# IDENTIFYING FACTORS HINDERING PROJECT SUCCESS IN THE SOUTH AFRICA NAVY

by

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THLKUL001

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Department of Construction Economics and Management

in partial fulfilment of the requirements for the degree

MSc in Project Management

October 2017

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**REQUEST FOR TO CONDUCT RESEARCH WITHIN THE PROJECT ENVIRONMENT IN NAVAL BASE SIMON'S TOWN: 98179419 MC CDR (DR) K.I. THELETSANE**

1. I'm a Project Management Lecturer for both undergraduate and postgraduates' students at the Military Academy. As part of staff development I registered for Msc (Project Management) in the Faculty of Construction Management at the University of Cape Town. I completed all modules successfully and currently busy with my research project.

2. The topic for my research is "Identifying factors hindering project success in the SA Navy". To succeed in this study it is required of me to visit project office and interact with project officers in Naval Base Simon's Town.

3. This research will be undertaken as part of the fulfilment of the requirements for the degree of Msc in Project Management at the University of Cape Town. This research is guided by ethical principles of the University of Cape Town. No classified information will be sourced and reported in the study without permission. In view of the above I therefore request permission to conduct this research in the project office of Naval Base Simon's Town.

4. Hoping that my request will receive your favourable consideration.

Yours Faithfully

**(K.T. THELETSANE)**
**CHAIR SCHOOL FOR DEFENCE ORGANISATION AND RESOURCE MANAGEMENT: CDR (DR)**

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Cdr (Dr) K.I Theletsane

**AUTHORITY TO CONDUCT RESEARCH IN THE SA NAVY: CDR (DR) K.I. THELETSANE**

1. Your letter dated 07 March refers

2. Permission is granted to Cdr (DR) K.I. Theletsane to conduct research in the SA Navy on the topic 'Identifying factors hindering project success in the SA Navy' as requested.

3. For your attention.

**(B.K. MHLANA)**
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**ABSTRACT**

South Africa is a maritime nation with an abundance of natural resources. These resources must be protected and preserved for the economy of the country. This makes the SA Navy a strategic component of South Africa and it must be well resourced to provide appropriate protection. In view of this South Africa has a Navy with a broad range of balanced capabilities as a key component of the National Defence Force in order to support the nation's objectives to project peace or, if necessity, strength, during times of tranquillity or tension. Project management plays a crucial role in ensuring that the Navy has these capabilities. However, project management in the SA Navy is full of challenges. There are a number of factors hindering project success in the SA Navy. These factors must be managed and understood in order to mitigate their impact on project management in the SA Navy. The literature identified various factors hindering project success in the SA Navy. The literature identified and treats these factors individually, however, this study proposes a holistic system based approach to factors hindering project success in the SA Navy and adopts Warfield's Interactive Management (IM) to investigate these factors. Interactive Management is chosen due to the methodology's ability to encourage communication and understanding of the problem among participants as well as to facilitate the examination of the interaction between problem elements. The end product of the Interactive Management methodology is the graph depicting the interaction or relationship between elements. Through the Interactive Management, this study identified six key factors hindering project success in the SA Navy namely, "Lack of top management support", "Lack of technical expertise by project managers", "Too much control from superiors", "High turnover rate of project officers", "Complexity of design" and "Inability to attract and retain talent". These are the key factors that must be addressed in order to ensure success in SA Navy projects.

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# CHAPTER 1

# INTRODUCTION AND BACKGROUND TO THE STUDY

## 1.1 INTRODUCTION AND BACKGROUND

There is an abundance of literature in the field of project management and it has provided a number of theoretical and practical ideas and methods. The literature introduced a framework for measuring project success such as a balance score card and critical success factors. Much has been written about project success factors but very little on factors hindering project success particularly in the military hence the need for this study. Project success in the South African Navy (SA Navy) remains a challenge as projects are always delayed and over budget. The project office is constantly facing unskilled personnel and budget cuts.

The purpose of this study is to investigate and analyse factors hindering project success in the South African Navy (SA Navy). To achieve this purpose, the study will use Warfield's Interactive Management, a systemic methodology to examine factors hindering project success in the SA Navy. Interactive Management (IM) is described by Janes (1995) as a methodology that allows the work efforts of a group to become fruitful particularly when dealing with complexity. There are four phases in Interactive Management:

- Identification of systems element (Idea generation);
- Serial ideas clarification;
- Structuring of ideas which involves the modelling or structuring of the elements linked to the problem situation; and
- Interpretation of the graphs.

South Africa is a maritime nation and has well-developed ports and maritime infrastructure. Between 90% and 95% of South Africa's import and export trade in terms of volume (159 million tons in 2000), or in excess of 75% in terms of value (Rbn 369 in 2000) is transported by sea (South African Navy, 2000). This makes the SA Navy a strategic component of South Africa and it must be well resourced to provide appropriate protection. The South African sea water is known for a wealth of food and

natural resources and this must be protected at all costs hence the need for the SA Navy projects to keep their equipment seaworthy.

The Republic of South Africa (RSA) is a maritime nation and it is important to consider the following:

- The RSA's ports are the trade gateway for many African countries,
- This area is rich in unexploited minerals and food resources,
- The RSA is vulnerable to blockade and the cutting off of its sea routes, and
- The RSA is vulnerable to the plundering of its marine resources (South African Navy, 2000).

The Navies of the world are responsible for protecting the sea waters of their respective countries and this includes the SA Navy. Prior to 1922, the Royal Navy was largely responsible for the safety of shipping around the Cape with many South Africans serving in a number of their ships (South African Navy, 2000). In today's increasingly uncertain and competitive world, the SA Navy continues to protect the national interests and responsibilities as well as helping to guard against risks to peace and security.

The SA Navy is now actively cooperating with other African countries and is willing to provide assistance and to cooperate in a regional context (South African Navy, 2000). The SA Navy also has the ability to further enhance the RSA's prestige abroad and encourage trade and sound international relations. It is already playing a leading role in this regard and for it to continue doing this it must be well resourced.

In view of the above the RSA needs a Navy with a broad range of balanced capabilities as a key component of the National Defence Force in order to support the nation's objectives to project peace or, if necessary, strength, during times of tranquillity or tension. Project management plays a crucial role in ensuring that the Navy has these capabilities, but, project management in the defence force is very complex.

There is a huge difference between the Defence and other industrial projects in two important respects. First, the state-of-the-art technology is always used in order to

achieve the required operational performance and second, defence projects by their nature are very large, complex, and interdisciplinary (Locke, 1984, Shenhar and Wideman, 2000). Despite the complexity and the technological risk, and the enormous potential for budget savings, the management practices, success and failure of defence projects have been less researched than those of commercial projects. Furthermore, most of the research done and results found of the few studies on defence projects are not available to the public and these projects are very complex and cumbersome.

The complexity of the project management process requires a widespread and collective attention of a number of budgetary, human, and technical aspects. Moreover, projects often have a set of specialised critical success factors whereby if they are addressed will improve the chances of project success. Furthermore, projects also have factors hindering project success and if not addressed could affect the project success negatively. The difference between project success factors and factors hindering project success is that the former affect project positively and the latter negatively. Adding to the complexity of project management is the defence projects which are always faced with among others secrecy, budgetary constraints, political interference and they are highly technical at times.

The success of any project is dependent on the customer follow-up—particularly imperative are the members involved in the project and their professional qualifications, experience, their sense of responsibility for project success and the stability of key members. Defence projects frequently are technically challenging and require members to operate at that level. The technological feasibility right from the beginning is very critical for military projects success. Moreover, the professional qualification and competency of members are proven to be a major success factor in many projects.

Project success in the SA Navy is important for the security of the country and protecting the territorial water. For the SA Navy to be able to provide maritime security, resources need to be acquired on time with the right quality. The important topic for this study is factors hindering project success in the SA Navy. Ninety percent of the South African Navy projects are over budget, don’t start on time and take longer than

expected (Martin, 2015). Interesting to note is that a number of projects are cancelled due to either budget constraints or political interference. Project management in the SA Navy remains a challenge and factors hindering project success are numerous. Martin (2015), analysed 29 projects since 1996 and discovered the following facts: all 29 projects started late, 15 projects were discontinued because of financial constraints and financial regulations not being adhered to, 14 projects went over budget and schedule and one project on completion was rejected as the supplied boats were too big for the ships. This is in a nutshell some of the challenges faced by the SA Navy project environment.

The study will first discuss the success factors. According to (Shenhar and Wideman, 2000) success factors can be broadly classified as project efficiency, impact on customers, business success and preparing for the future. In contrary it is difficult to achieve all these factors. According to (Shenhar and Wideman, 2000, Cooke-Davies, 2002) there is no universal understanding of the success concept. Different people perceived success differently. The construction of the Sydney Opera House took 15 years to construct and it was more than 14 times over the budget, but it was successful because it was finally completed, but from a project management perspective it was a failure. This could be because the project was not managed according to the traditional triangle, which is time, cost and quality. Therefore the concept project success factors are clear-cut to everyone. This is supported by (Jugdev and Muller, 2005), that “project success is a complex and ambiguous concept and it changes over the project and product life cycle”. Despite of the ambiguity, the continued contribution to understand the aim makes success factors applicable. Although the purpose of this study is to analyse factors hindering project success it is important to bring in project success factors. The two concepts are on the opposite side of each other.

## 1.2 PROBLEM STATEMENT

There are a number of factors hindering project success in the SA Navy. Most projects hardly start or finish on time and some are abandoned in the process due to various challenges. During the Arms deal enquiry it came out that the SA Navy is not sufficiently equipped to fulfil its mandate. To equip the SA Navy a robust project management environment is required. Currently the lengthy acquisition process and

budgetary constraints are the main challenge in the SA Navy project management environment.

The SA Navy spent billions of tax payers' money on projects. But the success of these projects leaves much to be desired. Projects are always behind schedule and they exceed the allocated budget. There is a high turnover rate of project managers as project managers are sometimes promoted to higher ranks in the military. Project management in the SA Navy may be inadequate especially in light of the fact that command and control is the order of the day in the military. This will limit the project managers in their independent thinking and autonomy.

## 1.3 RESEARCH AIM

The aim of this study is to explore, identify and analyse (Stebbins, 2001, Babbie and Mouton, 2012) and elaborate (Singleton Jr et al., 1993, Babbie and Mouton, 2012) factors hindering project success in the SA Navy. This is done against the backdrop of proposing strategies and tactics to address these factors.

## 1.4 RESEARCH QUESTIONS

To achieve the aim, the study will be directed by the following primary question: "What are the factors hindering project success in the South African Navy?"

## 1.5 RATIONALE FOR THE STUDY

Despite considerable wealth of research involving project success factors, factors hindering project success (especially in the SA Navy) are not well researched. This gap made it difficult for the researcher to find appropriate information. This study will close or narrow this gap. A research focusing on factors hindering project success in the SA Navy is needed to better understand and improve the SA Navy projects.

## 1.6 SCOPE OF THE STUDY

It is advisable to say what is not intended with the research. This helps the researcher to focus on the problem statement and not waste time on matters that are not directly associated with the problem. Though the study will draw quite significantly on previous research on project management, the findings will represent the practical realities in

the SA Navy. Geographically speaking, the study will confine itself to Naval Base Simon's Town. In other words, although the study is conducted in South Africa and in the SA Navy, it is not a true reflection of the Navy as a whole. This naval base was selected because it is the biggest naval base in South Africa and also because of its proximity to the researcher.

## 1.7 ETHICAL CONSIDERATIONS

In undertaking the study, the researcher will ensure that ethical requirements are complied with, in line with the University of Cape Town policy. Firstly, an application for ethics clearance will be done through the University of Cape Town's Ethics Committee. Upon the approval of the research project by the University's Ethics Committee, permission to conduct research will be sought from relevant stakeholders. Upon the approval of the research project by the relevant authority, the nature and purpose of this research project will be explained at length to the potential participants. The identity and the institutional association of the researcher (masters' candidate and the university under which this research is conducted) will be revealed to the potential participants. The study guarantees that the nature of participation in this study is completely voluntary. In this regard, should the participants wish to withdraw their participation because of unforeseen circumstances, they will be allowed to do so without any undue influence. They will not be forced to partake in the study. The responses provided by the study participants will be treated in a strictly confidential manner and will be kept safe. The information will typically be kept in a safe place where only the researcher has access to the information. The password(s) used to upload and store information to the computer will only be known by the researcher and nobody else will have access to it.

Attached to this confidentiality will be stringent measures to ensure anonymity to the study participants. Protecting their anonymity will make them feel comfortable while participating. There will be no costs that will be incurred by the study participants. There will be no discomforts and hurtful feelings on the side of participants. There will be no benefits that will accrue to participants for partaking in the study. The dissemination of the results will be in the form of a completed masters' thesis. Finally, the informed consent (clearly stipulating the purpose of the study and identity of the

researcher) and (preferably written) will be obtained from study participants before any workshop is conducted.

## 1.8 LIMITATIONS OF THE STUDY

The SA Navy has various project offices in the country but only the office in Simon's Town will be used for the study. This is done due to its proximity to the researcher and it is the main office which house approximately 80% of the staff working on projects. By focusing only on one office might limit the researcher to obtain information from other offices.

Due to the nature of military projects that are filled with confidentiality and secrecy, some information might only be available to the SA Navy. This could limit the researcher to get to other factors hindering project success. Due to the bureaucratic nature of the military and its command and control culture, participants might withhold the truth for fear of victimisation. The fact that the researcher is a uniform member in the SA Navy, some senior members might make it difficult to obtain information.

The study will start by giving the background, methodology and the problem statement followed by the literature review in Chapter 2. The philosophical foundation of the study will be established in the section dealing with systems thinking followed by a meticulous explanation of how IM will be applied in the investigation of factors hindering project success in the SA Navy. The study will analyse and discuss research findings and lastly a conclusion will be drawn, and recommendations and opportunities for future research will be identified.

## 1.9 STRUCTURE OF THE RESEARCH REPORT

**Chapter 1:** This chapter will provide the introduction and background to the study. The chapter will also provide the problem statement, research question, aim, research proposition, and the methods to be used. The chapter aims to set the scene and introduce the reader to the study.

**Chapter 2:** This chapter will cover the literature review extensively. The literature on project success and project management success will be covered.

**Chapter 3:** Chapter 3 will cover the research methodology used in the study.

**Chapter 4:** This chapter will present the research results and interpretation.

**Chapter 5:** This chapter will conclude the study and provide a summary. It is in this chapter where recommendations will be made and prospects for future research will be highlighted.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 INTRODUCTION

Project management is a very complex process and requires a widespread and collective attention to a wide facet of human, budgetary and technical aspects. Defence projects are not unique as they are complex and require an extensive technical expertise. Success factors refer to the elements that are necessary for the project to achieve its intended objective. These factors are required for ensuring the success of a project. While, factors hindering project success refer to those factors affecting the project negatively and if ignored could cause harm to the project success. The correlation between the two is that factors hindering project success affect the project negatively while project success factors affect the project positively.

Like any other organisation there are critical success factors and factors hindering project success in the SA Navy. The purpose of this chapter is to compile a literature review to support the study. This will assist the researcher to ask relevant questions during interactive management workshop. This chapter is important in laying down the foundation for the study and will contribute in identifying factors hindering project success in the SA Navy. The chapter starts by giving an overview of the acquisition process in the SA Navy. This is done to highlight the complexity of the defence acquisition process. The chapter further defines project management and going deeper into what constitutes project and project management success. The chapter further identifies factors hindering project success in general and later focuses specifically on factors hindering project success both in the broader military and in the SA Navy. Due to limited research on factors hindering project success in the SA Navy, other navies such as the United States and others will be discussed. It is important to note that these factors differ from industry to industry. The chapter is drawn from a number of authoritative sources in project management. As a point of departure it is important to define project and project management.

