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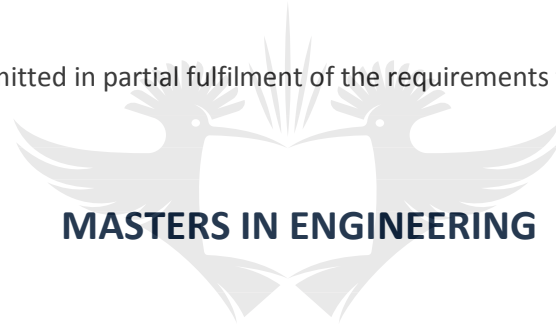


**EVALUATING THE LEVEL OF PROJECT MANAGEMENT MATURITY WITHIN A TRANSPORT
COMPANY AND ITS EFFECT ON MARKET DEMAND STRATEGY**

BY

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ABSTRACT

Project management is a combination of the art and skill of executing projects in order to achieve the objectives for an organisation. Many organisations claim that they employ project management principles during execution of projects. This dissertation seeks to explore the level of project management entrenchment within Transnet. Transnet consist of a number of operating divisions that have unique functions. These are: Transnet Freight Rail (TFR), Transnet Pipelines (TPL), Transnet National Port Authority (TNPA), Transnet Port Terminals (TPT) and Transnet Engineering (TE). TFR focuses on the delivery of freight using the railway Infrastructure and locomotives with wagons. TPL delivers fuel and gas using pipelines that run from the coast to the Gauteng region. The TNPA division is the landlord of all the port infrastructure. The TPT division operates the ports as well as all the container terminals. TE builds and maintains locomotives, coaches and wagons.

To be able to measure the maturity of an organisation such as Transnet requires an establishment of a measurement framework or model. A framework of maturity that has five levels was chosen, based on the Software Engineering Institute (SEI) capability model. A study of the following models was undertaken: the project management process maturity model, the Crawford project management model, the R&D pharmaceutical maturity model and the Norwegian project management maturity model. Consensus decision making was applied to select a maturity model that can be used for Transnet. The model that was chosen was the Project management Process Maturity (PM)² Model.

Both qualitative and quantitative methodologies were used to determine the level of project management maturity within Transnet. The sampling for survey participants were those who either execute projects or involved as stakeholders (interested parties). A response rate of 70% was achieved. By using descriptive statistics the level of project management maturity within Transnet was determined to be 3.19. This means that project management tools are established and in place for usage. The current level of maturity will have a positive impact on the rollout of the Market Demand Strategy (MDS). As highlighted from the research aspects such as cost, quality and human resource management must be improved further to ensure continued project success.

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ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
CIO	Chief Information Officer
GM	General Manager
GSM	Global System for Mobile Communications. The standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones
MDS	Market Demand Strategy
Mt	Million Tons
OD	Operational Division
PMMM	Project Management Maturity Model
SEI	Software Engineering Institute
TCP	Transnet Capital Projects
TE	Transnet Engineering
TFR	Transnet Freight Rail
TNPA	Transnet National Port Authority
TPL	Transnet Port Terminals
TPT	Transnet Port Terminals

CHAPTER 1 INTRODUCTION

1.1. BACKGROUND

Transnet is one of the State Owned Companies (SOC) which is focused on the movement of freight in a safe and reliable manner. The focus of the organisation is to facilitate the growth of the South African economy. Transnet as a group consists of 5 operating divisions, namely: Transnet Freight Rail (TFR), Transnet Port Terminals (TPT), Transnet National Ports Authority (TNPA), Transnet Engineering (TE), and Transnet Pipelines (TPL). Transnet also has a number of special units, e.g. Transnet Capital Projects (TCP) and Transnet Corporate (TC). Transnet's aim is to continually improve on the efficiency of the Group by improving the rail, pipelines, ports and locomotive manufacturing.

Transnet has embarked on a strategy to increase the freight market share. The strategy is termed the Market Demand Strategy (MDS) and at its completion, Transnet rail volumes would climb to 350 Million tons per annum from around 200 Million tons currently. The success of the MDS hinges on the following Eight (8) pillars (Transnet, 2015 (Internal Document)):

- Expansion and maintenance of economic infrastructure
- Growing volumes and improving market share
- Enabling regional integration
- Improving performance, productivity and operational efficiencies
- Promoting sustainable growth
- Prioritising safety, skills development and socio- economic benefits of procurement
- Creating regulatory certainty and compliance with policy
- Driving research and the deployment of new and cutting-edge technologies

The MDS will be accomplished within a period of 7 years from 2012-2019. In order to achieve most of the pillars, there is a need to execute projects for rail infrastructure, rolling stock as well as ports & pipelines. The success of project execution is dependent on a matured project management strategy. It is thus important to evaluate the level of project management maturity within the group. To fully understand the impact that PM maturity has in the group it is important to first explore the structure of Transnet.

1.2. TRANSNET OVERVIEW

Transnet as a group consists of 5 operating divisions (OD) with a number of special units (SU). The structure of the divisions and special units is shown in Figure 1-1:

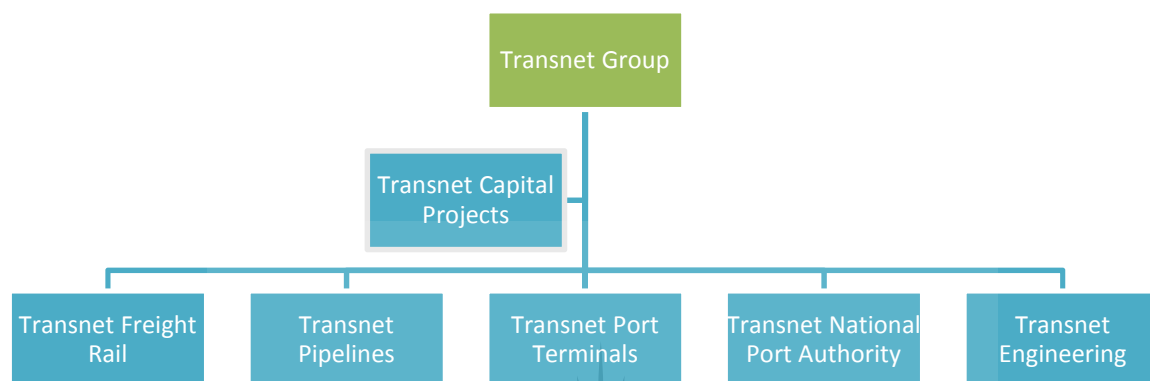


Figure 1-1: Transnet Group Structure (Transnet, 2015)

