholders. The document further defines the project's product or service, methods for approval, and tactical strategies for the change control process.

With the project charter and preliminary scope statement in hand, you have the ammunition, and most importantly, the authority to guarantee that resources are co-ordinated and scheduled in the manner and time you request.

### **5.2.3.2 Create a Plan of Attack**

Now that there is a project charter and the objectives of the project have been clearly defined, it is time to create a plan of action. Start by identifying the activities needed to effectively execute, manage, and monitor the project. Project management software can help with this step and allows you to plan and monitor the project from anywhere at any time. The software helps you create the project timeline and tasks, allocate the required resources, and get the day-to-day status updates needed to effectively manage the project.

As the plan is developed, verify that the team agrees. Make sure each team member can login to the project management software and ensure that they all know how to update their task completion status. Performing this simple step will make reporting and monitoring more accurate and timely.

### **5.2.3.3 Be Willing to Make Trade-offs**

One of the biggest challenges that will be faced in executing the project is managing people, their opinions, and the changes they request. For the project manager or project lead to be effective, they must be willing to compromise. Everybody won't get everything they want, but the project should meet the objectives and requirements established in the project charter.

Orchestrate how the team implements the project plan and make sure they complete the work required in the Project Scope Statement. Monitor and control the project work by measuring and balancing the progress of the project. Take corrective or preventative actions as needed to assure that all objectives are being met.

Use the pre-established process for change requests and ensure that all changes go through the proper channels before they become a part of the plan. Evaluate all change requests and approve the changes that will assist to meet the project objectives. Only validated and approved changes should be implemented.

### **5.2.3.4 Learn from Your Mistakes (And Successes)**

Hopefully, before commencing a project, it must be clearly defined that what it means for the project to be complete. As the project finishes up, verify that all the project activities are complete and that the final product or service meets the expectations of the client and/or stakeholders. Obtain a written approval of the project completion.

Once the project has been formally closed, it is now time to learn from your mistakes and successes. Organise a formal review meeting and hold a brainstorming session where you list all the mistakes made during the project. Now make a list of everything that was successful. How can one learn from this experience? What are the takeaways from project and how can one prepare for these challenges in the next project? This exercise will build team camaraderie and will help the project manager be more effective in the next project

## **5.2.4 Human resource management**

Resource Capability Planning is one of the key success factors for any business which delivers projects or services. With Resource Capability Planning the business has the power to analyse

the impact of delivering projects and services on resource capability in real time, enabling the Company to better manage customer expectations, improve overall business productivity, exceed customer service level agreements and reduce costs. Although the Company may be small or large, resource capability planning is vital to any business and provides a clear and consistent visual representation of the “book of work” and how it will be delivered. It also provides an essential tool for planning the Company growth.

Managing resources and resource scheduling provides an essential component for establishing the feasibility of the project plans and for setting realistic customer expectations. By scheduling resources before projects commence, the project managers will be able to assess the flexibility they have over the use of specific resources, align tasks and work packages with resource availability, and where resources are unavailable and delays are not an option, project managers can consider alternative approaches, trade-offs or the re-prioritization of work. For businesses with less structured or more volatile resourcing requirements, resource scheduling provides the ability to optimise resource utilisation levels. they increase revenue by providing the ability to quickly assign best fit available resources based on skills, experience and location, to efficiently fulfil resource requests and to manage out resource conflicts.(Needs, 2014)

The key component of all projects is the human resources on the project. Be sure to plan properly for human resources to ensure success. The Human Resource Plan is a tool which aids in the management of all projects. At the very least it defines things such as roles and responsibilities, organisational charts, how resources will be acquired, time when each resource will be needed and any specialised training requirements. Below a recommended Human Resource plan template will be discussed that can aid in improving Human Resource Management within the Company.(Piscopo, 2015)

#### **5.2.4.1 Introduction**

This section of the Human Resource Plan explains the purpose and importance of having a human resources management plan. It should provide a general description of what the plan includes and explain how the project manager and project team can use the plan to help them manage the project effectively.