## 2.2 PROJECT AND PROJECT MANAGEMENT DEFINED

Project management is defined by PMI (2013) as the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing (PMI, 2013). According to Maylor (1999) project management includes planning, organising, directing, and controlling activities in addition to motivating what is usually the most expensive resource on the project – the people. Project on the other hand is defined by Gido and Clement (2015) as an endeavour to accomplish a specific objective through a unique set of interrelated activities and the effective utilisation of resources. The DAP (2010) defines project as a complex activity consisting of a planned undertaking of a unique nature over a limited timeframe that has a specifically described beginning and ending. From the above definitions it is clear that project management is a complex process and this complexity, if not understood or managed, can lead to project failure.

## 2.3 PROJECT SUCCESS DEFINED

Since the study focuses on factors hindering project success in the SA Navy it is important to begin by defining project success very briefly. Various authors have researched the concept of project success but this concept remains loosely defined. A lot has been written about project success and most authors differ on what constitutes project success. Project success differs from industry to industry. A project that is completed within the budget and time may be deemed successful but might not meet customer requirements (Baker et al., 1983). Although much has been written about project success, there is no consistent interpretation of the term project success. According to McCoy (1986) there is no standardised definition of project success or an accepted methodology of measuring it and Wells (1998) also observed that little attention is given to the definition of project success except in broad terms.

Project success is defined by Tuman (1986) as achieving everything as hoped, anticipating all project requirements and having sufficient resources to meet needs in a timely manner. Authors such as De Wit (1986) considers a project a success if there is a high level of satisfaction concerning the project outcome among key stakeholders.

The key difference between the above two definitions is that the latter includes the satisfaction factor as a success measure. To determine whether a project is a success or not is a very complex and ambiguous process. Delays in projects are common but projects can still be considered successful after all. Project success is not to be confused with project management success.

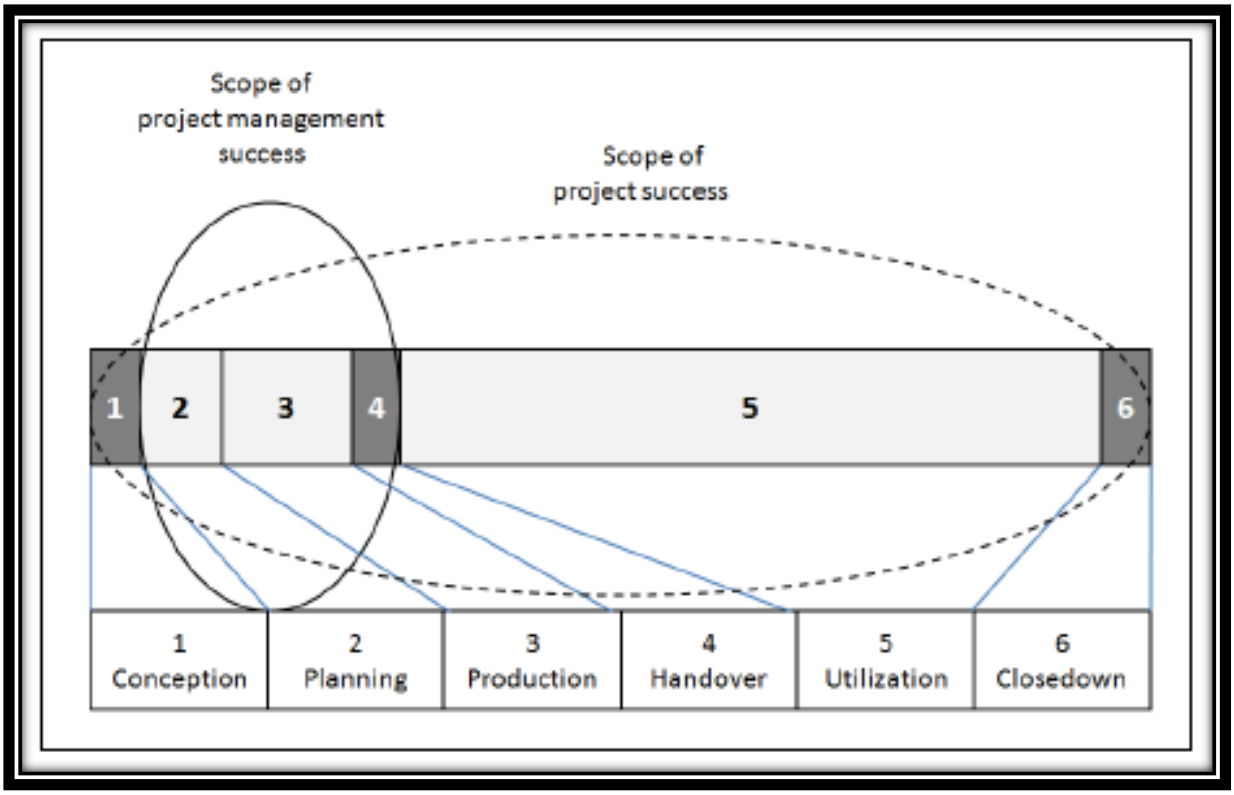


Figure 2.1: The scope of success in the project life cycle, (Munns and Bjeirmi, 1996)

De Wit (1998) was among the authors to point out the difference between project success and project management success. Successful project management will contribute to the achievement of a project but project management will not stop a project deliverables from failing to succeed (De Wit, 1998) and (Sigurðarson, 2009). According to Baccarini (1999) project management success is about fulfilling the time, cost and quality criteria whereas project success focuses on the effects of the project's final deliverables such as project goals, purpose and stakeholders' satisfaction. Project success will differ to different people due to various perceptions and this can lead to disagreement about what constitutes success of a project (Liu and Walker,

1998). Users and stakeholders are most likely to have different perceptions of the overall project. Three reasons suggested by Munns and Bjeirmi (1996) for this different perception are: first, this is due to the universal approach that all projects are similar, secondly the subjective nature of success or poorly defined success measures and lastly limited number of managerial variables.

According to Munns and Bjeirmi (1996), failure to distinguish between project management success and project success will worsen this difference in perception. The project management success focuses on the “iron triangle” and the quality of management process. The other part of project success relates to the effects of the project deliverables or service (Baccarini, 1999). Therefore a project can be viewed as successful despite the time, quality and costs not being met.

The project management team focus on successfully reaching phase four as seen in Figure 2.1 where they will terminate their involvement but the client is involved in all the phases. The project management success scope is phase 1- 4 and scope of project success spans over all the phases (Munns and Bjeirmi, 1996). For the purpose of this study, project success will be defined as the successful delivery of the end product that satisfies the customer and meet the customer’s expectations.

## 2.4 THE SOUTH AFRICAN MILITARY PROCUREMENT AND ACQUISITION PROCESS

It is important in this study to give an overview of the military acquisition process. The process is applicable to all arms of services in the South African National Defence Force. The acquisition process is lengthy and full of bureaucracy. This section is important for the study as it shows the complexity of the process and why complexity theory is necessary for this study. The complexity of the acquisition process is due to a number of stakeholders involved in the process. In the military context procurement and acquisition are two different concepts.

According to DAP (2010) acquisition deals mainly with the acquiring of complex systems, such as weapon systems. It utilises the system engineering process translating military requirements into specifications against which purchasing can take place. Procurement on the other hand entails the purchasing of all commercial

equipment, spares, machinery and consumables, as well as services (DAP, 2010). Both acquisition and procurement are carried out in an authorised and completely auditable fashion. The process for project related acquisition is fully documented in the DAP (2010). Non-project related procurement is carried out in accordance with the Department of State Expenditure Regulations. Both processes are subject to internal audit and inspections, and audits by the Auditor-General.

It can take approximately two years before a project can be authorised and registered in the SA Navy. A project will be authorised and/or directed through Military, Governance, Armaments Corporation of South Africa (ARMSCOR) and Joint Management Forums (DAP, 2010). All these forums have properly authorised constitutions that is revised on a regular basis. Once the applicable project phases have been approved by the Armament Acquisition Control Board, Armament Acquisition Steering Board and Armament Acquisition Council, contracts on industry for the execution of the applicable phase can be initiated via the ARMSCOR contracting process.

The project has to go through various forums both within the Department of Defence and outside the department. Project documentation may not be submitted to any governance forum without prior recommendation by the relevant military recommendation forums. The military recommendation forums are essentially instituted to verify and authorise the needs of the defence force. Each Service or Division (that is the Army, Air Force, Navy and Health Service) has forums specifically tasked and mandated for the approval of the project and subsequent milestone documentation in a coordinated fashion within that organisational component in order to recommend needs to higher authorities.

Once the project passed the internal forum (that is the SA Navy) the next step is to take it to the governance forum. Governance forums are instituted for the verification of process integrity, the authorisation of project phase approvals and allocation and commitment of financial resources. The approval structure for submissions consists of three levels as indicated in the following table.

| Board | Chairperson | Level of Approval | Tasks |
|---|---|---|---|
| Armaments Acquisition Control Board (AACB) | Chief Defence Materiel | Departmental node for the initiation and completion of projects. | Screens all milestone documentation |
| Armament Acquisition Steering Board (AASB) | Secretary for Defence | Final approval of Non- Cardinal projects | Recommends milestone documents, value systems |
| Armaments Acquisition Council (AAC) | Minister | Final approval for Cardinal projects | AAC will present Cardinal projects to Cabinet. |

Table 2.1: Project approval structure, authors own compilation from (DAP, 2010)

## 2.5 PRESENTATION OF FACTORS HINDERING PROJECT SUCCESS

This section will deal with factors hindering project success in general. It is important to note that factors contributing to project success are more positive (driving force) and must be taken into consideration to ensure success. On the other hand factors hindering project success are negative factors and they can affect the project negatively if not well managed. There are many factors hindering project success and this range from among others project related factors to organisational factors. Characteristics of a project have been neglected in the literature although they constitute one of the important dimensions in performance (Cooke-Davies, 2002). Schedule duration and urgency are identified as the critical factors by Morris and Hugh (1986). However, many projects fail because of many other factors inherent to the project. Belassi and Tukel (1996) list six factors which are the value and size of the project, how unique the project activities are, project network density, life cycle of the project and urgency of the project outcome. The study by Tukel and Rom (1995) discovered that most large projects will exceed their duration. Therefore, if one uses

the project duration as performance evaluation, caution should be taken about the size of a project and the effectiveness of the penalties (Belassi and Tukel, 1996).

Belassi and Tukel (1996) also highlight risk as one of the factors that hinders project success. If the risk is not clearly identified or if it is poorly managed it could affect the project severely. A poor risk planning will jeopardise the accomplishment of the project objective (Gido and Clement, 2015). Risk is inherent in any project and should form part of the planning process and must be incorporated at each stage of the project life cycle.

Project planning begins early in the project's life cycle and if the plan is wrong it will affect the succeeding stages of the project. Planning is indispensable in project management (Munns and Bjeirmi, 1996). If the plan is poor everything is bound to fail in projects. With poor planning the scope will be incorrectly defined and this can lead to disaster. In the planning phase a number of activities will be identified. Not only must the number of activities be taken into consideration but also how familiar the type of project undertaken to the organisation is as the project manager's performance can be heavily affected by the uniqueness of the activities. If the activities are standard it will be easier for the project manager to plan, schedule and monitor projects, but if the activities are ambiguous the project manager could struggle. If enough time is not allocated to planning, and scheduling the project will most likely exceed budgets and become unsuccessful (Pinto and Slevin, 1987). Therefore poor project planning will hinder project success severely.

There are many other factors linked to the skills and characteristics of project managers and their team members and these factors are suggested for the successful completion of projects. Pinto and Slevin (1987) demonstrated the importance of the project managers' selection process. According to Pinto and Slevin (1987) it is important to select project managers with the necessary technical and administrative skills for successful termination of a project. Poor selection of a project manager can jeopardise the project. Pinto and Slevin (1987) presented that the commitment of project managers and their competence is critical during the planning and termination phase. The other factor identified is the competence of the team members. The project manager can have the know-how but with incompetent team members the success of

a project is doomed. All these factors will hinder the project success and will also affect satisfaction from customers or the client and of project acceptance.

Equally, there must be a well-established communication network between the project manager, the organisation and the client in order for the project outcome to be accepted by the client (Belassi and Tukel, 1996). Poor communication at all levels can also hinder the project success. This is important especially for projects with multiple stakeholders such as military projects.

Tukel and Rom (1995) highlight top management support as one of the most critical factors. Lack of support from the top management will hinder the success of any project as top management provide resources. This support will even be stronger if there is a project champion from the top management who will assist the project manager to understand and achieve the objectives specified by the top management and the client. Top management normally have access to resources which are overseen by functional managers. The support given by the functional managers is determined by the top management support. For projects that are part of functional structures the availability of resources is easy as functional managers are usually project managers (Tukel and Rom, 1995). But acquiring resources for matrix organisational projects can be difficult as this requires negotiation skills and some positional power (Tukel and Rom, 1995). There are other factors that hinder the project success which are beyond the control of the project manager or organisations.

These factors are external to the organisation but can hinder the success of a project. A number of environmental factors such as political, economic, social, technological, ecological and legal will affect the project negatively or positively. Pinto and Slevin (1987) found that most of these environmental factors affect the project during the planning phase. However, some of these factors will affect the project at all phases such as the weather, the social environment and economic environment. At times these factors can be so severe that is could lead to project termination. Government and public attitude can be an influential external factor. An outside client can also be considered as an external factor. If projects are internal the client is from within the organisation and therefore client factors can be classified under organisational factors.

| Sources | Factors hindering project success |
|---|---|
| (Kumar, 1989, Cash and Fox, 1992, Baker et al., 1974a, Kerzner, 1987, Baker et al., 1974b), (Cooke-Davies, 2002) | Unclear objectives<br>Poor project administration<br>Poor relationship with client<br>Politics<br>Efficiency<br>Conflicts and Profit |
| Morris and Hugh (1986); (Pinto and Covin, 1922, Pinto and Slevin, 1987) | Unrealistic goal<br>Inability to satisfy customers<br>Poor implementation process<br>Lack of management support |
| Avots (1969); Munns and Bjeirmi (1996) | Inadequate basis for project<br>Wrong or incompetent project manager<br>Lack or poor or top management support<br>Insufficiently defined tasks<br>Poor project management techniques;<br>Misusing of management techniques<br>Poor planning of project closedown<br>Poor or lack of commitment |
| (Belassi and Tukel, 1996, Helfrich, 2016) | Poor planning<br>Poorly managed risk<br>Insufficient funds<br>Lack of commitment from project team<br>Incompetence of project manager<br>Complexity<br>Poor stake holder engagement and analysis |

| | |
|---|---|
| | Unrealistic time frame |

Table 2.2: Summary of factors hindering project success

These factors are generic and are not specific to a particular industry. They can also be found in the military projects. This section was meant to lay the foundation before discussing factors hindering project success in the military. The next section deals with factors hindering project success in the military.