1.2.1. TRANSNET CAPITAL PROJECTS

Most of the big capital expenditure (CAPEX) projects within the group are executed by Transnet Capital Projects. The major portion of the infrastructure build is managed and executed from this special unit. Because most of the projects are managed in this area the project management skills are high. This SU is structured as a project based organisation. According to experts (Meridith & Mantel, 2012) an organisation set up in this manner can achieve higher levels of project management and also project success. Figure 1-2 represents the structure of the special unit:

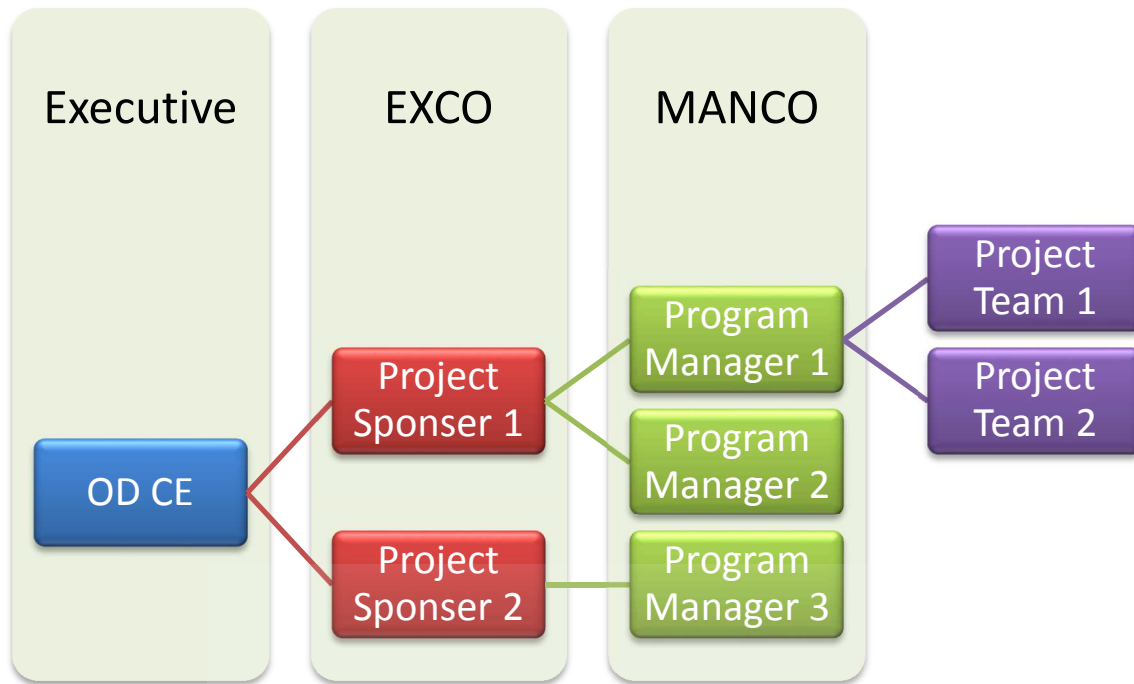


Figure 1-2: Transnet Capital Projects Structure (Trannset, 2015)

1.2.2. TRANSNET FREIGHT RAIL

Transnet Freight Rail (TFR) formerly known as SPOORNET, is the largest OD in the Transnet Group (TFR, 2015). This OD focuses on the logistics of freight using Railways. TFR is responsible for the maintenance of Rail network infrastructure and also rolling stock maintenance. This division also consists of an operational department that has 6 business units, namely: Coal, Mineral Mining and Chrome (MMC), Agriculture & Bulk Liquids (ABL), Steel & Cement (SC), Iron Ore & Manganese (IOM) and Container & Automotive (CA). The Figure 1-3 shows an abbreviated structure for Transnet Freight Rail.

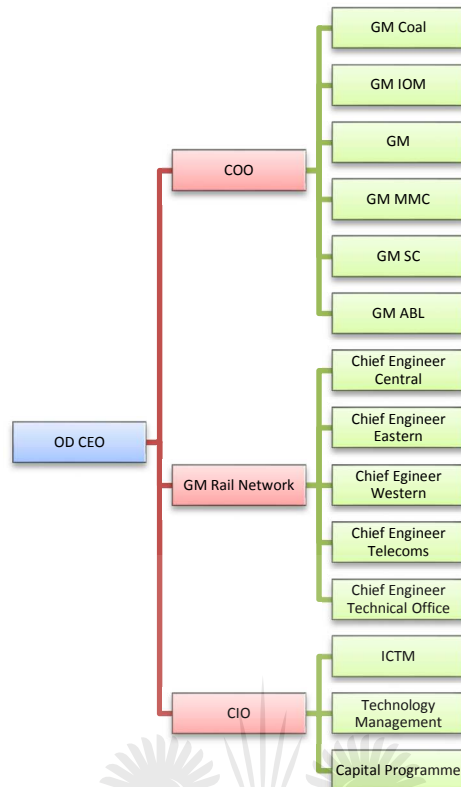


Figure 1-3: Operating Departments in Transnet Freight Rail (TFR, 2015)

This OD has operational, functional and projectized departments. The functional departments as shown in the diagram above are technical departments under the General Manager: Rail network. These departments have a maintenance and technology monitoring function. The Chief Information Officer (CIO) department has a technology management department that recommends, approves and tests new technology before use within TFR. The CIO office also has a capital projects department that is used for the execution of projects. The name of the department is Capital Programme and executes most capital projects within TFR. The technical knowledge of railways lies within the functional department. This means that the capital programme department must constantly engage in consultation with the functional department about in-depth engineering problems. This can lead to a slowdown in the project execution. The technical departments also have to deal with projects from time to time. Since the technical departments are focused mainly on technology, the projects may suffer due to less efficient project management.