For example, Human resources management is an important part of the Software Upgrade Project. The human resources management plan is a tool which will aid in the management of this project’s human resource activities throughout the project until closure. The human resources management plan includes:

- Roles and Responsibilities of Team Members Throughout the Project
- Project Organisation Charts

- Staffing Management Plan to Include:
  - How resources will be acquired
  - Timeline for resources/skill sets
  - Training required to develop skills
  - How performance reviews will be conducted
  - Recognition and rewards system

The purpose of the human resources management plan is to achieve project success by ensuring the appropriate human resources are acquired with the necessary skills. Resources are trained if any gaps in skills are identified. team building strategies are clearly defined, and team activities are effectively managed.

#### **5.2.4.2 Roles and Responsibilities**

Roles and responsibilities of team members and stakeholders must be clearly defined in any project. Depending on the organisational structure, project team members may represent many different groups/departments and act in the interest of different functional managers. Additionally, team members may have varying degrees of authority and responsibility. When listing roles and responsibilities the following should be included:

- Role – description of the portion of the project for which the member is accountable
- Authority – the level at which the member may make decisions, apply project resources, or make approvals
- Responsibility – the work a team member must perform to complete assigned work activities
- Competency – the skill(s) required to complete assigned project activities

#### **5.2.4.3 Project Organisational Charts**

In this section the Human Resource Plan provides a graphic display of the project tasks and team members. The purpose of this is to illustrate the responsibilities of team members as they relate to the project tasks. Tools such as responsible, accountable, consult, inform (RACI) or responsibility assignment matrix (RAM) may be used to aid in communicating roles and responsibilities for the project team. Additionally, organisational or resource breakdown structures may be used to show how responsibilities are assigned by department or by type of resource respectively. It should be noted that the level of detail may vary depending on project complexity. The following RACI chart shows the relationship between project tasks and team members. Any proposed changes to project responsibilities must be reviewed and approved by the project manager. Changes will be proposed in accordance with the project's change control process. As changes are made all project documents will be updated and redistributed accordingly.

**Table 17 - RAM matrix sample**

	<b>Project Manager</b>	<b>Design Engineers</b>	<b>Implementation Manager</b>	<b>Training Leads</b>	<b>Functional Managers</b>	<b>Department Managers</b>
<b>Requirements Gathering</b>	A	R	R	C	C	I
<b>Coding Design</b>	A	R	C		C	I
<b>Coding Input</b>	A	R				
<b>Software Testing</b>	A	R	C		I	I
<b>Network Preparation</b>	A	C	R		I	I
<b>Implementation</b>	A	C	R	C	C	C
<b>Conduct Training</b>	A			R	C	C

Key: R–Responsible for completing the work A – Accountable for ensuring task completion/sign off C – Consulted before any decisions are made I – Informed of when an action/decision has been made.

#### **5.2.4.4 Staffing Management**

This part of the Human Resource Plan contains information on several areas including: when and how human resource requirements will be acquired, the timeline for when resources are needed and may be released, training for any resources with identified gaps in skills required, how performance reviews will be performed, and the rewards and recognition system to be used. It is important to note that depending on the scope of the project there may be other items included in staffing management (government and/or regulatory compliance, organisational health and safety, etc.).

### **5.3 Evaluation of the Study.**

To determine if the research was successful it needs to be critically evaluated to determine if the primary and secondary objectives were achieved as given in Chapter 1.