## 2.6 PRESENTATION OF FACTORS HINDERING PROJECT SUCCESS IN THE MILITARY

Military projects are mostly complex and always draw public and political attention. According to Tatar (2010) militaries are very bureaucratic and due to command and control system, project managers within the military environment lack autonomy. It is important that the project manager have autonomy and independence to approach the task. According to Tatar (2010) there is a high level of interference in military projects and the project manager will have to follow orders to avoid any punitive action. Defence projects are very complex and require independent thinking. Lack of autonomy by the project manager and his/her team can hinder project success.

Most defence project is very complex and complexity if not properly managed or understood can hinder project success in the defence sector. The development of complex systems poses many challenges. According to Demir (2015) military projects are large-scale and use a sophisticated software which adds complexity to the projects. Due to this complexity, most work will have to be outsourced and this requires proper communication between stakeholders. Therefore complexity is one of the factors hindering project success in the military.

One of the other factors identified in the literature hindering project success in the military is a lack of funding. Many defence forces continue to struggle to overcome various challenges brought by budget cuts (Preda, 2013). Defence forces rely heavily on government for funding and they have to compete with other departments such as housing, health and education to mention but a few. According to Preda (2013) many defence projects are discontinued due to a lack of funding. Defence projects rely

heavily on software today and software is the major component in any defence system (Hagen et al., 2012). The success of any weapon system depends on the success of the system software but without adequate funding the project will be unsuccessful. It is however pointless if funds are available but they are not used for the intended purpose due to corruption.

Corruption is a well-known factor in government projects and procurement. The military as part of government is also being influenced by corrupt practices during the procurement process. Corruption has a negative impact on defence projects by creating economic inefficiencies, increasing the costs of doing business, reducing competition, scaring potential investors and most importantly compromising on quality (Preda, 2013). Military projects are often large and lengthy - their exact value is difficult to monitor and therefore may present lucrative opportunities for corruption. It is easier to collect substantial bribes on large defence projects than on small procurement such as uniform. However, dealing with corruption and having funding will not achieve success without talented individuals. Having talented individuals will help towards project success.

Inability to attract and retain talent is identified by Oueslati (2016) as a factor hindering project success in the military. When engineers join the military from universities the only thing in mind is how to make and earn more money (Oueslati, 2016). A defence's project success lies in research, development and experiment and for research to succeed takes time. According to Oueslati (2016) these engineers are not encouraged to think outside the box and those with the ability to think are subdued. This is due to interference as the military operates within a command and control environment. Numerous studies in the United States Naval projects indicate that talent shortage is a major contributing factor to project failures.

Tishler et al. (1996) analysed what influenced the success of defence projects in Israel. According to their study, organisational and management style variables have a considerable impact on Israel's defence project's success. The most important factor hindering project success in Israel's defence is the lack of '*esprit the corps*' in the development team; lack of leadership, lack of technical qualifications among the development team; instability of 'key' personnel for the entire duration of the

development phase; and a lack of professionally experienced project managers (Tishler et al., 1996). There are many factors hindering project success in the military and Table 2.3 indicates other factors as identified by various authors.

| Source | Factors hindering project success in the military |
|---|---|
| Demir (2015) | Poor understanding of project integration management<br>Poor project scope management<br>Inability to manage time<br>Lack of funding<br>Poor risk management<br>Poor communications management<br>Poor procurement systems<br>Project stakeholders management<br>Corruption |
| Preda (2013) | Complexity<br>No risk plan<br>Poor communication<br>Political interference<br>Poor stakeholder management<br>Lack of top management support<br>High turnover rate of personnel<br>Top management interference<br>Bureaucratic procurement system<br>Corruption |
| Tatar (2010); (Tishler et al., 1996) | Length of defence projects<br>Inadequate funding |

| | |
|---|---|
| | Poorly managed risk<br>Development based on government regulations<br>Poor coordination<br>Lack of technical expertise<br>High turnover rate of personnel<br>Government regulations<br>Lengthy and bureaucratic procurement system<br>Command and control<br>Corruption<br>Lack of autonomy of project manager |

Table 2.3: Summary of factors hindering project success in the military

## 2.7 PRESENTATION OF FACTORS HINDERING PROJECT SUCCESS IN THE SA NAVY

The previous section analysed factors hindering project success in the military. These factors are also applicable to the SA Navy as part of the military milieu. The section is important for the study as it laid the foundation for factors hindering project success in the SA Navy. Only a few studies in the project management literature concentrate on the military and factors hindering project success in the military. Even fewer studies concentrated on factors hindering project success in the SA Navy. The author relied on unpublished documents of the SA Navy and the defence web. Other navies will also be analysed to get a broader perspective on factors hindering project success in the SA Navy. It is clear that factors hindering project success in the SA Navy are similar to those in the literature. In this section factors hindering project success in navies of other countries will be discussed as this can also be applicable to the SA Navy and add value to the study.

Like many other identified factors in the previous section, one of the key factors hindering project success in the SA Navy is the budgetary constraints. According to Helfrich (2016) many projects in the SA Navy are not started on time due to budget constraints and some of them have to be abandoned half way. Helfrich (2016) identified two key projects for the SA Navy which started in 2014 but due to budget challenges have not yet started. Tenders were published in 2014 and according to the Department of Defence (2016) Annual Report the total cost of the offers received from bidders exceeded the available capital budget and the SA Navy is reviewing the total budget before a decision is made regarding continuation of the contracting process.

Similarly, acquisition of the British destroyers shows how a lack of funding can contribute to project failure. Due to budget constraints, the Royal Navy cancelled the project and opted for an alternative design of the Sheffield Class which were lighter and less expensive (Bennett, 2010). The size of the class was further reduced as the costs of the first ship threatened to rise. The ship's bow was reduced and the beam to length ratio was decreased and as a result the ships became poor sea keepers, with very poor accommodation and could not carry the weight of a full defence system (Bennett, 2010). These ships were designed to defend the fleet from air attack but they could not even defend themselves. The ceiling imposed on the costs of these ships contributed to the project failure. Although the Navy projects are struggling financially, there is always a problem of budget/costs overrun and schedule delays.

According to (GAO, 2008e) the United States Naval acquisition costs for their weapons' systems were 26 percent over budget in 2007 with a total of $295 billion. This is up from $42 billion for the study conducted in 2000. Figure 2.2 gives an overview of the budget overrun in the United States naval acquisition. The (GAO, 2008e) reported that the average schedule delay was approximately 21 months and from the 33 percent on schedule, 38 percent is 1 to 24 months late and 29 percent more than two years behind (see Figure 2.3).

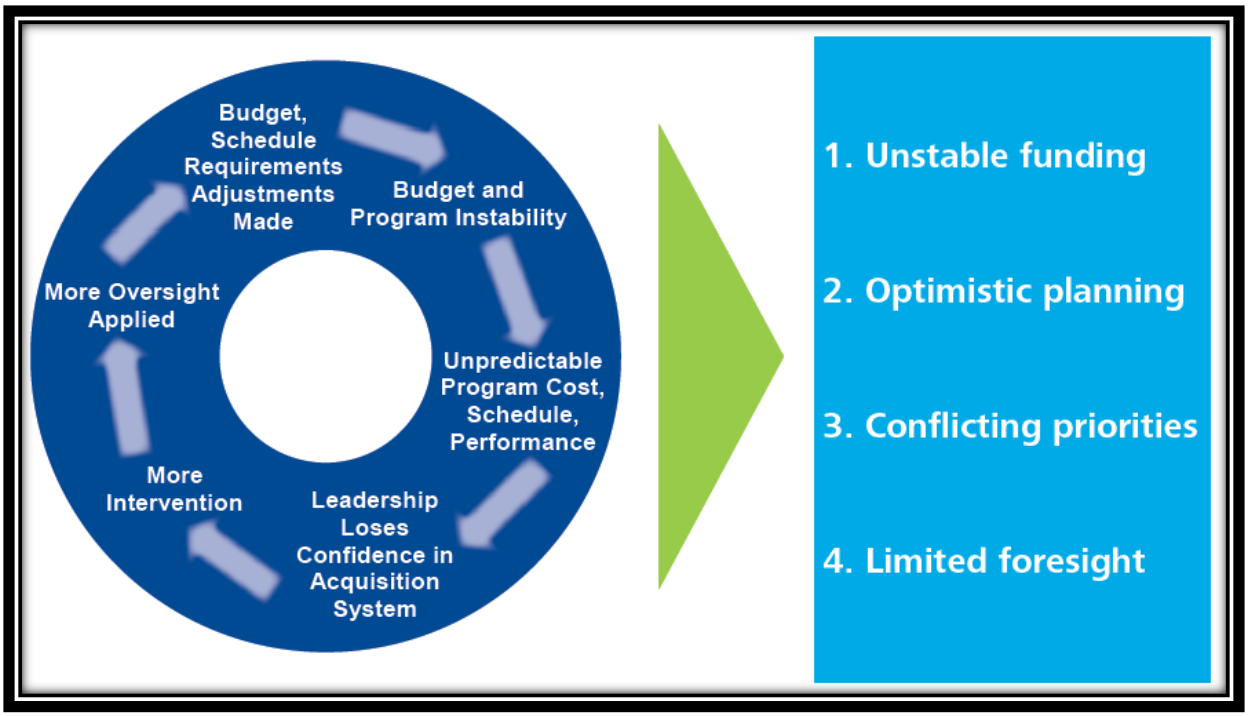


Figure 2.2: A vicious cycle of budget overruns, from (GAO, 2008c).

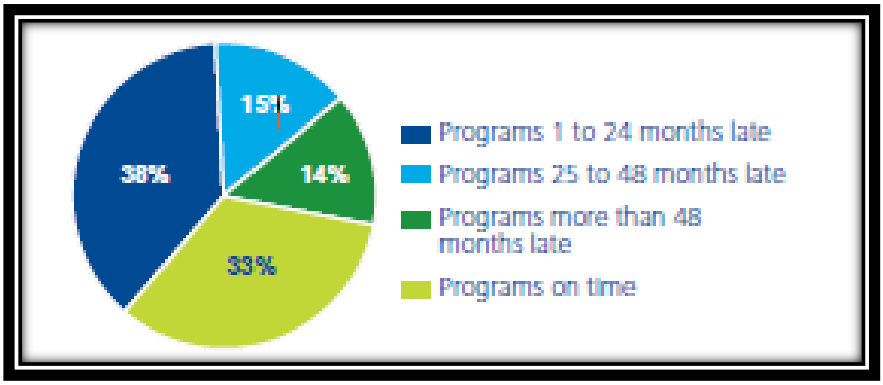


Figure 2.3: United States Naval Acquisition Schedule delays, from (United States Government Accountability GAO, 2008e).

The (GAO, 2008c) also mentioned program management challenges as one of the factors hindering project success in the United States Navy. Research shows that program management challenges in the Navy is on the rise. In the United States Navy program management like planning, staffing and finance integration played a role in driving budgets overrun (Deloitte, 2009). The United States Naval program management is very complex and faces many challenges. These challenges could include (GAO, 2008b, GAO, 2008a, GAO, 2008d):

- The Department of Defence in general relies heavily on contractors from outside to perform roles that have been performed by government in the past.
- There is a frequent program managers' turnover which take place during the system development and demonstration phase. On average, the tenure for program managers in the 39 United States Naval major acquisition programs was 17 months. This is less than what the Department of Defence prescribed. This creates problems as there is no accountability and continuity and ultimately the project will fail.
- Program managers have no decision-making capability as they are not empowered to do so. They have little control over new requirements, and have no authority over staffing.

Bennett (2010) mentioned complexity as one of the factors hindering project success in the United States Navy. This is due to the fact that modern weapons systems have become so complex that the individuals involved cannot comprehend them. Weapons systems may involve a million or more elements of lines of computer codes (Bennett, 2010). Even a small project such as the Australian Bay Class Minehunters contain science ranging from electromagnetism, shock waves and marine biology to mention a few (Bennett, 2010). There is no individual scientist or engineer who possesses such a spectrum required skills to deal and understand all issues involved in these projects. Their contracts are large and complex. The Collen Class Submarine contract in the United States covered 22 000 pages, 600 sub-contracts and contained 250 000 activities to be scheduled, managed, and networked (Stuban et al., 1999). The unexpected interface between countless activities aggravates a project uncertainty and risk. As a result many of these projects fail in the midst of complexity. Due to this complexity, there is a high level of interdependency.

Interdependence is also one of the factors hindering project success according to Bennett (2010). There are many factors that cannot be controlled by the project officer. Change in any of those factors can affect project success. This was seen in the Australian Naval Defence (Australian Governemnt, 2009). During the production phase, the Australian Navy experienced challenges due to interdependency. This

interdependency sometimes requires structural changes which delay and increase the costs of the ships.

According to Helfrich (2016) the high turnover rate of personnel in the project environment is a contributing factor that hinders project success. As mentioned earlier, defence projects are lengthy in their nature and as a result project managers' change as they take up senior positions elsewhere within the SA Navy. Therefore there is no continuity within the project environment. The challenge with human resources in the Navy is that the provision of the required to manage the project is outside the ambit of the project manager. There is therefore a need for the Navy project managers to have sincere decision-making authority on personnel assignment and this is the trademark of successful private sector's major projects (Bennett, 2010).

According to Helfrich (2016) formal qualification in project management is not a requirement in the SA Navy. Any Navy member can become a project officer (manager) without any formal qualification in projects. Therefore project managers in the SA Navy lack technical expertise and are more of project administrators than managers. Project officers will be sent on a project course in Pretoria at a later stage but this course is not a prerequisite to be appointed as a project manager.

The other identified factor is the lengthy and painful government acquisition process. The Government's procurement and acquisition system is regulated by pieces of legislation and if not followed properly could hinder the success of SA Navy projects (Dvir and Ben, 1999). If this process is not followed accordingly one could be guilty of financial misconduct which is a punishable offence. According to Dvir and Ben (1999) those responsible for acquisition do not come from the project environment and therefore, will not relax policies for the benefit of the project. Acquisition managers and project managers are sometimes talking a different language.

Helfrich (2016) identified the lack of a Naval Research and Development Centre as a contributing factor. This could be a Naval Research organisation within the SA Navy. It will primarily be responsible for applied research, developing prototype defense systems and full-scale defense systems with industry partnership. The experiences acquired within the Naval Research Centre could be used as a starting point for

establishing other military research organisations. Therefore, it could be considered as a role model. Without this the SA Navy relies on consultants and outside companies for technical advice and these outsiders are not the end user of the product and this increases the costs of the project.

In trying to identify factors hindering project success the United States Government Accounting Office (USGAO) examined the program of building submarine ballistic missiles, which was considered an unsuccessful project because of schedule and performance as identified (Dvir et al., 2006). The USGAO identified five main factors that were considered the main factors hindering the success of the submarine project: instability of funds and instability of the operational plan; full responsibility for the whole program by more than one organisation; instability of key personnel in the program office; lack of professional and technical expertise in the program office; limited communication channels within and outside of the project (Dvir et al., 2006).

A lack of autonomy by project managers is considered a hindering factor by (Helfrich, 2016). Project managers in the SA Navy are uniform members and are subjected to the military disciplinary code. Therefore they follow orders and they can only advise as project managers but ultimately superiors who might not have any knowledge of the project or project management have a final say.

A previous study by Dvir and Ben (1999) focusing on the causes of project failure in the United States Navy analysed team characteristics and management style. The authors also analysed cultural barriers. The main variables as identified by Carver and Jackson (2006) are: outside of work activities (activities which are not directly related to the project and usually done after working hours) for improving the cohesion of the development team; members not perceiving their work as important; reluctance of the project team and top management to accept new ideas; inability to create an atmosphere of partnership, non-existence of a mechanism for distribution of lessons learnt in previous projects; and, not creating an organisational culture that encourages cooperation and a sense of identification with the project's goals.