Historically most project management initiatives have come from TFR because it is the largest OD. An evaluation of the project management maturity on this OD will be pivotal to establishing the overall level of maturity within Transnet.

1.2.3. TRANSNET PIPELINES

Transnet Pipelines (TPL), formerly known as Petronet, is the OD that focusses on delivery of fuel and Gas (TPL, 2015). The pipeline depots for the fuel line traverses 5 provinces, namely: KwaZulu-Natal, North West, Free State, Mpumalanga, and Gauteng. The fuel includes diesel, leaded and unleaded petrol. The intake for the network is two refineries, one in Durban and one in Secunda. Due to the decentralised nature of the business the OD has 2 regional offices in Pinetown and Bedfordview.

The functional teams that exist are based in Durban and consist of finance, human resources, technical, projects, marketing and information systems. All these departments are considered to be support and therefore the level of project management maturity in these functional areas is limited. The new Multi-Product Pipeline project made evident the need for good project management while leveraging on the expertise from the functional areas. The project management skills for this project were from within Transnet.

1.2.4. TRANSNET PORT TERMINALS

Transnet Port Terminals (TPT) is the OD that is focused on the import and export of cargo at various ports (TPT, 2015). This is achieved through 8 Port terminals in three Geographical areas namely: KwaZulu Natal, Western and Eastern Cape. The business units within the OD are the following: Containers, Mineral Bulk (Coal), Break-Bulk (abnormal cargo e.g. steel coils), Agricultural Bulk and Automotive. These types of cargo require terminals that have a variety of equipment causing TPT to constantly be involved in upgrade and capacity building projects. Some of the projects currently underway include the Iron ore expansion of the Saldanha Bay terminal for more capacity and the addition of a 3rd tippler in the same terminal.

The OD has its head office in Durban but the functional teams are in all the 3 geographical areas of operations. Project management is achieved by specialised project teams that have interactions with functional teams in those regions.

1.2.5. TRANSNET NATIONAL PORTS AUTHORITY

Transnet National Port Authority (TNPA) is the OD that is a landlord port authority that manages, administers and controls the system at the ports in South Africa on behalf of Transnet and the shareholder (TNPA, 2015). TNPA makes provision for port infrastructure and marine services at 8 ports, namely: Richards's bay, Durban, East London, Ngqura, Port Elizabeth, Mossel Bay, Cape Town

and Saldanha. TNPA operates under the **National Ports Act 2005(Act No. 12 of 2005)** making it the Ports regulator of South Africa. This entails that one of the responsibilities of the OD is the economic regulation of the ports system in line with government policies.

As the landlord for the ports TNPA is always engaged with the extension of its land mass and also the dredging on the sea side. These projects often require specialised teams of environmental expertise as well as engineering. To support the day to day management of the port infrastructure there are operational teams. Since these operate from within TNPA they have the technical knowledge needed to maintain operations. This however does not necessarily entail an in-depth knowledge of Project management.

1.2.6. TRANSNET ENGINEERING

Transnet Engineering is the operating division that is responsible for the in-service repairs, upgrades as well as construction of new rail bound rolling stock (TE, 2015). The OD has the following business units: wagons, foundry, coaches, wheels, rotating machines, auxiliary, rolling stock equipment and locomotive. The operational model for the division with Project management as focus is shown by Figure 1-4.

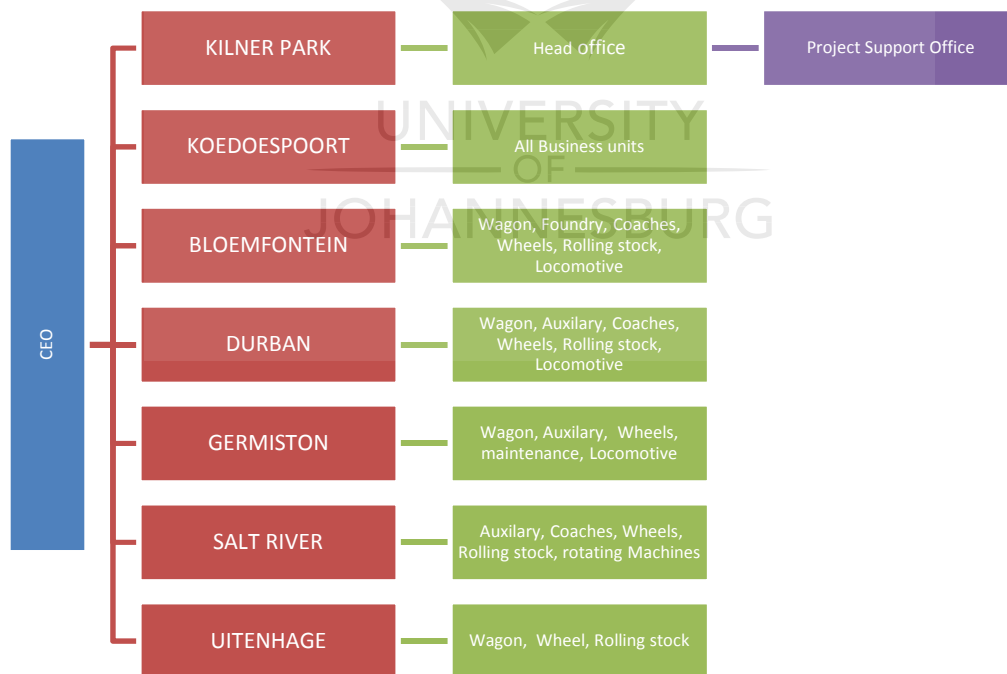


Figure 1-4: Transnet Engineering structure (TE, 2015)

Most of the work that is done by this operating division is highly technical. Thus almost all the work has a technical project team that is responsible for the execution. These teams then interface with the project support office.