### 5.3.1 Primary Objective

The primary objective of the research was to determine what factors impede successful project management within a specialised global drilling services company. To evaluate if the **primary objective** was achieved, the following research questions as stated in Chapter 1 needed to be answered:

- **What factors impedes successful management of projects within the company?**

To be able to understand what factors impede the successful management of project a literature study was conducted. From several publications, the list of critical success factors was identified. This list was further narrowed down by making use of semi-structured interviews to narrow the list down to the top 5 critical success factors. In summary, it can be said that the primary objectives were achieved and the top 5 factors impeding the successful management of projects are as follows:

- **Clear realistic objectives**
- **Good communication/ feedback**
- **Skilled/suitably qualified/ sufficient staff/team**
- **Adequate budget**
- **Sufficient/well allocated resources**

### 5.3.2 Secondary Objectives

The secondary objectives of the study were the following:

- Identify the factors that impedes project success
- Compare the factors identified in the literature review to recent studies done on the same topic
- Narrow the list of factors down by doing a research to saturation on studies done in the same field
- Identify factors impeding project success in the Company through a semi-structured interview with key role players
- Provide recommendations to reduce the impact of the factors identified on successful project management in the Company to retain a competitive advantage

The secondary objective to identify the factors that impede project success were identified in the literature study done in Chapter 2. The comparison of these factors through analysing case studies relating to the same topic were achieved and presented in Chapter 3. The critical success factors were narrowed down to a list of ten critical success factors and applied to the Company

project management environment in Chapter 4, to determine the which of these factors had the greatest influence on project success. Recommendations to reduce the impact with an action plan were discussed in Chapter 5. It can be concluded that all the secondary objectives as set out in Chapter 1 for the research study were achieved as intended.

#### **5.4 Limitations of the study**

This research study had a few limitations. The main limitation was that the number of available respondents involved in project management within the Company was too small to do a quantitative study in the form of a survey.

#### **5.5 Suggestions for further research**

The results of this research will assist to give greater insight on the factors impeding the success of project management. The findings of this study will help to identify recommended solutions to reduce the impact of these factors so that the Company can manage projects more successfully.

#### **5.6 Overall Conclusion**

It can be concluded that the primary objective of this study which was to **determine what factors impede successful management of projects within the Company** were achieved. The results obtained from the literature review and qualitative study highlighted that the following ten factors had the greatest influence and impeded the successful management of projects: Support from senior management, Sufficient/well allocated resources, Clear realistic objectives, Good communication/ feedback, Skilled/suitably qualified/ sufficient staff/team, Competent project manager, Good leadership , Strong business case/ sound basis for project, Adequate budget and Good performance by suppliers/contractors/consultants. Applying these identified factors to the Company resulted in the five factors identified in Chapter 4.

Recommendations, based on the findings of the study, were offered to the Company to improve the project management process and reduce the impact of the identified factor on project success.

The research study was critically evaluated against the primary and secondary objectives as set out in Chapter 1. The study was found to be successful since both the primary and secondary objectives were achieved.

Recommendations were made for future research not only to the specific Company but also the researchers aiming to do research into the same field or topic.

## REFERENCES

Anon. 2005. Read "measuring performance and Benchmarking project management at the department of energy" at NAP.edu: The National Academies Press.

Anon. 2010. The value of project management. <http://www.pmi.org/-/media/pmi/documents/public/pdf/white-papers/value-of-project-management.pdf> Date of access: 2016-10-25.

Anon. 2016. The use of project management knowledge areas for integration management.

Brynard, P.A. & Hanekom, S.X. 2006. Introduction to research in management-related fields. 2nd ed. Pretoria: Van Schaik Publishers.

Cryer, P. (2006). The research student's guide to success (3rd ed.). Berkshire, England: Open University Press.

du Randt, F.J., van Waveren, C.C. & Chan, K.-Y. 2014. An empirical study on the critical success factors of small- to medium-sized projects in a South African mining company. *South African Journal of Industrial Engineering*, 25:13-28.

Ferguson, J. 2010. 5 tips for improving project communications.

Fichtner, C. 2015. PMBOK knowledge areas for project management guide 5th edition - process groups and processes - the complete guide.

Fortune, J. & White, D. 2006. Framing of project critical success factors by a systems model. *International Journal of Project Management*, 24(1):53-65.