Dvir and Ben (1999) mention diversity as one of the factors hindering project success in the Navy. Westerveld (2003) acknowledged that when managing diverse projects

judgment is generally made by several and diverse stakeholders over different periods of time. Diversity reflects the degree of variation among stakeholders or within the project scope. The diversity of stakeholders in the Navy projects involve geographical locations, national cultures, working practices, awareness of objectives (goal misperception), and the variety of skills or disciplines that are used in a project (Dvir and Ben, 1999). In view of the above discussion one can conclude that the naval projects have some degree of complexity.

The following table summarises what is considered factors hindering project success in the Navy:

| Factors | (Helfrich, 2016) | (Dvir et al., 2006) | (Dvir and Ben, 1999) | USA Acquisition | GAO |
|---|---|---|---|---|---|
| Budget constraints | ✓ | ✓ | ✓ | ✓ | ✓ |
| Procurement process | ✓ | ✓ | ✓ | | ✓ |
| Political interference | ✓ | | ✓ | ✓ | ✓ |
| High turnover rate of project team | ✓ | ✓ | ✓ | | |
| Lack of technical expertise | ✓ | ✓ | | ✓ | ✓ |
| Poor communication | ✓ | | ✓ | | ✓ |
| Not understanding the risk | ✓ | ✓ | ✓ | | |
| Not performing quality audits | | ✓ | ✓ | ✓ | ✓ |
| Poor leadership | ✓ | | ✓ | | |
| Inexperienced project managers | | ✓ | ✓ | | ✓ |

| | | | | | |
|---|---|---|---|---|---|
| High turnover rate of personnel | ✓ | | ✓ | ✓ | |
| Misuse of command and control | ✓ | | ✓ | | ✓ |

Table 2.4: Summary of factors hindering project success in the Navy

## 2.8 CONCLUSION

The literature analysed so far gave an overview of factors hindering project success in the SA Navy. Although the literature came from authoritative sources, it lacks substance and its drawback is that there is no interrelationship or interconnection of the identified factors. The identified factors appeared to be independent which is not the case. There could be various reasons why these factors are not interrelated. The research methods used could not provide the analysis of the interrelation of elements. The literature also fails to recognise the complexity of the defence acquisition process. To solve this problem, the interactive management approach will be utilised.

There is an abundance of project management literature concentrating on the critical success factors that affect project success. While many of these studies produce a number of critical success factors, each list differs in its scope and purpose. Even less studies focussed on factors hindering project success in the military particularly in the SA Navy. The review of the literature indicates that military projects are complex and unique. The literature indicates that most military projects fail due to a number of issues such as budget, risk, and quality. The literature focused on military in general and briefly the SA Navy and other navies of the world. In view of these the author is interested in identifying factors hindering project success in the SA Navy.

The literature in this chapter started to define project management and project success. The literature further revealed that for far too long project success has always been attributes to the “iron triangle” that is the time, quality and costs. These criteria have been criticised by many authors as being insufficient for many reasons. Therefore, the time, quality and costs cannot be the sole criteria for measuring project success. The literature tried to make a distinction between project management and

project management success. Successful project management will contribute to the achievement of a project but project management will not stop a project deliverables from failing to succeed. The project management success focuses on the “iron triangle” and the quality of the management process. The literature highlighted that a project can be viewed as successful despite the time, quality and costs not being met.

The literature deliberately analysed project success factors before analysing factors hindering project success. Project success factors are the positive factors and if not taken into consideration a project will not succeed. Project success factors are therefore a must do to ensure success whereas factors hindering project success are the negative factors as they influence the project negatively.

The literature further identified factors hindering project success in general, in the military and in the SA Navy. Factors hindering project success in the military can also be applicable to the SA Navy as the Navy forms part of the military. Some of these factors are internal to the Navy and others are external. It is clear from the literature that some of the factors hindering project success in the SA Navy are very unique and only found in the Navy. Factors hindering project success in the SA Navy will also be discussed in more detail in Chapter 4. These factors will be discussed from the perspective of the SA Navy members. These factors will be from the perspective of SA Navy members.

Lastly, an overview of the acquisition process was highlighted to give an indication of the complex process the SA Navy has to follow. This was discussed to show the complexity of the process and to justify the use of complexity theory in the research methodology of this study. The following chapter discusses the research methodology of the study.

# CHAPTER 3

# RESEARCH METHODOLOGY AND DESIGN

## 3.1 INTRODUCTION

As a point of departure, this chapter aims to introduce the methodology used in the study. Given the world's diverse complexities, social scientists often prefer to employ a plethora of research methods in order to interrogate the nature of social reality. Because of the complexity of defence projects and multiple stake holders involved, the use of reductionism and system thinking is necessary.

In addressing the objectives and questions of the research, the study takes cue from the scholarly contribution made by Stacy Carter and Miles Little in, *Justifying knowledge, justifying method, taking action: Epistemologies, methodologies, and methods in qualitative research* which was published in 2007. In doing so, the study subscribes to their key definitions which are as follows (Carter and Little, 2007):

- *Epistemology*. It is defined as the study of the nature of knowledge and justification; and epistemological imperatives are issues about an adequate theory of knowledge or justification.
- *Methodology*. It is the theory and analysis of how research should proceed; analysis of the assumptions, principles, and procedures in a particular approach to inquiry; or study – the description, the explanation, and the justification – of methods, and not the methods themselves; reconstructed reasons that justify, clarify, and help us understand research methods; methodology aims to justify the method of a research project.
- *Method*. It is the techniques of gathering evidence; procedures, tools and techniques of research; methods are the bolt and nuts in research action.

The preceding definitions assist in justifying the selection of a particular research design and research methodology (Babbie and Mouton, 2012, Carter and Little, 2007). Due to the complex nature of the SA Navy project management process the reductionism approach will be appropriate.

## 3.2 APPLICATION OF REDUCTIONISM IN THE STUDY

Reductionism is the thinking that things must be broken down into smaller pieces in order to understand them. Reductionism denotes any approach to clarification that aim to reduce complexities of structure or behaviour to less complex units (Baxter and Jack, 2008, Eisenhardt, 1989, Handel, 1992, Merriam, 1998, Yin, 1994). Reductionism also has a particular meaning, and according to Kaplan (1964) human behaviour can be condensed to physical laws related to the instinctive type of behaviour of other animals to intensively investigate emergent properties and categories and their interactions within complex and dynamic social systems. The current study is conducted within a complex environment whereby there are various stakeholders such as the end user, the government, the public and the defence related industry among others. With the application of reductionism the complexity will be minimised. Therefore, reductionism is relevant to this study as the study is exploratory in nature and the analysis will be enhanced.

According to Ackoff (1972) reductionism consists of the believe that everything in this world and all knowledge thereof can be decomposed, reduced, or stripped to a simple indivisible or element parts. Ackoff further states that reductionism gives rise to a systematic way of thinking about the world, a means of looking for explanation and gaining understanding of it.

Reductionism therefore is understood as the traditional way of approaching problem solving, at least in the great scheme, and it is common across numerous disciplines. Jackson (2005) provides a valuable outline for the supporting of reductionism. Reductionism can be labelled many names including among others “stepwise refinement”, “disaggregation” and simply “breaking the problem down”. According to Jackson (2005) in reductionism problems are broken down into simpler parts and are, possibly, reconstructed into a single whole solution or give a single systemic understanding. Alternatively, the individual sub problems can gain fairly self-contained answers with no reference to other parts of the understanding of the problem. Reductionism is the paradigm of understanding that has been used by the human race in a number of various scenarios with countless achievements. This knowledge of breaking problems into their fundamental pieces comes naturally to people and goes

some way towards relieving the burden of bounded rationality (O'Loughlin and McFadzean, 1999). That is, there are some huge/difficult challenges, concepts or issues than can only be correctly understood by first subdividing them into their basic parts. With this method there is an implicit assumption that there is little necessity or effort to understand the context or 'whole' systems or problem. Reductionism on the other hand failed to account for dynamics in organisms in the field of biology where it was obvious that the whole, which is the organism, cannot be understood only through the behaviour of its fundamental part (Flood, 2010). The organism as a whole took a form that is not comprehensible from its integral parts or to state it differently the whole was bigger than its inseparable parts. This occurrence where the whole emerged from the interface between the individual parts and the parts affecting each other in a network relationship is called emergence by Jackson (2003). When reductionism failed to deal with emergence, the general systems thinking was formulated (Bertalaffy and Woodger, 1338). As a result of this failure, general systems thinking was developed as a counter to reductionism and in reply to the need for knowledge generation and understanding phenomena takes interrelatedness and emergence into consideration (Flood, 2010).

## 3.3 SYSTEMS THINKING AS A SUBSTITUTE TO REDUCTIONISM

This research aims to identify and analyse factors hindering project success in the SA Navy. It is important to note that these factors are very diverse and come from multiple stakeholders as mentioned earlier. These factors are interrelated and are part of a bigger system which has various stakeholders. Stakeholders are among others the public, the end user, government, unions, defence industries, and the international organisations. It is against this background that the author proposes a systems' approach in addressing the research problem. Although there are multiple stakeholders, only members of the SA Navy and ARMSCOR will form part of the research. This will be the end user of the system and personnel supporting the system such as logistics and intelligence.

Ludwig von Bertalanffy, a biologist somewhere in the 1940s, is widely recognised for the development of the general systems theory in an effort to incorporate the universality of science and generate a shared language across disciplines as an

alternative to reductionism (Ackoff, 1974, Jackson, 2000). A system can be defined as a set of interconnected elements (subsystem) operating as a whole (Wilson, 1984). In light of this, the SA Navy can be taken as a system that operates in a specific environment. The SA Navy is neither independent nor self-reliant. It shares resources with and it is reliant on the outside environment where it functions.

The key features of systems thinking is centred around the whole system or organism instead of just the part (Nicholas and Steyn, 2012). It implies being able to observe the system in a condition, to take a seemingly disordered, confused condition and see some degree of order or harmony in it. As such, it is a valuable way of dealing with an intricate phenomena, particularly human created systems (Nicholas and Steyn, 2012).

Individuals depending on the environment will define system differently. For someone in the information technology industry a system means a computer, for the mechanic it means an engine or a car, for a government employee a system means bureaucracy or administrative system and for the Navy it means weapon system.

When one explains the system theory and present the SA Navy as an independent system, four fundamental notions must be clear: an open system (as opposed to closed system), subsystem, entropy and synergy. According to Smit et al. (2014) a system is closed when it is independent and can exist self-sufficiently in a specific setting. However, the system is open if:

- it is reliant on the environment in which it operates, and the SA Navy is reliant on the Ministry of Defence for resources such as budget and equipment,
- the environment is dependent on the system, because the Ministry of Defence is dependent on the SA Navy to protect the territorial waters of the Republic and fulfil its constitutional obligation; and
- there is a specific interface between the environment and the system.

The SA Navy is therefore a subsystem, i.e. a system within a system (the broader Department of Defence). The systems approach to research provides a framework in which numerous organisational subsystems can be considered individually, but also in terms of the whole organisation. A specific value of the systems approach is that it

highlights the fact that the actions in one fragment of an organisation influence activities in the other part. The system approach also infers that the SA Navy is an open system which has an explicit connection with its environment.

As alluded to earlier the theory of open system was developed by von Bertalanffy (1950). The open system theory employs relational and functional and relational measures to study the whole, rather than principles of reductionism of studying the simple element. An organism as a whole is said to coexist in relation to an environment. Open systems take inputs from their environments, change them and then return them in the form of output or product back to the environment (Jackson, 2003). In order for them to exist they are reliant on the environment and adjust to the environmental change.

Synergy is the other notion of the system theory that can be applied to research. It basically implies that the whole is more than the sum of its parts, or the individual subsystems are concurrently applied in such a way that the results of their simultaneous application is greater than the sum of their individual effort (Smit et al., 2014). One last concept of the system is called entropy which is the process of systems disintegration and it is the opposite of synergy. When the system fails to make the needed changes or provisions to allow it to remain its existence in a specific environment, it is bound to fragment and fail (Jackson, 2005). For the purpose of systems thinking, a systematic approach will be followed in this research.

If one follows a recipe of baking cakes in a chronological manner then one is being systematic. Student mechanics in class take a systematic method to their study of the engine – the starter, brakes, clutch and lights among others – but on completion of their study the students may possess very little knowledge or even understanding of the entire engine because the whole differs from the sum of its parts, that is, the whole has emergent properties as depicted in Table 3.1. Many individuals either indirectly or indirectly mention things that are interrelated (exhibit connectivity – see Table 3.1) when referring to the term “system”. A common instance is the use of a “transport system” or “computer system” in daily language. Over and above a set of unified ‘things’ (elements), a ‘system’ can also be understood as a technique of thinking about the linkages (relationship) among things – hence a process (Ison, 2008). A constraint

to think about ‘system’ as a process and as an object is activated by the fact that the word system is a noun – a noun refers to something one can see, touch or feel, but in modern systems thinking further care is paid to the process of ‘formulating’ a system as shown in Figure 3.1. Figure 3.1 demonstrates somebody who has articulated or distinguished a system of interest in a situation that is a process. In the process a boundary judgement is made which differentiates an environment from a system of interest.