1.3. PROBLEM STATEMENT

The freight logistics industry is one of high competition leading to the need for continually increasing market share. The deregulation of the transport industry caused an increase of road freight since 1990 (Mescht, 2006). Today Rail is estimated to carry only about 11.5% of all the freight that is transported within South Africa (UD Trucks, 2013). This however has caused a deterioration of road infrastructure (Mescht, 2006). As noted from recent events in Gauteng, the public tends to resist the efforts that the South African National Road Agency (SANRAL) puts forward to finance (User pay system) the construction and maintenance of roads.

In recent times there has been an interest from government to bring some of the freight off the road to rail or pipeline (Sibande, M, 2012). In order to move freight from road to rail/pipeline and also continually be stationed as preferred port in Southern Africa, there is a need to execute projects. Project management is thus a pivotal tool to be used in achieving successful project delivery. Many projects at completion however do not fulfil the inherent criteria of success i.e. within time, cost and scope constraints. Organisations such as Transnet will implement project management practices that are intended to increase their advantage over their competition. The level of project management adaptation as a tool within Transnet must be assessed. A maturity model that closely resembles the Transnet organisational structure is needed in order to evaluate the current level of PM maturity. When a fitting model is found the subsequent step is determining how the level of maturity will affect the execution of major projects. The success or failure of these projects will ultimately determine the achievement of the Transnet Market Demand Strategy (MDS) and the government's objective of reducing road usage.

1.4. RESEARCH OBJECTIVES

The objective of this research is to determine the level of project management maturity within Transnet. This will be done by formulating a project management maturity model that best fits Transnet as a logistics company. The model will then be used to determine the level of project management maturity within Transnet.

As many projects are currently underway, it is the aim of the research to determine what effect the Project management maturity will have in the successful execution of these projects. The success of projects will affect the market demand strategy that is currently being executed.

1.5. RESEARCH METHODOLOGY

In order to achieve the objectives set for this research there will be an extensive search in literature about the PM maturity models that are currently employed within the industry. After the analysis of the different models there will be evaluation of the level that Transnet has with regards to the adoption of project management principles.

A survey will be conducted with individuals within Transnet who are at entry, moderate and advanced level of project involvement. An evaluation of these surveys will lead into the level of PM maturity entrenchment in the employees. The following diagram displays the methodology that will be followed to achieve the answer to the research questions.

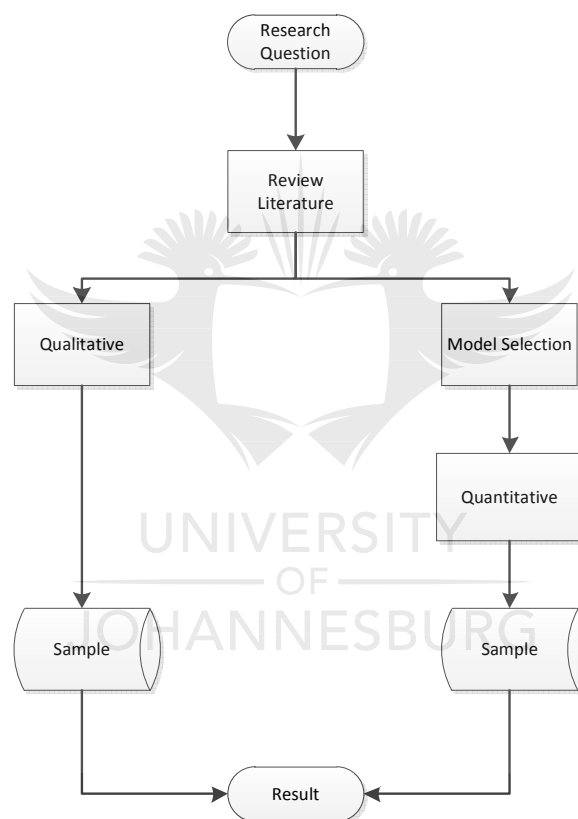


Figure 1-5: Research Methodology (adapted from (Coetzee, 2014))

1.6. OUTLINE OF CHAPTERS

The following section highlights the outline of the chapters to follow:

Chapter 2

Chapter 2 details the literature review. The chapter describes the four project management models that have been considered. The consensus criteria method is then used to choose the model that best fits the operational environment of Transnet.

Chapter 3

This chapter highlights the research methodology that has been employed in the addressing of the research question. The chapter discusses quantitative methods of conducting the research. The last section in the chapter discusses the use of qualitative research by employing individual interviews and case study analyses.

Chapter 4

This chapter discusses the methods used for data collection both for the qualitative and quantitative analyses. The results of the demographics of the respondents is highlighted along with the maturity levels in the different areas. The qualitative analyses of interviews as well as case studies is then highlighted.

Chapter 5

This chapter highlights the impact that the maturity level is likely to have on the execution of the Market Demand Strategy (MDS). The chapter also highlights the correlation between maturity level and project success

Chapter 6

This chapter details the conclusions and recommendations for future work.

Chapter 7 & 8

These chapters highlight the bibliography and the appendix respectively.