Gurunathan, A. 2016. 4 Simple Ways to Improve Project Communication. <https://www.linkedin.com/pulse/4-simple-ways-improve-project-communication-anand-gurunathan> Date of access.

Harbour, S. 2016. Why is it important for organizations to use project management? *Small Business Chron.*

Hartley, J. (2008). Academic writing and publishing: A practical guide. Oxon, OX: Routledge

Heizer, J., Render, B. (2014). *Operations Management: Sustainability and Supply Chain Management* (11th ed.). Essex: Pearson.

Kerzner, H. 2009. *Project management. [electronic resource] : a systems approach to planning, scheduling, and controlling*: Hoboken, N.J. : Wiley, c2009. 10th ed.

Khang, D.B. & Moe, T.L. 2008. Success criteria and factors for international development projects: A life-cycle-based framework. *Project Management Journal*, 39(1):72-84.

Kildrummy. 2014. Cost control: Five ways to manage project budgets. <http://kildrummy.com/cost-control-five-ways-manage-budget/> Date of access.

Maree, K. 2007. *First steps in research*. Pretoria: Van Schaik Publishers.

Margaret & Rouse. 2014. What is critical success factors? - definition from WhatIs.com.

Mitchell, M L., & Jolley, J. M. (2010). *Research design explained* (7th ed.). Belmont, CA: Wadsworth.

Needs, I. 2014. 15 great ways project management can help your growing business.

Nethathe, J.M., van Waveren, C.C. & Chan, K.-Y. 2011. Extended critical success factor model for management of multiple projects: An empirical view from Transnet in South Africa. *South African Journal of Industrial Engineering*, 22:189-203.

Noordwes-Universiteit. 2012. *NWU-verwysingsgids*. Biblioteekdienste, Noordwes-Universiteit.

Ofori, D.F. 2013. Project management practices and critical success Factors—A developing country perspective. *International Journal of Business and Management*, 8(21).

Osorio, P.C.F., Quelhas, O.L., Zotes, L.P. & Shimoda, E. 2014. Critical Success Factors in Project Management: An Exploratory Study of an Energy Company in Brazil. *Global Journal of Management And Business Research*, 14(10).

People, T.L. 2016. *The ten knowledge areas of PMBOK*.

Piscopo, M. 2015. *Human resource plan template*.

Rolstadås, A., Tommelein, I., Schiefloe, P.M. & Ballard, G. 2014. Understanding project success through analysis of project management approach. *International Journal of Managing Projects in Business*, 7(4):638-660.

Roodt, G. & Fouche, C. (2004). Guidelines for writing a research proposal. University of Johannesburg.

Salkind, N.J. 2008. Exploring research. 7th ed. Upper Saddle River, NJ: Prentice Hall.

Saunders, M., Lewis, P. & Thornhill, A. 2009. Research methods for business students. 5th ed. Essex, England: Pearson Education Limited.

Smith, M. 2002. ASSESSING THE EFFECTIVENESS OF PROJECT MANAGEMENT PRACTICES IN PROJECT-DRIVEN ORGANISATIONS. (9780620288538).

Steyn, H. 2008. Project management : a multi-disciplinary approach. Pretoria, South Africa: FPM Pub.

Trochim, W. & Donnelly, J.P. 2007. The research methods knowledge base. 3rd ed. Cincinnati, OH: Atomic Dog Publishing.

Welman, C., Kruger, S.J. & Mitchell, B. 2005. Research Methodology. 3rd ed. Cape Town: Oxford University Press.

Walliman, N. 2010. Research methods: The basics: Routledge.

Warner, J. 2011. Four keys to project integration management.

Watt, A. 2014. Project management. <https://opentextbc.ca/projectmanagement/chapter/chapter-5-project-stakeholders-project-management/> Date of access.

Westland, J. 2010. 5 goals every project manager should aspire to achieve.

Whitley, B.E. 2002. Principles of research in behavioral science. 2nd ed. NY.: McGraw-Hill.