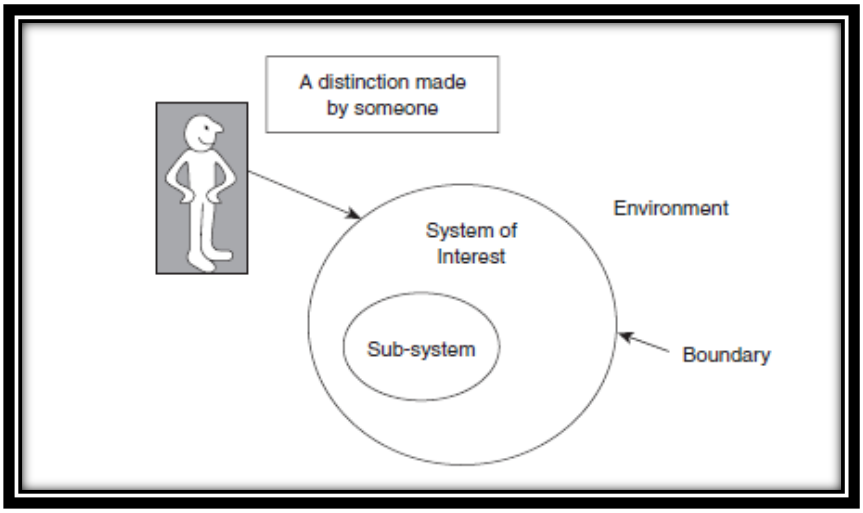


Figure 3.1: Key elements of systems practice as a process which result from systems thinking within situations experienced as complex (Ison, 2008)

Systems thinking embraces a number of concepts which most systems lineages have as a common grounding (Table 3.1). Thus, like other academic areas, ‘systems’ has its own language, as shown in Table 3.1. At this point it is worth mentioning that the word system has been used in a number of different ways: firstly, in the daily sense when one mentions ‘problem with the system’; secondly, ‘system’ of interest which is the product of a process of formulating or constructing by someone as shown in Figure 3.1; Thirdly, in the academic field of study called ‘systems’ and fourthly, a systems approach – practice or thinking which encompasses both systematic and systemic thinking and action (Ison, 2008).

| Concept | Definition | Source |
|---|---|---|
| **Boundary** | The system's borders, determined by the observer(s), which define a point where control action can be taken: a particular area of responsibility to achieve system purposes | (Capra, 1996) |
| **Communication** | (i) The first-order communication is based on simple feedback (equally to a regulator) but must not be confused with human communication, which has a biological basis<br><br>(ii) The second-order communication is viewed from a theory of cognition which includes emotion, language, perception and behaviour. Amongst human beings this gives rise to new properties in the communicating partners who each have different experiential histories | (Wilson, 1984) |
| **Connectivity** | Rational dependence among elements or components (including subsystems) within a system | (Wilson, 1984) |
| **Difficulty** | A condition is considered to be a bounded and well-articulated difficulty where it is presumed that it is clear who is involved and what would constitute a resolution within a given time frame | (Pearson and Ison, 1997) |
| **Emergent properties** | Properties which are exposed at a certain stage of the organisation and which are not possessed by basic subsystems. Therefore these properties appear from an assembly of subsystems | (Capra, 1996) |
| **Environment** | That which is on the outside of the system border and which affects and is also affected by | (Wilson, 1984) |

| | | |
|---|---|---|
| | the system's behaviour; otherwise the 'context' for a system of interest | |
| **Feedback** | A form of interconnectedness is found in a varied variety of systems. There may be a negative feedback (balancing or compensatory) or positive (reinforcing or exaggerating) | (Wilson, 1984) |
| **Hierarchy** | Layered structure; the position of a specific system in a range of levels of organisation. This implies that systems are at the same time a subsystem of some broader system and they are themselves a wider system to its subsystems | (Capra, 1996) |
| **Measure of performance** | The standards used to measure whether the system achieve its intended purpose. The collected data according to performance measures, are used to adapt the interactions within the system | (Pearson and Ison, 1997) |
| **Mess** | This is a set of circumstances that produces dissatisfaction. It can be conceptualised as a system of opportunities or problems; an opportunity or problem is a final element abstracted from a mess | (Pearson and Ison, 1997) |
| **Controlling and Monitoring** | The collected data and the decisions taken in relation to performance measures are controlled and monitored. If there is any action required it will be taken through some management avenue. | (Wilson, 1984) |
| **Networks** | An explanation of the concept of hierarchy which evades the human projection of 'below' and 'above' and recognises an assemblage of | (Capra, 1996) |

| | | |
|---|---|---|
| | objects in relationship, for example an organisms in an ecosystem | |
| **Perspective** | This is a way of experiencing which is moulded by our unique personal and social histories, where experiencing is a mental or cognitive act | (Wilson, 1984) |
| **Purpose** | What the system is doing or why its exist; the *raison d'êtr*e which in terms of a model developed by people is to achieve the particular transformation that has been defined | (Capra, 1996) |
| **Resources** | Available elements within the system boundary and which enable the transformation to occur | (Wilson, 1984) |
| **System** | An integrated whole whose essential properties arise from the relationships between its parts; from the Greek *synhistanai*, meaning 'to place together' | Capra, 1996) |
| **System of interest** | The product of distinguishing a system in a situation, in relation to an articulated purpose, in which an individual or a group has an interest (a stake); a constructed or formulated system, of interest to one or more people, used in a process of inquiry; a term suggested to avoid confusion with the everyday use of the word 'system' | (Wilson, 1984) |
| **Systemic thinking** | The understanding of a phenomenon within the context of a larger whole; to understand things systemically literally means to put them into a context, to establish the nature of their relationships | (Capra, 1996) |
| **Systematic thinking** | Thinking which is connected with parts of a whole but in a linear, step-by-step manner | (Pearson and Ison, 1997) |

| | | |
|---|---|---|
| **Tradition** | Literally, a network of pre-understandings or prejudices from which we think and act; how we make sense of our world | (Pearson and Ison, 1997) |
| **Transformation** | Changes, modelled as an interconnected set of activities which convert an input to an output which may leave the system (a 'product') or become an input to another transformation | (Pearson and Ison, 1997) |
| **Worldview** | That view of the world which enables each observer to attribute meaning to what is observed (sometimes the German word *Weltanschauung* is used synonymously) | (Capra, 1996) |

Table 3.1: Definitions of some generalised systems concepts likely to be experienced when encountering a system practitioner or for co-option into own action research

There is a relationship between systems thinking and action research. There are two main lines of thought in systems thinking that lead to different conceptions about action research. The first is that systems thinking support thinking about real social systems that it assumes exist in the world (Wilson, 1984). The second is that systemic thinking supposes only that the social construction of the world is systemic (Pearson and Ison, 1997). Greater emphasis is placed on systemic thinking consistent with its greater importance to contemporary action research. Systemic thinking when taken to its practical conclusion from a critical perspective offers to action research a somewhat unique liberating praxis (Pearson and Ison, 1997).

## 3.4 SYSTEMS THINKING APPLIED TO FACTORS HINDERING PROJECT SUCCESS

It is quite obvious that factors hindering project success in the SA Navy will at times be subjective, depending on an individual's experience and encounters. These factors hindering project success could impact on one or more project objectives. These factors can be interrelated hence the proposal of systems approach. As mentioned earlier the problem with this study is the multiple stakeholders involved and the complexity of managing defence projects. This is described by Jackson and Keys (1984) as systemic-pluralist and mention problem-solving methodologies seeking to

address conflict arising from multiple purpose (pluralist) and the interdependency of the problem (systemic). This study proposes a soft systems approach specifically Warfield's Interactive Management. A soft systems approach will address the interrelatedness and emergence properties of factors hindering project success while accommodating multiple stakeholders.

## 3.5 ACTION RESEARCH

Developments in systems thinking and practice have gone on in parallel – sometimes with mutual influences, sometimes in isolation – with other academic trends such as the emergence of discourse theory or post-structuralism or concerns with reflexivity, to name but a few (Ison, 2008). This should not pose problems for action researchers; it should rather offer more choices for practice. Awareness of the different systems traditions, the praxes that have evolved, their constituent concepts (Table 3.1) and the techniques, tools and methods that are used are all available for an action researcher to enhance their own repertoire. One of the key concepts in systems is that of hierarchy or layered structure (Table 3.1); this concept illuminates an important aspect of systems practice, the conscious movement between different levels of abstraction (Ison, 2008).

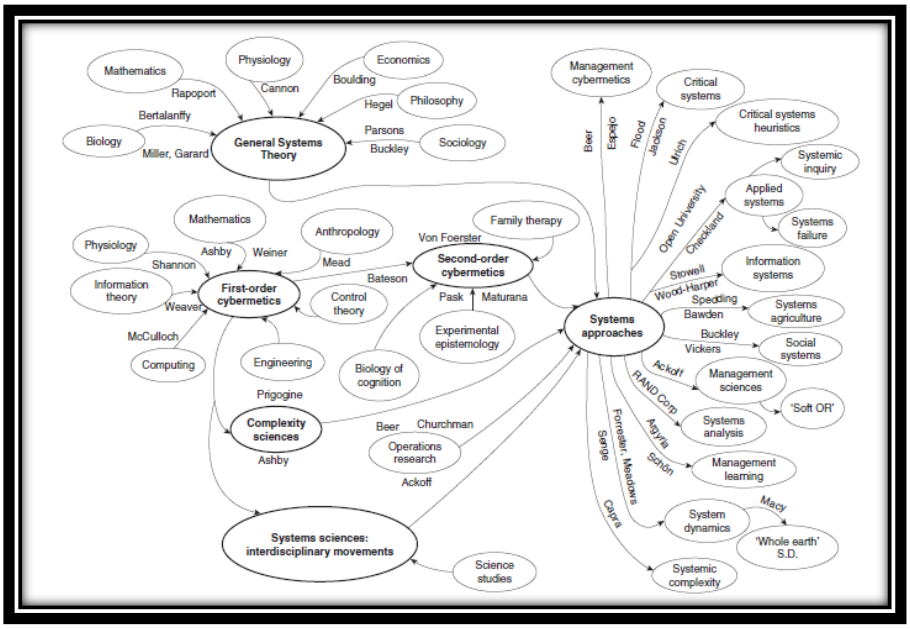


Figure 3.2: A model of different influences that have shaped contemporary systems approaches (Ison, 2008)

Many action researchers, including Kurt Lewin, have been influenced by systems thinking, but what is not always clear is the extent to which this is done purposefully – with awareness of the different theoretical and practical lineages depicted in Figure 3.2. Engaging with systems offers a set of conceptual tools which can be used to good effect in action research (e.g. Table 3.1). There are other potential advantages for action research practitioners. Firstly, systemic understandings enable reflections on the nature of research practice, including action research practice itself. This can be understood by exploring purpose (Table 3.1). Secondly, there is a rich literature of how different systems approaches or methodologies, including systems tools and techniques, have been employed within action research to bring about practical benefits for those involved (Checkland and Poulter, 2006).

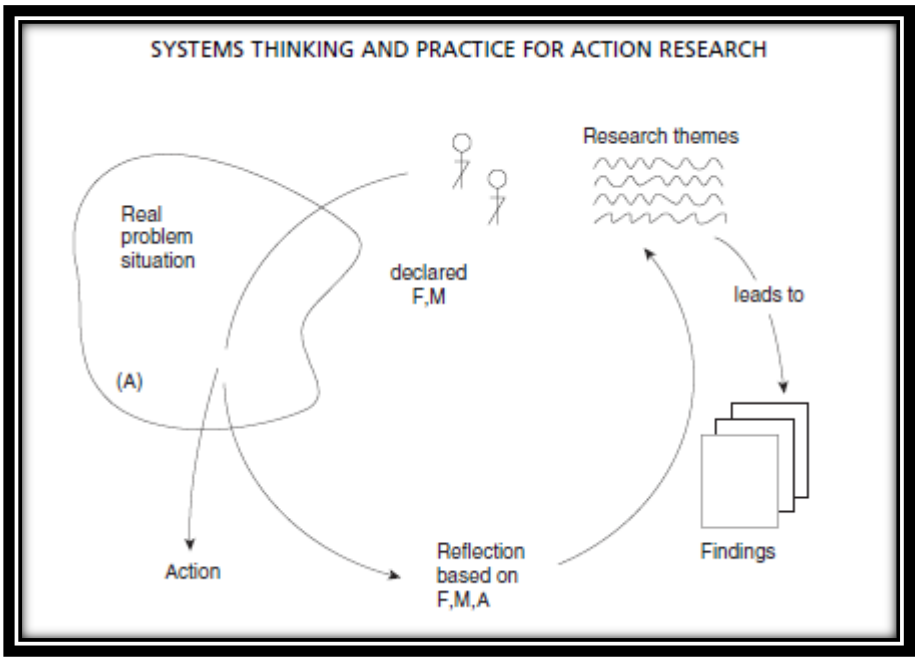


Figure 3.3: The cycle of action research based on a declared framework of ideas (F) and methodology (M) and area of application (A) and articulated research themes: (Checkland and Holwell, 1998a, Holwell, 2004)

The distinctions between what constitutes research (within the phrase action research) and how it might be differentiated from 'inquiry' or 'managing' is contested. Action research has been a concern within the 'applied systems' lineage (Figure 3.2) for over 30 years (Checkland and Holwell, 1998a); within this lineage (Holwell, 2004) proposes three concepts that constitute action research as legitimate research: recoverability,

iteration, and the purposeful articulation of research themes (Figure 3.3). According to the cycle in Figure 3.3, a researcher interested in a specific research theme, pronounces early his\her framework of a linked idea (F) and methodology (M) and then enters into a real world situation whereby the research themes are pertinent and he/she becomes involved as a researcher and a participant (Holwell, 2004). According to Checkland and Holwell (1998a) action is taken in the real world situation whereby the researcher is committed to continuously reflect on the collaborative process and outcome of the activity. Howell exemplifies the claims with a description of 'a program of action research with the prime research objective of understanding the nature of the contracting relationship [within the United Kingdom National Health Service] with a view to defining how it could be improved'. The project was 'complex in execution, including several projects overlapping in time' covering work from different bodies of knowledge, and was undertaken by a seven-member multidisciplinary team with different intellectual traditions. The issues explored crossed many organisational boundaries; the work was done over a four-year-period and followed a three-part purposeful but emergent design (Checkland and Holwell, 1998b). Within the Checkland and Holwell lineage they emphasise that the research process must

(i) be recoverable by interested outsiders – 'the set of ideas and the process in which they are used methodologically must be stated, because these are the means by which researchers and others make sense of the research' (Holwell, 2004);

(ii) involve the researcher's interests embodied in themes which are not necessarily derived from a specific context. 'Rather, they are the longer term, broader set of questions, puzzles, and topics that motivate the researcher [and] such research interests are rarely confined to one-off situations' (Holwell, 2004);

(iii) involve iteration, which is a key feature of rigor, something more complex than repetitions of a cycle through stages 'if thought of in relation to a set of themes explored over time through several different organizational contexts' (Holwell, 2004); and

(iv) involve the 'articulation of an epistemology in terms of which what will count as knowledge.

The action research process described in this study is the one frequently adopted by practitioners conducting academic research. According to Dick (2001) one pursues both action (change) and research (understanding) while conducting action research. Action research incorporates critical reflection on the action to gain better understanding that the result is a more informed action. Action research is usually participative and qualitative although quantitative methods have been used by some of the researchers when the situation demanded it (Sankaran et al., 2010).

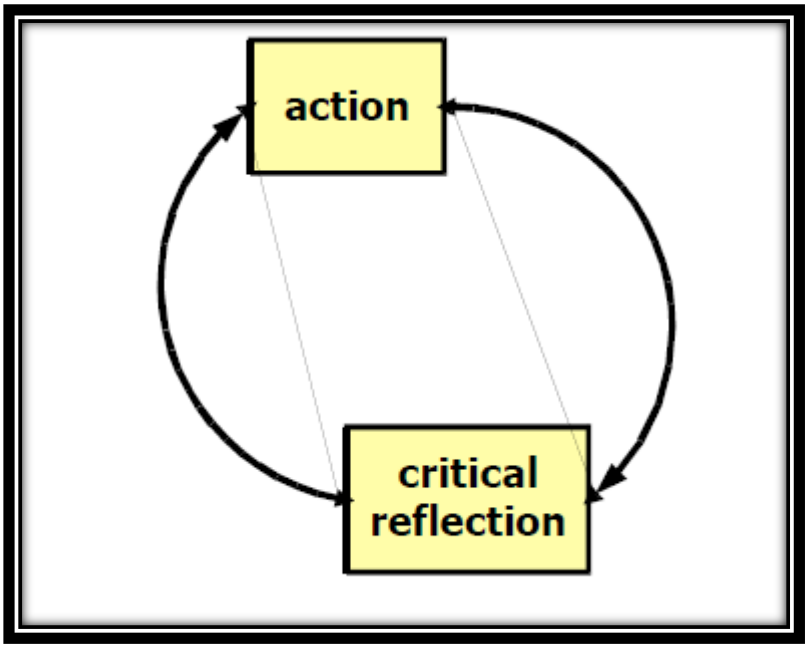


Figure 3.4: General model of action research (Sankaran et al., 2010)

As shown in Figure 3.4 that action research is carried out in a spiral fashion. The most common form used by researchers is the Deakin cycle (Kemmis and McTaggart, 1988) of plan-act-observe and reflect and then the cycle repeats itself. Often one starts with the problem and as one takes action, observes and reflects on the situation you converge through an interactive cycle to a better understanding of the situation. Action research was selected as a research methodology as the researcher wants to pursue action outcomes and at the same time to address the problem statement. The research requires active participation of all stakeholders making the action research useful.