1.7. CONCLUSION

Transnet is a freight logistics group that encompasses different methods of transporting goods. The competition that exists between road transport and rail requires that Transnet as a 21st century organisation continue to execute projects to improve reliability and efficiency. The structure of Transnet as an organisation makes it a partly projectized and functional organisation. Thus adoption of Project management principles needs to filter through all the relevant divisions to enhance project execution. There is thus a need to determine the level of project management maturity within Transnet and also determine what the industry norms are in this regard. A detailed literature investigation is thus necessary in the identification of the basis on which to benchmark Transnet.

CHAPTER 2 LITERATURE REVIEW-PM MATURITY MODEL

2.1. INTRODUCTION

Project management is used as a tool within many industries to achieve project execution. The success of the project is measured by achieving the triple constraints cost, time, and scope. The balancing of the triple constraints results in the quality (Van Wyngaard, Pretorius & Pretorius, 2012). As shown in this study, it is important to account for the usefulness of the triple constraints. The adoption of project management techniques within an organisation can determine the realisation of project goals. This means that an organisation must have a methodology of measuring the level of adoption of project management practices among individual personnel and the organisation. This is often called project management maturity level. Since there are many models that exist there is a need to identify ones that could be applied in a freight logistics environment.

2.2. PROJECT MANAGEMENT MATURITY (PMM)

Project management maturity is a mechanism in which an enterprise can determine the level at which the organisation has embedded project management practices. The concept of maturity in humankind conveys the thought of experience. There exists measurement model that has been adapted from the Capability Maturity model (Paulk, Curtis, Chrissis & Weber, 1993) developed by the Software Engineering Institute. The measurement scoring model has five levels of maturity and it's used in various industries. The five levels are described (Meridith & Mantel, 2012) as shown below:

- The first level is called "Initial"; this represents organisations that have no formal or documented processes for project management.
- The second level is termed "Repeatable", in this level the firm has procedures that have been employed. Project management software such as "Microsoft Project" exists for scheduling and tracking. The data from all projects is however not integrated.
- The third level is called "Defined", in this level there exists integrated systems for project management. Principles of project management are however not well understood and thus not employed for project control.
- The fourth level is the "Managed"; the systems are deployed and are in use during project execution.
- The last level is the "Optimizing"; at this level there exists databases that store project management information for all in the organisation. In this level historical data of previous

projects is stored and retrieved for future improvement. Figure 2-1 shows the levels of project management maturity as adapted from the Capability Maturity Model.

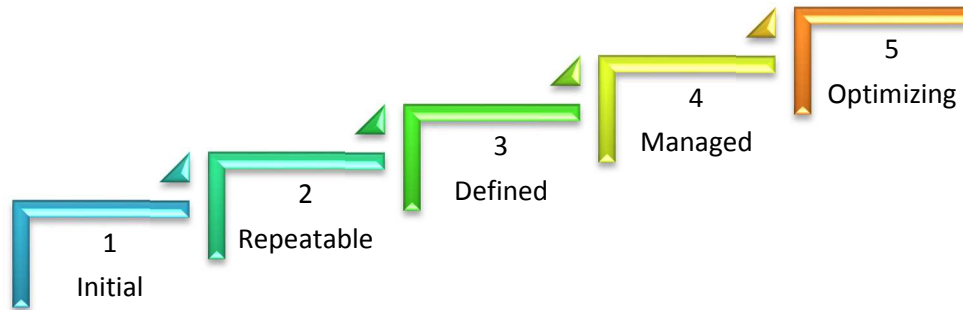


Figure 2-1: Project Management Maturity Levels

Many models have been developed that seek to measure the level of Project management maturity within different organisations. Since the models come from all sectors it is necessary to review a sample and determine which model would best fit within Transnet. A total of four of these models will be discussed, namely: The project management process maturity model, the Crawford Project management maturity model, The R & D pharmaceutical Maturity model and the Norwegian Project management model.

2.2.1. PROJECT MANAGEMENT PROCESS MATURITY (PM)² MODEL

The (PM)² model was developed in the environment where adoption of project management was high. However the organisations were found not to have a clear knowledge of the level of entrenchment of Project management principles within their staff (Kwak & Ibbs, 2002). The model was designed to be a systematic analysis tool for measuring the maturity of an organisation and comparing it with other organisations. The method was developed from the study of available literature as well as interrogation of experts in the field of project management. The model contains traits of quality management methodologies as well as the software capability model.

This model integrates the models that have come before it and ensures that an incremental growth (Kwak & Ibbs, 2002) of the organisation's project management maturity can be done. The model breaks down project management practices into nine PM knowledge areas and five PM process. This methodology follows closely the Project management body of knowledge (PMBOK) framework that has been developed by the Project Management Institute (PMI). Using the model can result in an organisation recognising its current state of maturity and forging a way to improvement. The following sections will describe some of the elements of the model.

2.2.1.1. PROJECT MANAGEMENT KNOWLEDGE AREAS

The model is based on the project management knowledge areas and the following section will review all the nine areas of the body of knowledge, namely: project integration management, scope management, time management, cost management, quality management, human resources management, communication management, risk management and project procurement management.

PROJECT INTEGRATION MANAGEMENT

This process ensures that all the activities within a given project work harmoniously together and are well coordinated (Kwak & Ibbs, 2002). According to Project Management Institute (2004), some of the characteristics carried by the word integration include a unification, articulation and consolidation for the benefit of project success. A typical example of this would be if there is a change in the location where the railway line will run (i.e. change in scope) then there must be processes in place to ensure that the cost, risk and quality will be maintained in order to meet customer expectations. The processes that are included in this knowledge area are as follows (Project Management Institute , 2004): development of project charter, preliminary project scope, project management plan, directing and management of project execution, monitoring & controlling of project work, integrated change control and closing of project.

The execution of a project requires that all the processes in the project integration process be included during project conception. Let us take the project charter as an example. The project charter is a document that is essential as it authorizes the use of the resources within an organisation by the project manager. Thus the choosing of the project manager is also included in the document by the project sponsor. The project manager then will start the project planning and resource allocation (Yazdanifard, Molamu & Musa, 2011). At Transnet, the project sponsor is usually the Chief Executive in the relevant Organisational division. When a project is conceived, the responsibility rests with the executive to choose create a project charter.