This research aims to identify and analyse factors hindering project success in the SA Navy. The author proposes a systemic process of identifying and analysing these factors. This study will adopt Checkland and Holwell (1998a) cycle of action research as a research approach.

## 3.6 RESEARCH STRATEGY

In view of Checkland and Holwell (1998a) cycle of action research, the research theme, framework and methodology for this study are as follows.

### 3.6.1 Research Theme

The theme for this study can be specified as: What are the key factors hindering project success in the SA Navy?

### 3.6.2 Framework

Systemic thinking is proposed for this study as a guiding framework. Factors hindering project success are not only one sided as there are multiple stakeholders in SA Navy projects.

### 3.6.3 Methodology

This section presents methodological practices that seek to describe, explain and justify the methods used in research and is not a method in itself (Kaplan, 1964). To put it figuratively, the methodological practitioner is neither a ‘baseball commissioner who writes rules’ nor ‘umpire with powers to thump offenders’ but a ‘coach whose recommendations’ rest “on what the play of the game shows to be effective” (Kaplan, 1964). In other words, the task of research methodology is usually inquiring about techniques and/or logical principles as “the ways of doing the work of that science which are regarded, for more or less compelling reasons, as being acceptable” (Kaplan, 1964). Kaplan also presents that methodological studies also seek to establish the potentialities and limitations of various techniques or probes of some of its alternatives. One must also confess that this section is viewed as a “retreat to a previously prepared line of defense against criticism of the substantive outcome of the inquiry” (Kaplan, 1964). The study undertakes not to use this section to advance any

‘scientific honorifics’, but affirms the proper concerns of methodologies to be used and their standards of scientific acceptability. Kaplan (1964) warns that any attempt to press methodological norms too far, may obscure imaginative and bold explorations of unresolved mysteries.

This study will employ an interactive management approach. Interactive management is a specialised system of management using collaborative teamwork to define and resolve highly complex issues (Alexander, 2002). Warfield and Cárdenas (1994) explained:

> The development of interactive management is based on the recognition that for coping with complex situations there is a need for a group of persons, knowledgeable of the situation, to tackle together the main aspects of the concern, to develop a keen understanding of the situation under analysis and to elaborate the basis for effective action; all these founded in a spirit of collaboration, commitment and within the framework of a serious and organised effort.

The notion of interactive management was developed by Warfield and Christakis at the University of Virginia in 1980 (Banathy, 1996) and has been used successfully in larger groups facing crisis situations (Warfield and Cárdenas, 1994). Interactive management is structured to avoid situations that lead deliberations to flounder; it creates a situation whereby a democratic decision through consensus can be arrived at by all the participants, not just the majority, by developing a pattern created by the dialogue (Warfield and Cárdenas, 1994). In that way, participants are not persuaded to settle to a substandard decision just to be able to see some action and to get on to other tasks demanding their attention.

The researcher will identify roles of the IM process as suggested by (Warfield and Cárdenas, 1994). For the purpose of this research IM participants will be carefully selected to have broad stakeholder representation. Participants will comprise of project officers, those utilising the systems like ships, representatives from ARMSCOR and procurement group. In total there will be a maximum of seven participants. This is in line with Janes (1988) suggestion that a group of participants should be limited to a maximum of eight members. Janes further states that increasing the group size above

this number will weaken the quality of debate. Participants will be selected according to the different projects they worked on or are currently busy with.

The key participator during IM is the facilitator. The role of the facilitator is to plan the IM workshop, select participants, and most importantly organise the venue for the interaction. A triggering question will be used to generate ideas from participants. Participants will be asked to identify factors hindering project success in the SA Navy. These ideas or factors identified will be gathered and will serve as an input in the idea clarification stage.

Once ideas are collected individuals will clarify factors hindering project success. Once these factors are identified participants will be invited to discuss each factor to aid understanding. The researcher as a facilitator will listen to the discussion and record ideas in order to condense them into a single thought.

During the IM process the researcher identifies the participants, the information and the facility requirements. Warfield and Cárdenas (1994) highlighted that a critical purpose is to make sure that the participants' time is used productively in the IM workshop. Warfield and Cárdenas (1994) further states that before ideas are generated there must be an identification of the complex issues or problem, the framing of the problem, awareness of potential alternative signs, selection of design and the the process of implementation of the selected design. After stipulating the action research subject, outline, procedure, and concerned area, the action process will be as follows:

### 3.6.4 Interactive Management Process

Various roles for the IM process were identified by (Warfield and Cárdenas, 1994). It is given that resources are always limited and for the purpose of this research the following roles are regarded as relevant:

a. **The IM participants:** These are stakeholders in the issue under investigation of study. In the interest of fairness, all key stakeholder groups must be represented in the participants to avoid compromising the IM process. It is a fact that one will get substantive information from participants who are

knowledgeable about the problem situation. Jackson (2003) describes various roles of different players. As stakeholder groups described by Jackson (2003), Table 3.2 identifies stakeholders for this research.

| **Stakeholder Group** | **Description** | **Designation for this research** | **Number of participants** |
|---|---|---|---|
| Decision-makers | Decision-makers are able to influence and make things happen in the system. | The Military Command Council or their representative. Management from ARMSCOR. | One |
| Actors customers and client | Actors perform basic tasks while customers and clients suffer or benefit from the system. | Commanders of Ships and Engineers. | Two |
| Problem owners | Problem owners are concerned about the system's performance. | The logistics officers in the SA Navy. | One |
| Witness | Finesses are affected by the system but cannot influence the behaviour of the system. | The combat officer in the SA Navy and technician | Two |
| Problem-solvers | Problem-solvers are responsible to solve the problem. | Project officers. | One |

Table 3.2: The identified stakeholders for the study

In the IM workshop the identified members will assist in providing the necessary information. Once the information is provided members or participants will then provide feedback based on the generated model and identify the relationship.

b. The **IM Facilitator** (the researcher) is responsible to plan the workshop, select the participants, ensure that the discussion is facilitated in a fair manner and interpret the results of the Interpretive Structural Modelling (ISM) model.

First in the IM process is the idea generation. The generation of ideas is a process to draw any system's element from stakeholders (Nthunya et al., 2016). In this phase the participants are conversant about the situation and they are brought together with the guidance of the IM practitioner to generate ideas (Jackson, 2003). Various methods can be used to generate ideas such as the Nominal Group Technique and Delphi Technique to mention but a few. For the purpose of this study, the idea generation process will be done in a form of a triggering question. Participants will be asked to name at least seven factors hindering project success in the SA Navy. This will be done on paper to protect the identity of the participants. The researcher will then go through identified factors to eliminate any repetition. The identified factors will be used as input into the idea clarification stage. Participants will be given an opportunity to generate ideas on their own time and space. The generated ideas will give participants an understanding of other perception of the problem (Nthunya et al., 2016). At this stage the participants will frame a consensual understanding of the problem and respond to the triggering questions. Warfield and Cárdenas (1994) and (Christakis, 2000) stated that there are two reasons why it is necessary that participants become familiar with what the patterns convey, namely: (a) to assure the quality of the display by either verifying its accuracy as presented initially or by amending it appropriately, and (b) to enable them to convey an interpretation of the structure to others who may also lack the capacity to interpret the structures. The above process may be summarised as follows:

i. Clarifying the triggering question;
ii. generation of ideas silently in writing by each participant;
iii. recording of ideas on the board; and
iv. discussion of each idea for clarification and editing as discussed in the next section.

Once ides are identified they must then be clarified. Participants sometimes use the same words to convey different concepts, or use different words to convey the same

concepts (Nthunya et al., 2016). Because of this, the IM process will clarify each generated idea in ensuring unambiguity in the extracted information. This is where generated ideas are checked and rephrased if required. The Nominal Group Technique may be used to select important elements of the modelling (Nthunya et al., 2016). After the clarification of ideas and any new additions are made during the clarification discussion, participants can be asked to vote by means of a written ballot (Warfield and Cárdenas, 1994). During this voting process each participant can be given an opportunity to choose the five ideas deemed to be important in respect to the issue and they are ranked in the order of importance (Warfield and Cárdenas, 1994).

On completion of the idea clarification the idea structuring will begin. The idea structuring phase can be done with the aid of a binary matrix (Nthunya et al., 2016). Once a set of evidently pronounced elements is available, these ideas will be structured into patterns. This is a computer operation process and during this phase the computer operator must manually keep track of the answers given by the group in order to be able to amend any changes should the need arise later. In this phase participants will examine the relationship between a pair of system elements.

For the purpose of this study the (ISM) will be used to structure factors hindering project success in the SA Navy as identified during the idea generation and clarification stage. The ISM assists to frame elements linked with issue formulation. The ISM is a useful tool when dealing with complexity where there is interrelatedness between elements associated with the complex situation. According to Warfield and Cárdenas (1994) the ISM is capable of adapting the poorly defined view about the problem or the situation. The discussion is used to investigate the structure and relations between the elements. The ISM will therefore be a supporting mechanism for the workshop participants for structuring ideas and sharing their knowledge. This is the phase where the output is reviewed thorough the IM process. The graphs emerging from IM activities are interpreted. Participants are allowed to change the voting records during the interpretation process (Nthunya et al., 2016). The generated model, although not conclusive, can be utilised to develop an action plan.

According to Iyer and Sagheer (2009) the ISM is based on two basic concepts which are

- one, identified sets of elements within a situation context and
- two, a contextual relation is chosen as a possible statement or relationship among elements. For the purpose of this study, an influence type relationship will be used. The participants will be requested to respond to pairwise comparison in order to identify the interacting position of each factor. For example, does factor A significantly lead to factor B?

Once elements are identified and the contextual relationship is defined, pairwise comparison is then used to determine the subordination relation between elements (Warfield, 1973). According to (Warfield, 1973) the subordination relations are encoded in an n x n systems matrix where *n* represents the number of elements identified. The ISM uses the discrete mathematics of logic and structure (including binary relations, set theory, matrix theory, graph theory and Boolean algebra) which is mainly appropriate for representing systems described in terms of elements and relations (Janes, 1988).

Complex structures are well represented in the form of a graph or diagraph. In the ISM the elements of the issue or problem being studied are represented by the vertices of the diagraph, whereas the edges are directed and denote a specific relation between the elements, for example:

| **Element** | **Relation** |
|---|---|
| 1. Strong project leadership | -would help to achieve |
| 2. Insufficient funds | -strongly contributes to |
| 3. Clear project objective | -would help to achieve |
| 4. Dysfunctional leadership | -significantly aggravate |
| 5. Lack of technical expertise | -would lead to |
| 6. Poor project structure | -would influence |
| 7. Poor stakeholders engagement | -would influence the |

8. Lack of autonomy by project managers -would lead to

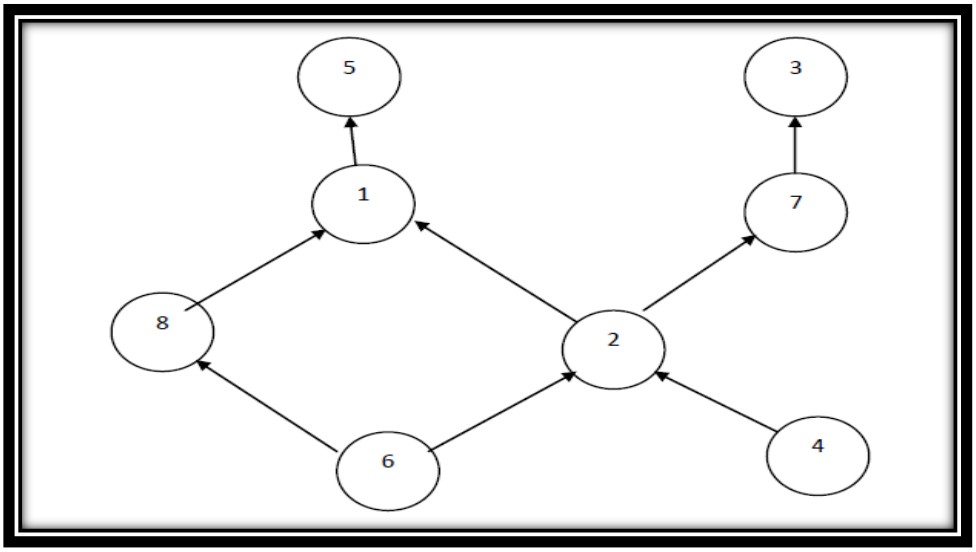


Figure 3.5: Example of a diagraph representing the example above (Janes, 1988)

The circle represents objectives and arrows the phrase (e.g. would help to achieve). By inserting the wording of the elements in place of the numbered circles will provide a well-defined structural model based on words and diagraph which can easily be communicated (Janes, 1988). The good thing about the ISM is that it can be used in any complex situation irrespective of the content of the situation, but, this is on condition that the set of elements can be identified with appropriate contextual relations defined.

This study will utilise ISM computer software by Sorach International called Concept Star to structure the identified factors hindering project success in the SA Navy. The end product of the ISM process will be a model showing how the identified factors interrelate. The ISM software enables the researcher to enter a set of elements into the computer whereby a group is asked to respond to a series of questions put out by the computer. For example does factor X significantly lead to factor Z? The group discuss the question under the guidance of the facilitator and a “yes” or “no” answer is agreed upon. When the group vote “yes” a “1” is entered in the appropriate cell of a matrix in the computer and with a “no” vote a “0” is entered. The constructed binary matrix represents a binary relation of a set in itself (Janes, 1988). In the process the

computer will make logical inference, based on given answers which leads to the construction of a system matrix as shown in Figure 3.6.

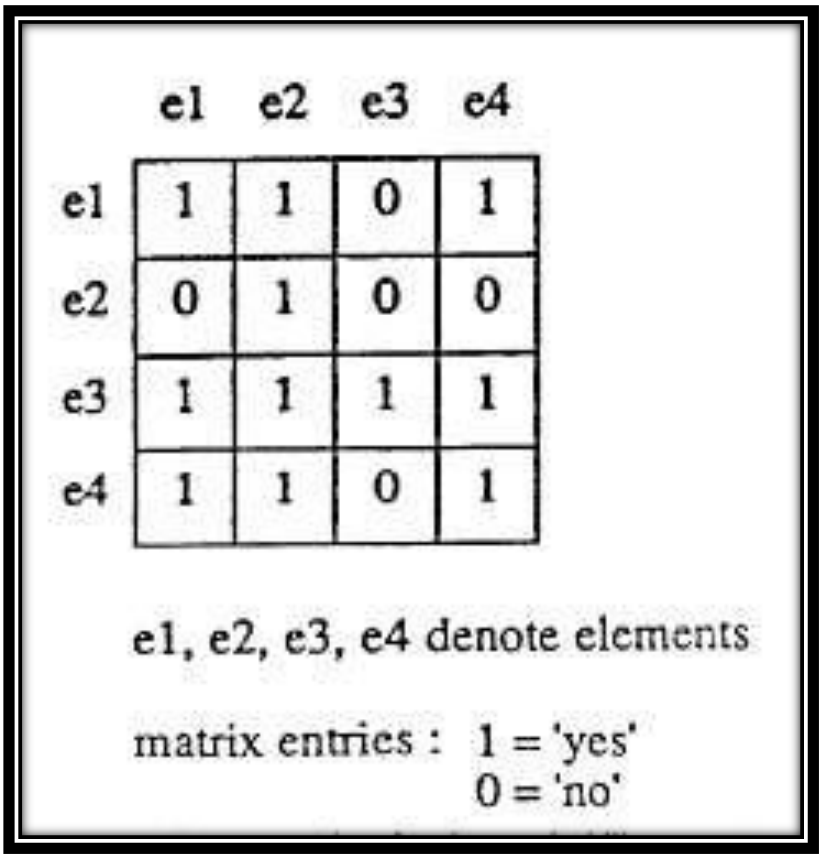


Figure 3.6: Example of a systems matrix of a four element set (Janes, 1988)

# CHAPTER 4

# RESEARCH FNDINGS

## 4.1 INTRODUCTION

The previous chapter provided an overview of the methodology used in the study. The aim of this chapter is to discuss and analyse the research findings of the study. The findings will be derived from the IM model developed during the workshop.

## 4.2 DATA COLLECTION AND IDENTIFICATION OF STAKEHOLDERS

As a point of departure in this study, a triggering question was posed to the participants to generate ideas during the IM process. To protect participants' identity, each IM participant was given a piece of paper to generate factors hindering project success in the SA Navy (See appendix A). A total of 134 factors were generated by participants. The IM facilitator collected all papers from the participants and transferred /wrote those factors on a white board. Interestingly, there were huge similarities in the factors identified by participants. The IM facilitator took the IM participants through each identified factor for clarity. In the end only 17 factors were left for discussion. Other factors were either merged or removed because they were either similar or the participants agreed that they have no substance.

A total of seven members participated in the workshop. Participation was broadly representative of various stakeholders. It is very important to have a diverse stakeholder representation in the IM workshop otherwise the quality of the IM output could be compromised (Warfield and Cárdenas, 1994). Participation involved, the representative of the Military Command Council from ARMSCOR, logistics officer, an engineer, commander of a ship, a combat officer, a technician, and project officer as depicted in Table 3.2 (Chapter 3 of the study). The defence related industry's participation could not be included and the member was not available at the time of the workshop. The study was undertook to ensure that the ISM group size was met as proposed by Janes (1995) and the representation requirements as suggested by Warfield and Cárdenas (1994).

## 4.3 GENERATION CLARIFICATION OF IDEAS

The participants were asked a triggering question as mentioned earlier to gather ideas on factors hindering project success in the SA Navy. Participants were also asked to give a description of each identified factor for the sake of clarity. In total, the participants identified 36 factors which were discussed extensively during the clarification stage. In the end the participants agreed on 17 factors as outlined in Table 4.1.

Although participants generated factors individually on a piece of paper to protect their anonymity, during the discussion they were able to share their ideas with each other and this made the facilitation process very easy for the researcher. All seven participants identified a high turnover rate of project officers', lack of autonomy by project managers, budgetary constraints, poor planning, lack of top management support, bureaucratic procurement and acquisition process and poor project management.

It is interesting to note that participants chose to differentiate between incompetent project managers and a lack of technical expertise by project managers. Although a lack of training contributes to both, one can be fully trained and still be incompetent. A lack of technical expertise is caused by a lack of training.

Sixteen of the seventeen identified factors are found in the literature. It is interesting to note that participants never struggled to agree on these factors. The IM facilitation process was very easy as participants mostly agreed with each other. During the voting process participants agreed without any hassles. There was never a time in the voting process where participants differed on whether the answer should be yes or no.

| Ref | Factor | Factor Description | Number of participants posing the factor | Literature reference |
|---|---|---|---|---|
| 1 | Incompetent project managers | Due to a lack of training, project managers lack competency. A prior knowledge of project management or qualification is not a requirement to become a project manager in the SA Navy. | Five | (Belassi and Tukel, 1996, Helfrich, 2016) |
| 2 | Lack of top management support | Top management are not standing up for the members. Not ensuring that resources required are available when needed. | Seven | (Avots, 1969, Belassi and Tukel, 1996, Helfrich, 2016, Morris and Hugh, 1986, Munns and Bjeirmi, 1996, Pinto and Covin, 1989, Preda, 2013) |
| 3 | Poor project management techniques | Because members have no formal qualification and some have never worked on projects before, they display poor project management techniques. | Four | (Avots, 1969, Munns and Bjeirmi, 1996) |
| 4 | Poor planning | Not understanding project management planning | Seven | (Avots, 1969, Belassi and |

| | | | | |
|---|---|---|---|---|
| | | techniques. This is the results of lacking technical expertise. | | Tukel, 1996, Helfrich, 2016, Munns and Bjeirmi, 1996) |
| 5 | Poor stakeholder engagement and analysis | Inability to identify stakeholders and engage them accordingly. This ends up in projects being delayed or sometimes cancelled. | Three | (Demir, 2015, Preda, 2013) |
| 6 | Unrealistic time frame | Time frame that is optimistic rather than realistic. | Six | |
| 7 | Budgetary constraints | Funds are always limited and this impact on project success and sometimes projects has to be cancelled. | Seven | (Hagen et al., 2012, Preda, 2013) |
| 8 | Lack of technical expertise by project managers | Project managers come from different environments within the SA Navy and lack technical expertise due to a lack of training. Prior knowledge of project management is not a requirement to be appointed as a project manager in the SA Navy. | Five | (Tishler et al., 1996) |
| 9 | Lack of autonomy by project managers | Due to command and control in the military, project managers have no autonomy in their projects. Their decisions can be overruled by their superiors. | Seven | (Tatar, 2010) |

| | | | | |
|---|---|---|---|---|
| 10 | Too much control from superiors | Superiors have more powers over project managers and this result in excessive control at times. | Five | (Tatar, 2010) |
| 11 | High turnover rate of project officers | To be a project manager or officer is not a career in the Navy. Members will always seek promotions in higher posts outside the project environment. Others will even leave the Navy for high paying jobs in the private sector. | Seven | (Preda, 2013, Tatar, 2010, Tishler et al., 1996) |
| 12 | Poor risk management | Members lack expertise to identify risks and to incorporate it in their plan. | Four | (Demir, 2015) |
| 13 | Poor quality management | Inability to plan and manage quality. | Five | (Demir, 2015) |
| 14 | Complexity of design | Defence projects are complex in their nature and require managers with technical expertise. | Four | (Demir, 2015) |
| 15 | Inability to attract and retain talent | The SA Navy is unable to attract highly qualified project managers. Once members' have undergone training the SA Navy is unable to retain them as they are unable to match the salary being paid in the private sector. | Three | (Oueslati, 2016) |

| | | | | |
|---|---|---|---|---|
| 16 | Bureaucratic procurement and acquisition process | Government procurement and acquisition regulations are very rigid and cannot be bypassed. They add delays in the approval process and sometimes even failure. | Seven | (Tatar, 2010, Tishler et al., 1996) |
| 17 | Poor project management | The fact that project managers have no technical skills will result in poor project management. | Seven | |

Table 4.1 Factors hindering project success in the SA Navy identified by the participants

## 4.4 INTERPRETIVE STRUCTURAL MODELLING

The Concept Star as ISM software designed by Sorach International was used to create a hierarchical model of the identified factors hindering project success in the SA Navy. The 17 identified factors through the triggering question were loaded into the software in order to develop a model through pairwise comparison prompts as shown in Figure 4.1.

The participants discussed each pairwise comparison in order to achieve an agreement on whether the response to the pairwise comparison statement was a yes or no. In Figure 4.1 there is an icon “next vote”. This can be used when participants failed to reach an agreement by skipping or deferring the comparison without giving an answer or it can also be used when participants reach consensus on the relationship between the posed elements. The pairwise comparison can also be presented again at a later stage. Should the participants fail to reach an agreement again, the response will be reached through a vote where the most supported response will be accepted. These two scenarios were never experienced in the workshop as there was always a consensus.

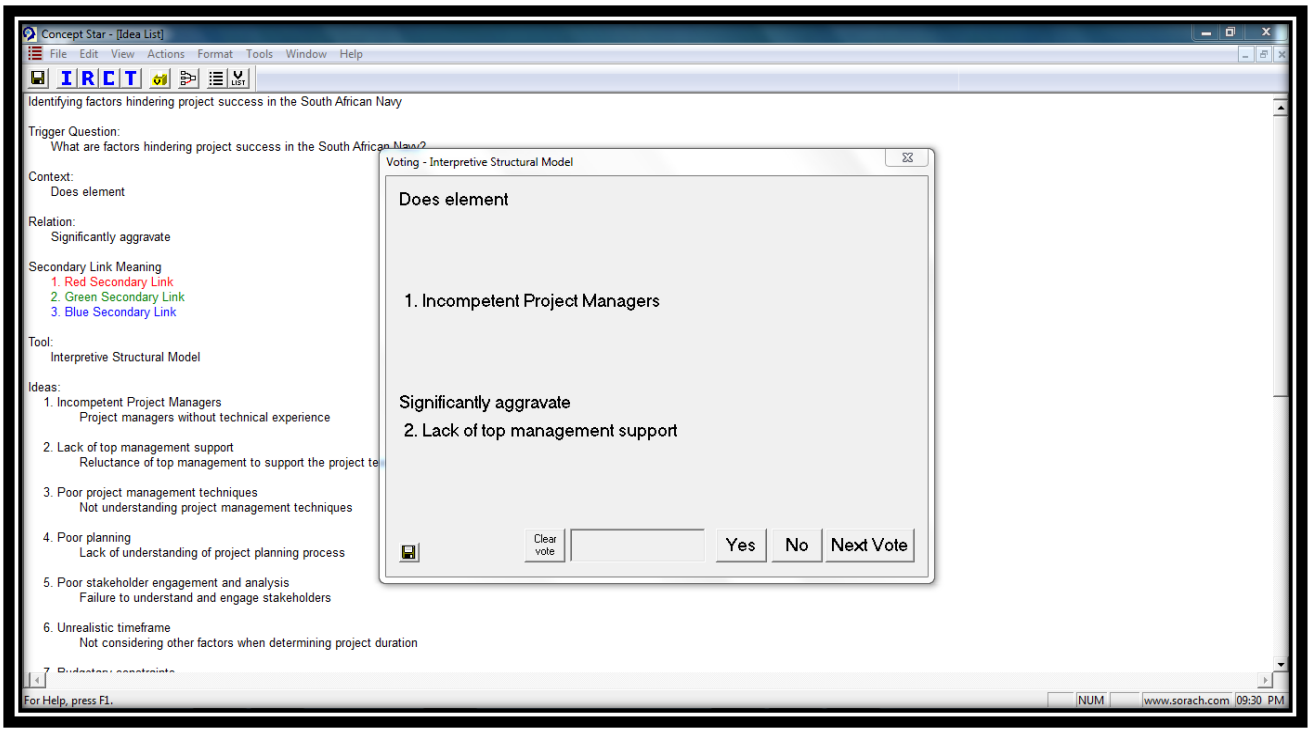


Figure 4.1 Voting screen taken from the Concept Star Software

It took approximately two and half hours to complete 150 pairwise comparisons out of a possible 289. The Concept Star's software logic used Transitive Logic to imply some of the relationships. The model that was produced was checked for inconsistencies and was accepted as the final ISM model for factors hindering project success in the SA Navy.

## 4.5 MODEL ANALYSIS

The relationship model in Figure 4.2 depicts the relationship between factors hindering project success in the SA Navy. Factors are shown in the boxes and the direction of the arrows illustrates the direction of the relationship between factors hindering project success. In this model the relationship represented is "Significantly aggravate". Most factors are displayed in the individual boxes. There is no circular relationship in the model, e.g. A significantly aggravate B and B significantly aggravate C. The model is hierarchical where the left most items form the base of the hierarchy. The far right elements of the diagraph represent the factors with no influence on other factors.

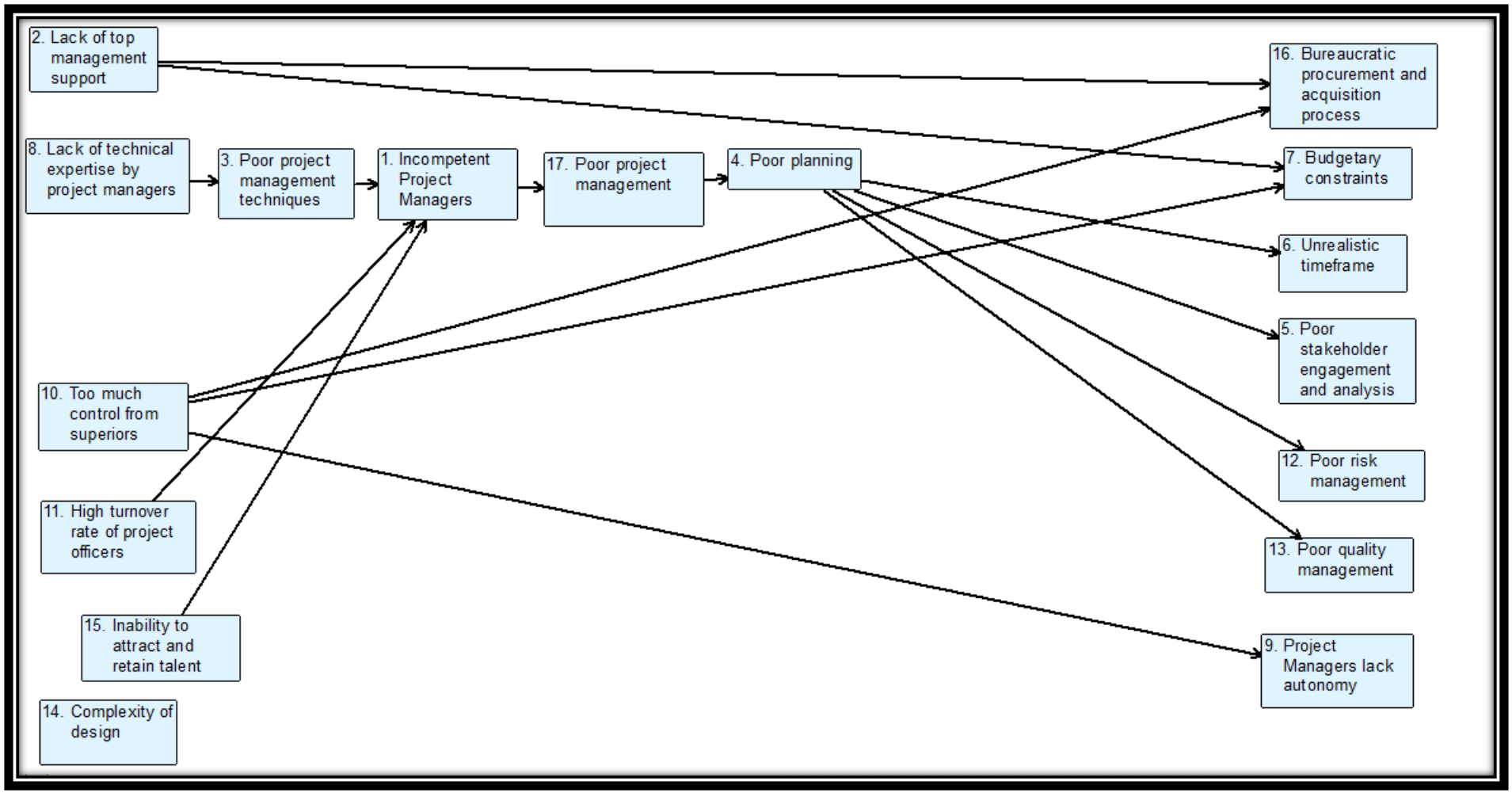


Figure 4.2: ISM model of factors hindering project success in the SA Navy

The ISM model depicted in Figure 4.2 is made up of six hierarchical levels. The first level on the left of the model indicates six factors as the primary key drivers for factors hindering project success:

- Lack of top management support;
- Lack of technical expertise by project managers;
- Too much control from superiors;
- High turnover rate of project officers;
- Complexity of design; and
- Inability to attract and retain talent.