The (PM) ² model then has the following criteria (Figure 2-2) to determine the levels of Project integration management maturity in an organisation:

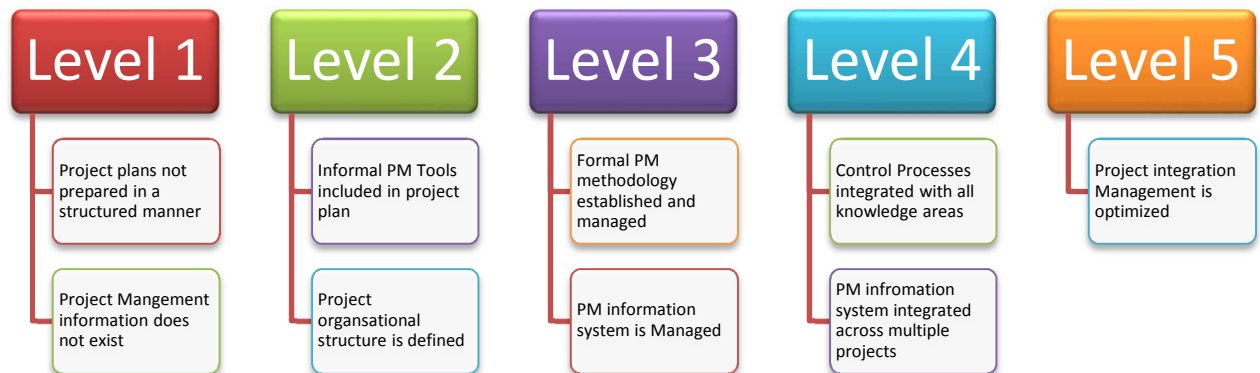


Figure 2-2: Project Integration Management Maturity

PROJECT SCOPE MANAGEMENT

Project scope management is concerned with the inclusion of all the necessary activities that are needed for the successful execution of a project (Project Management Institute , 2004). The scope serves as a guideline of the activities that are included and those that have been excluded. The components of scope definition include the following: Scope Planning, Scope definition, work breakdown structure, scope verification and scope control. All the components integrate with all the other knowledge areas. Taking the work breakdown structure (WBS) as an example, it breaks down the work to be completed into smaller deliverables. These smaller components can then be scheduled, cost allocated, monitored and controlled. Figure 2-3 shows a snapshot of a portion of a WBS that was created for the manganese line and port expansion project.

WBS Number				Activity
1	1	0	0	Port Infrastructure
1	1	1	0	Land & Property
1	1	1	1	Land Acquisitions
1	1	2	0	Buildings
1	1	2	1	Workshops and stores
1	1	2	2	Substations
1	1	3	0	Civil Infrastructure
1	1	3	1	Roads
1	1	3	2	Back of Quay paving
1	1	3	3	Fencing
1	1	3	4	Sewage system
1	1	3	5	Cable Ducts
1	1	7	0	Electrical Infrastructure
1	1	7	1	HT bulk power supply
1	1	7	2	HT Power Substation equipment
1	1	7	3	Substation fire detection and protection
1	1	7	4	Queyside electrical
1	1	7	5	Point earthing and lightning protection
1	1	7	6	Small power and lighting
1	1	5	0	Services
1	1	5	1	Raw water supply system
1	1	5	2	Portable water supply system
1	1	5	3	Return water System

Figure 2-3: WBS for the Port Expansion project

Figure 2-4 below shows how the different levels are classified in order to determine the organisation's scope management maturity level.



Figure 2-4: organisation scope management maturity

PROJECT TIME MANAGEMENT

Project success has been known to have at the very least three variables (Anuar & NG, 2011), namely: time, cost and quality. Project time management carries the thought of completing a project in the allocated time. Some recent research (Anuar & NG, 2011), consider time as an intangible resource that is finite. When a project has time overruns, these results in failure to achieve one of the triple constraints of project success. According to Project Management Institute (2004) time management consists of the following processes: activity definition, sequencing, resource estimating, duration estimating, schedule development and schedule control. Since the scope is already defined the WBS can be used as a basis to develop a schedule.

The process of sequencing activities entails the identification of the relationship between the scheduled activities. From this sequencing, different schematic representations are drawn up to understand the sequence of events. Using methods such as the critical path methods decisions can be made about which activities can be fast tracked or delayed without adversely affecting the project. The model measures the maturity of time management as described by Figure 2-5.



Figure 2-5: Organisation Time management maturity

PROJECT COST MANAGEMENT

Capital investment is a major factor in the management of projects. Just like time cost/capital is a finite resource that must be preserved. Thus project cost management is the process that ensures that a project is completed within the confines of the approved budget. The activities included in cost management are the following (Project Management Institute , 2004): Cost estimating, budgeting and control. When it comes to cost control, this requires the constant monitoring of the project scope and schedule. Some of the principles that can be included are the lowest cost and the overall cost control system (WANG, 2011). Ensuring that there is an overall cost control system ensures that all within a project make cost management their concern. The project team is thus aware of anything that can cause cost overruns and they report these early in the deviation.