These primary drivers are not influenced or aggravated by other factors. Senge (1997) suggests that systemic thinking has revealed that small actions focussed on the right things or areas produce large and long-lasting improvements. Applying Senge's statement to the SA Navy hierarchical model suggests that even by focusing on just the six key factors identified through the IM process – the project team could potentially realise the results further in other levels. It is worth noting that the factor "complexity of design" does not have a relationship with any factor. This means that this factor is not influenced by other factors and has no influence on any factor. It is worth mentioning that the complexity of the design factor will remain the Naval project environment factor as mentioned in the literature review as defence projects are very complex in their nature. The only remedy is to have project managers with strong technical expertise and who can handle and manage complexity.

The findings from this study suggest that in order to derive the best benefit for the success of the SA Navy projects, the SA Navy needs to focus its attention on the following key factors:

a. **Lack of top management support**. Lack of top management support in the model is only linked to two factors, bureaucratic procurement and acquisition process and budgetary constraints. Although budgetary constraints are not a primary driver according to the model, it is one of the key factors in any project. Without sufficient funding, no project will succeed. Without the top management's support, the procurement and

acquisition processes cannot be bypassed. With strong motivation from the top management, government procurement and acquisition processes can be relaxed.

b. **Lack of technical expertise by project managers.** Lack of technical expertise by project managers is the most aggravating factor in the model. This is the key factor hindering project success in the SA Navy the most. This factor influences nine factors out of seventeen factors as depicted by the model. A lack of technical expertise by project managers influences poor quality management, poor planning and poor risk management among others. A poor plan in project management will ultimately lead to poor project performance. It came out during the workshop that to be a project manager in the SA Navy, a formal qualification is not a requirement. Prior knowledge of project management is also not a requirement. Basically anyone wearing the SA Navy uniform can be utilised to manage projects. Once individuals are appointed to manage projects, only then will they be send on various courses for development. Participants mentioned that most project managers learn on the job.

**c.** **Too much control from superiors.** Control is necessary to ensure that things happen accordingly but too much control can be problematic. According to the model, too much control by superiors made project managers to lack autonomy. The participants mentioned that even if project managers have different opinions than that of the superior, the superior will have more power to overrule any opinion from the junior. This is due to the command and control system of the Military. In the military, one needs to obey orders and failure to do so is punishable in the Military Court of Justice and could lead to a dismissal or punishment depending on its severity. According to the participants there is no sufficient independence of project officers to manage and decide on their projects. The participants felt that it will be a mammoth task to effectively address the problem of too much control from superiors. According to participants, too much control can also

be attributed to a lengthy approval process before projects can be implemented.

**d.** **<u>High turnover rate of project officers</u>.** A high turnover rate of project officers aggravates incompetence of project officers. This is due to the fact that new project officers have to be appointed and most of them have no prior knowledge of project management. It appeared during the workshop that being a project officer in the SA Navy is not considered a career. Project officers leave the project environment for more senior posts in the SA Navy. Other project officers (once gained experience and are more qualified) leave the SA Navy for a more lucrative job outside while others become consultants to the SA Navy where they earn more than what they were paid in the SA Navy.

**e.** **<u>Complexity of design</u>.** The Navy projects are known for their complexity and always requiring sophisticated technology. The integration of various systems is very complex and requires a team that can manage complexity. The element complexity of design was found to have no connection with other elements. Most SA Navy projects designs require interfacing with other systems and according to the participants this put project delivery at the mercy of a third party. This often leads to project delays and the difficulty of dealing with the third party that SA Navy cannot control. The participants also mentioned that there is always an escalation in costs as a result of a third party.

**f.** **<u>Inability to attract and retain talent</u>.** Inability to attract and retain talent leads to incompetent project managers. The participants mentioned that the SA Navy cannot compete with the market related salaries and as a result project managers are reluctant to remain in the SA Navy.

The seven elements on the far right of the sixth level of the hierarchy namely, bureaucratic procurement and acquisition process, budgetary constraints, unrealistic timeframe, poor stakeholder engagement and analysis, poor risk management, poor

quality management and project managers lacking autonomy are the elements mostly influenced by others. They have no influence or impact on any other elements. This can be inferred that as long as other elements are properly addressed then the seven elements on level six will automatically be addressed. Table 4.2 indicate the first level of the hierarchy and a number of elements influenced by the first level.

| **First level Element** | **Number of elements influenced** |
|---|---|
| Complexity of design | Zero element |
| Inability to attract and retain talent | One element |
| High turnover rate of project officers | One elements |
| Lack of top management support | Two elements |
| Too much control from superiors | Three elements |
| Lack of technical expertise by project managers | Nine elements |

Table 4.2 Summary of first level elements and a number of elements influenced by the first level

## 4.6 COMPARATIVE OBSERVATIONS FROM RESEARCH FINDINGS AND THE LITERATURE REVIEW

There are similarities between the literature review and the findings of this study. Many of the factors identified by the participants are found in the literature as discussed in Chapter 2 of the literature review. Although some of these factors are similar to the ones in the literature review, their impact on individual organisations will be different. Furthermore, the literature does not show the interrelationship between these factors. The study however, shows the interconnection between factors and how they affect each other and this makes the study unique and different.

The study further found that poor quality management will hinder project success in the SA Navy. The literature is very unsubstantial on quality management in the Navy. A high turnover rate of project managers contributes to the challenge of managing and retaining talent in the SA Navy.

The literature addresses complexity as one of the factors hindering project success in the SA Navy, but the findings specifically dealt with the complexity of design. It was

found that due to a lack of technical expertise complexity of design remains a challenge in the SA Naval project environment.

## 4.7 CONCLUSION

The aim of this chapter was to present the results and analyse the IM model developed during the IM workshop. A total of 17 elements were analysed and the results indicated that for the SA Navy to achieve its project success the identified elements must be addressed. The most important elements are the ones on level one of the hierarchy. If these elements can be addressed the project success in the SA Navy will be realised. The next chapter will provide the conclusion and recommendation for the study.

# CHAPTER 5

# RESEARCH CONCLUSION

## 5.1 OVERVIEW OF RESEARCH FINDINGS

The objective of this study was to analyse factors hindering project success in the SA Navy. The findings of the study suggest that there are various factors hindering project success in the SA Navy. Some of these factors are more severe than others and this was discussed in Chapter 4 during the analysis of the IM model. The study suggests that there is a lack or absence of top management support which is a cause for concern. The identified factors if not addressed will influence the success of the SA Navy projects and this will affect the operational readiness of the SA Navy.

It was argued that the SA Navy is a system made up of multiple stakeholders generating their own purpose in projects. It came out that these factors hindering project success are systemic in nature and there is a clear interaction between them where one factor impacts on one or more other factors.

This study used IM, a systemic approach whose support is participation, interpretation, learning and structural representation. Through the IM process 17 factors hindering project success were identified and modelled by using Sorach's International Concept Star ISM software. The ISM tool was used to aid careful logical thinking around the complex issues in SA Navy's projects. The ISM model revealed six factors as the key drivers hindering project success in the SA Navy. They are the critical point of departure for addressing the problem in the SA Navy's projects. The IM process provided a very invaluable learning experience for both the researcher and the participants.

## 5.2 REFLECTION ON THE PROBLEM STATEMENT

The problem statement examined by this study was that there are a number of factors hindering project success in the SA Navy. A number of projects in the SA Navy hardly start or finish on time and some are abandoned in the process due to various challenges. The arms deal enquiry revealed that SA Navy is not sufficiently equipped to satisfy its mandate. The problem statement also stated that the SA Navy spent billions of tax payers' money on projects, but, the success of these projects is

questionable. The study revealed that there is a high turnover rate of project managers as project managers are sometimes promoted to higher ranks in the military. The study further revealed that there is a lack of top management support and there is also too much control from superiors. This leads to project managers lacking autonomy in decision-making. Project management in the SA Navy may be inadequate especially in light of the fact that command and control is at the order of the day in the military.

## 5.3 REFLECTION ON THE RESEARCH QUESTIONS

The study was aimed at answering the following question and the findings are discussed below. "**What are the factors hindering project success in the South African Navy?"**

To answer this question the researcher facilitated the IM workshop of seven participants. A total of 17 factors hindering project success were identified. The end result of the workshop was the IM model which indicated the six key factors among the seventeen identified factors which influence eleven other factors while they themselves were not influenced by any factors. These key factors are:

- Lack of top management support,
- Lack of technical expertise by project managers,
- Too much control from superiors,
- High turnover rate of project officers,
- Complexity of design, and
- Inability to attract and retain talent.

Of particular interest is the factor "lack of technical expertise by project managers" which is the main key factor influencing the other nine factors. The study revealed that if all six of these factors can be successfully addressed it will lead to other factors being addressed. This will automatically lead to project success in the SA Navy.

The study revealed that there is no set criterion to select project managers. Anyone in the SA Navy can be utilised in the project environment. It appeared that there is not a requirement for prior project background. This has a serious negative impact on

projects as it takes time to develop individuals to a level where they can independently manage projects.

The study revealed that there is a high turnover rate of project managers in the SA Navy. It was revealed by participants that project officers sometimes leave the project environment to pursue other senior positions in the SA Navy. Others once attended courses and they are qualified leave the project environment to take up well paid jobs outside the SA Navy. The IM model suggests that the high turnover rate leads to incompetent project managers as the organisation now has to start from the beginning to recruit and train new project managers.

It appeared during the IM workshop that to manage a SA Navy project one requires the ability to deal with and manage complexity. An individual who can deal with ambiguity is the one who will succeed in SA Navy projects.

## 5.4 LIMITATION OF RESEARCH

Getting participants together was a challenge as they have obligations outside their offices. The participants' job involved extensive travelling. A number of factors identified by participants were deemed classified and participants requested they not be included in the study. The researcher tried to have a broad representation of stakeholders but due to unavailability of more senior members the researcher was left with no choice but to use some junior members. Warfield and Cárdenas (1994) suggested that the IM participants must include representatives from all key stakeholders groups. Although the study managed to get as many stakeholders as possible, the debate could have been improved or more robust with the participation of more senior members.

## 5.5 RECOMMENDATIONS

In view of this study, the following recommendations on the identified factors are provided to project management in the SA Navy:

- Incompetent Project Managers: The SA Navy needs to deal with incompetence by ensuring that talented project managers are recruited. Once project

managers are recruited, they must be provided with training and this will lead to good quality planning, and sound project management techniques.

- Lack of top management support: Top management need to play a leading role by supporting project manages. This will improve their commitment and lead to more members realising their worthiness. This will also ensure that resources are available and bureaucratic processes are reduced.

- Lack of technical expertise by project managers: The only solution to this challenge is to recruit talented individuals and skill them accordingly. By recruiting talented individuals it will address the issue of poor project management techniques, poor risk management and poor quality management and in the end project managers will be competent. By improving technical expertise of project managers, they will be able to deal with complexity at all times. The SA Navy must be able to attract and retain talent to address this challenge.

- High turnover rate of project officers: In order for the SA Navy to attract and retain talent it needs to pay market related salaries of its project officers. Managing projects in the SA Navy must be considered as a career and individuals must be well looked after in terms of benefits.

- Complexity of design: The complexity of design in defence projects is inevitable. The only way to deal with this is to appoint competent project managers who understand complexity and are able to deal with it.

- Inability to attract and retain talent: For SA Navy projects to be successful, competent and talented individuals must be recruited and retained. This will ultimately lead to competent project managers and planning will improve.

- Too much control from superiors: Project managers must be given their independence to act and decide.

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## Appendix A: Individual response of factors hindering success in the SA Navy

### Participant 1

1. Lack of technical expertise
2. High turnover rate of project team
3. Incompetent Project Managers
4. Lack of top management support
5. Poor project management techniques
6. Poor planning
7. Poor stakeholder engagement and analysis
8. Unrealistic timeframe
9. Budgetary constraints
10. High turnover rate of project officers
11. Poor risk management
12. Poor quality management
13. Complexity of design
14. Inability to attract and retain talent
15. Bureaucratic procurement and acquisition process
16. Poor project management
17. Project Managers lack autonomy
18. Too much control from superiors

**Participant 2**

1. Lack of planning
2. Inability to analyse stakeholders
3. Budget
4. Timeframe not real
5. Poor project management techniques
6. Lack of top management support
7. Design complexity
8. Control from superiors
9. Lack of technical expertise
10. High turnover rate of project team
11. Politics Incompetent Project Managers
12. Turnover rate of project officers
13. Poor quality and risk management
14. Inability to attract and retain talent
15. Poor procurement and acquisition process
16. Poor project management
17. Project Managers lack independence

**Participant 3**

1. Lack of top management support
2. Poor project management techniques
3. Budget cuts
4. High turnover rate of project officers
5. Poor risk
6. Lack of quality management
7. Superiors abuse control
8. Complexity of design
9. Inability to attract and retain talent
10. Bureaucratic procurement and acquisition process
11. Poor project management
12. Project Managers lack autonomy
13. High turnover rate of project team
14. Incompetence
15. Poor planning
16. Poor stakeholder analysis

**Participant 4**

1. Lack of experience
2. No quality audits
3. Leadership
4. Not understanding the risk
5. Poor communication
6. Lack of technical expertise
7. High turnover rate of project team
8. Unrealistic timeframe
9. Poor quality management
10. Complexity of design
11. Poor project management techniques
12. Poor stakeholder engagement
13. Budget
14. Incompetent Project Managers
15. Lack of top management support
16. Bad planning
17. Budgetary constraints
18. High turnover rate of project officers
19. Poor risk management
20. Procurement process
21. Political interference
22. Loss of talent
23. Painful procurement process
24. Poor project management

**Participant 5**

1. Not performing quality audits
2. Poor leadership
3. Not understanding the risk
4. Poor communication
5. Poor quality management
6. Lack of top management support
7. Poor planning
8. Unrealistic timeframe
9. Seniours' control
10. Lack of experience
11. Technical expertise lacking
12. Budgetary constraints
13. Lengthy Procurement process
14. Political interference
15. High turnover rate of project officers
16. Poor risk planning
17. Poor procurement
18. High turnover rate of project team
19. Incompetent Project Managers
20. Poor project management
21. Lack of independence of project managers

**Participant 6**

1. No Support from the top
2. Lack of plan
3. Absence of leadership
4. Poor communication
5. Turnover rate
6. Political influence
7. Inexperienced project managers
8. Poor project management
9. Procurement process
10. Budget constraints
11. Independence of project managers
12. Technical expertise
13. Talent management
14. Risk management
15. Unrealistic timeframe
16. Lack of funding
17. Too much control from superiors
18. High turnover rate of project officers

**Participant 7**

1. Leadership
2. No risk plan
3. Politics
4. Turnover rate is high
5. Command and control
6. Procurement process
7. Absence of communication
8. Lack of planning
9. No top management support
10. Inability to do audits
11. Lack of technical expertise
12. Project managers are too junior
13. No independence of project managers
14. Timeframe not real
15. High turnover rate of project officers
16. Unavailability of funds
17. Poor project management techniques
18. Painful procurement systems
19. Too much control from the top
20. Project officers not staying long in their posts