The model has the following scales when it measures project cost control in an organisation:



Figure 2-6: Organisation Cost Management Maturity

PROJECT QUALITY MANAGEMENT

The product or service that a project delivers is the important aspect for a client. The value therefore of a project to a prospective client can accurately be measured by the quality of the product that is eventually delivered (Liberatore & Bruce, 2013). Project quality management ensures that the project satisfies the expectations that a client would have measured against accepted norms and standards. Some activities that are included in this process are: quality planning, assurance and control (Project Management Institute, 2004). Considering the performing of quality assurance Transnet has many dedicated departments that are for quality control. An example of this is the Telecommunication department with its Radio and fibre installation quality assurance. Thus before a radio installation is handed over for operations there are quality assurance tests that are performed. To ensure consistency these tests are standard and can be performed by one or more individuals. The model has the following measurements for project quality management maturity:



Figure 2-7: Organisation quality management maturity

PROJECT HUMAN RESOURCE MANAGEMENT

Any project will not succeed if there were no people to execute them. People are required to initiate the project, plan, control and all activities in a project. This means that project human resource management ensures the effective use of the people involved in a project. The management, motivation and organisation of people form part of this process. According to (Project Management Institute , 2004) there are at least four activities that require attention, namely: human resource planning, project team acquisition, project team development and management of the project team. The aspect of project team acquisition becomes important when the organisation has a project department as well as a functional department. In order to facilitate the use of human resources from the functional team there is a need to have a formal secondment process to the project. The model has the following maturity rankings for human resource management. A factor that is important to consider is the team composition and selection. Recent research (Coetzee, 2014) has shown that the snare in project team composition can be assembling a team of only top performers. This can result in conflict as all the individuals will have an opinion and the problems are not settled.



Figure 2-8: Organisation HR management Maturity

PROJECT COMMUNICATION MANAGEMENT

Communication is the ability of transferring information from one person to another. It can be both verbal and nonverbal. Communication is thus an important part of any project. Project communication management (Kwak & Ibbs, 2002) ensures timeous creation, collection, distribution, storage and disposal of project information. Any changes to the scope, schedule and cost requires clear communication during project execution. According to (Project Management Institute , 2004) the components of a communication process include: communication planning, distribution, reporting and management of stakeholders. A typical example within a project in Transnet was the communication with different stakeholders during the Swaziland link project. The type and kind of information shared with affected farmers was different from tribal chiefs. The following figure shows the maturity rating for an organisation relative to their communication management.

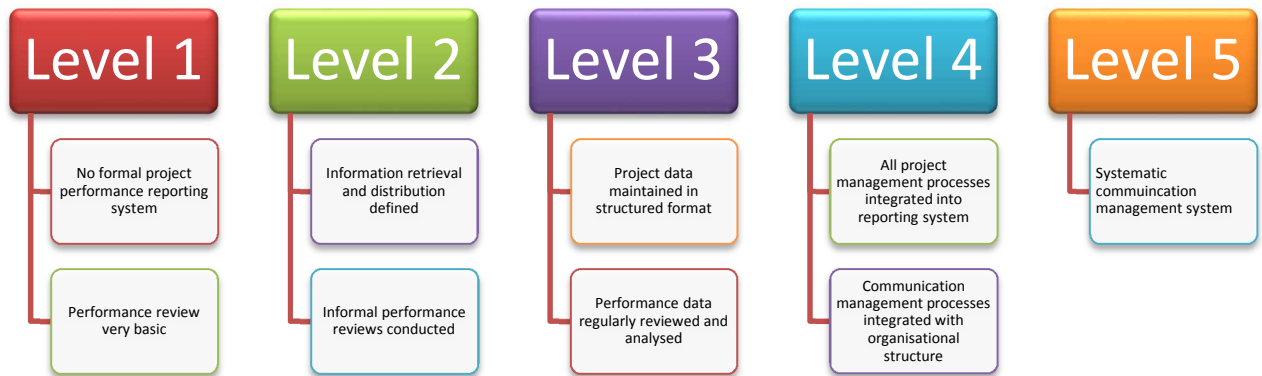


Figure 2-9: Organisation communication maturity

PROJECT RISK MANAGEMENT

Risk management seeks to prepare the project to some of the threats and opportunities during execution. Thus project risk management includes the identification, analysis, and response to project risk. Every project within Transnet has to first have a project risk register before funding is approved. This ensures that at least all the risks of the project have been identified and rated to ensure knowledge of potential impediment to project success. The (PM) 2 model has the following rating for maturity for risk management.

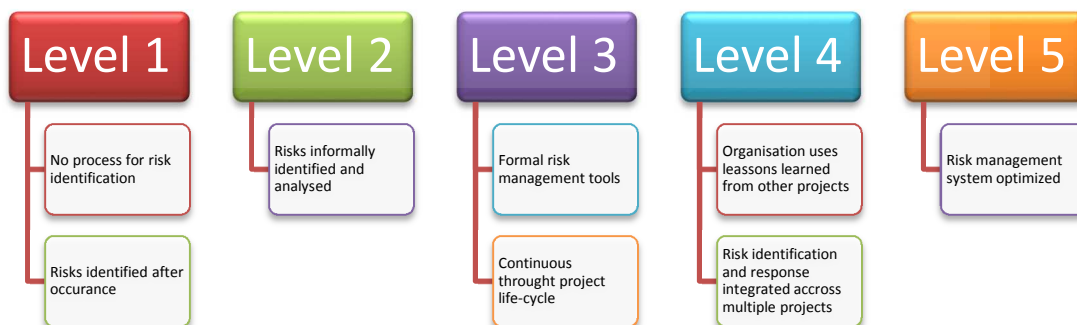


Figure 2-10: Organisation Risk management maturity

PROJECT PROCUREMENT MANAGEMENT

With the execution of majority of projects there arises a need to get goods and services that are external to the organisation. Procurement management is the process that is required in order to get these goods and services into the organisation. Literature (Project Management Institute , 2004) details the following as some aspects included in procurement management: Planning of purchases & acquisitions, contracting, request for seller responses, selection of seller, contract administration and contract closure. Within Transnet some of the tools used to solicit response from the suppliers include the Request for Proposal (RFP) and the Request for Information (RFI). According to the model the maturity of the procurement strategy is evaluated as follows.



Figure 2-11: Organisation Procurement Maturity

The knowledge area evaluation can assist an organisation to determine which aspects of the PMBOK body of knowledge needs attention. With this approach a single aspect can be dealt with and improvement can be tracked. The model measures all the nine areas in the project management process cycle. The following section will briefly describe how the model affects different stages of PM management.

2.2.1.2. PROJECT PROCESSES

The life cycle of a project has always been divided into at least five categories, namely: initiation, planning, execution, controlling and closeout. The following section will describe some of the aspects of maturity that is measured.

INITIATING PROCESS

A project is often conceived when need is identified, leading to a product or service. This idea can then be pitched to those who have the delegated authority to authorize any endeavour in the organisation. This process thus includes the development of a proposal (Kwak & Ibbs, 2002) and feasibility studies are carried out. The model has the following rating for an organisation’s ability during project initiation.

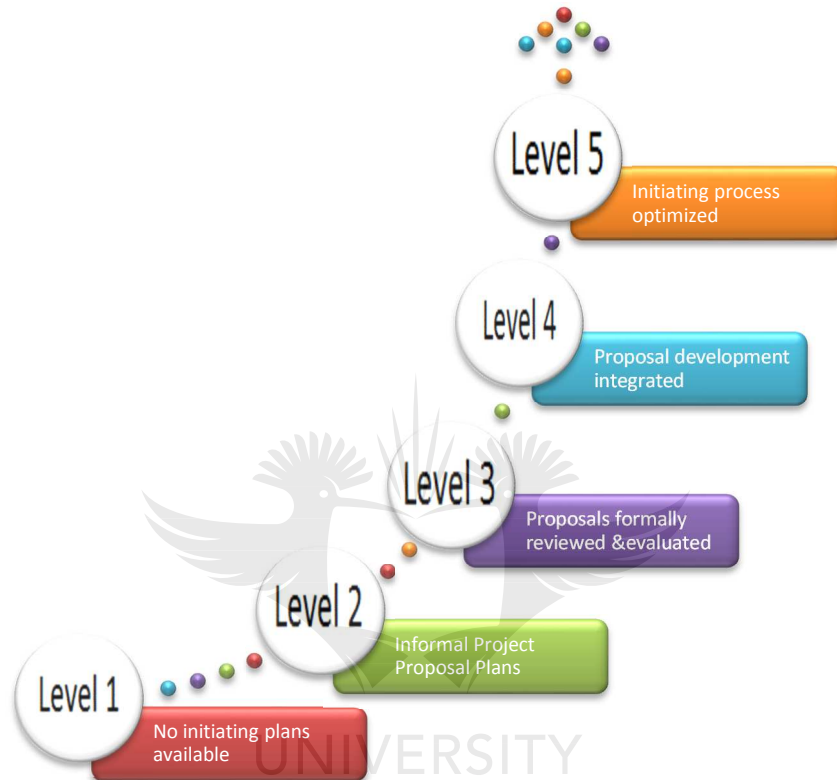


Figure 2-12: Organisation initiation process maturity

PLANNING PROCESS

The old adage has always proved true:

“A journey of a thousand miles must begin with a single step.”—LAO-TZU

Planning is an important method for ensuring that even a difficult tasks can be achieved. Project management in contemporary organisations included the process of project planning. As (Meridith & Mantel, 2012) explains project planning involves risk planning, budgeting & estimating, scheduling & resource planning. Scope development, development of a WBS and refining of estimates are some of the activities included in the planning phase. If the planning is not done correctly and properly there is a risk that the project will not be executed successfully. The model has the following rating for project planning:

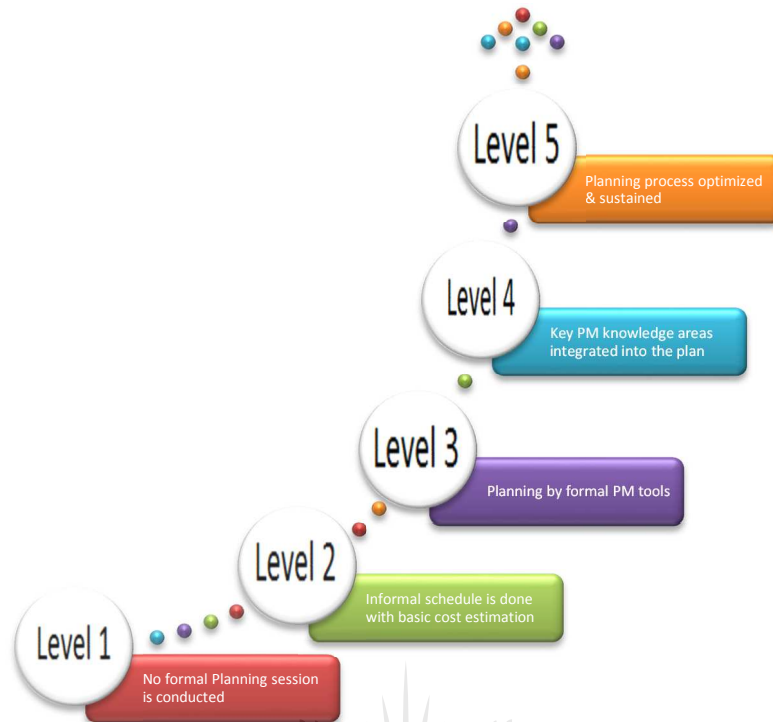


Figure 2-13: Organisation Project Planning maturity

EXECUTING PROCESS

Once the detailed plan is complete the next phase of a project is the project execution. During this phase the majority of the deliverables (new product or service) is done (Turner, 2009). Some of the activities included in this phase include resourcing the project, implementation plan and the allocation of work. As the work is continuing there is a monitoring of the progress of the work. Monitoring includes collection, recording, and reporting information concerning and all aspects of project performance. This information is then disseminated to all the project stakeholders to ensure that the progress meets the schedule. The model has the following measurements for organisation's maturity with regard to its executing process.

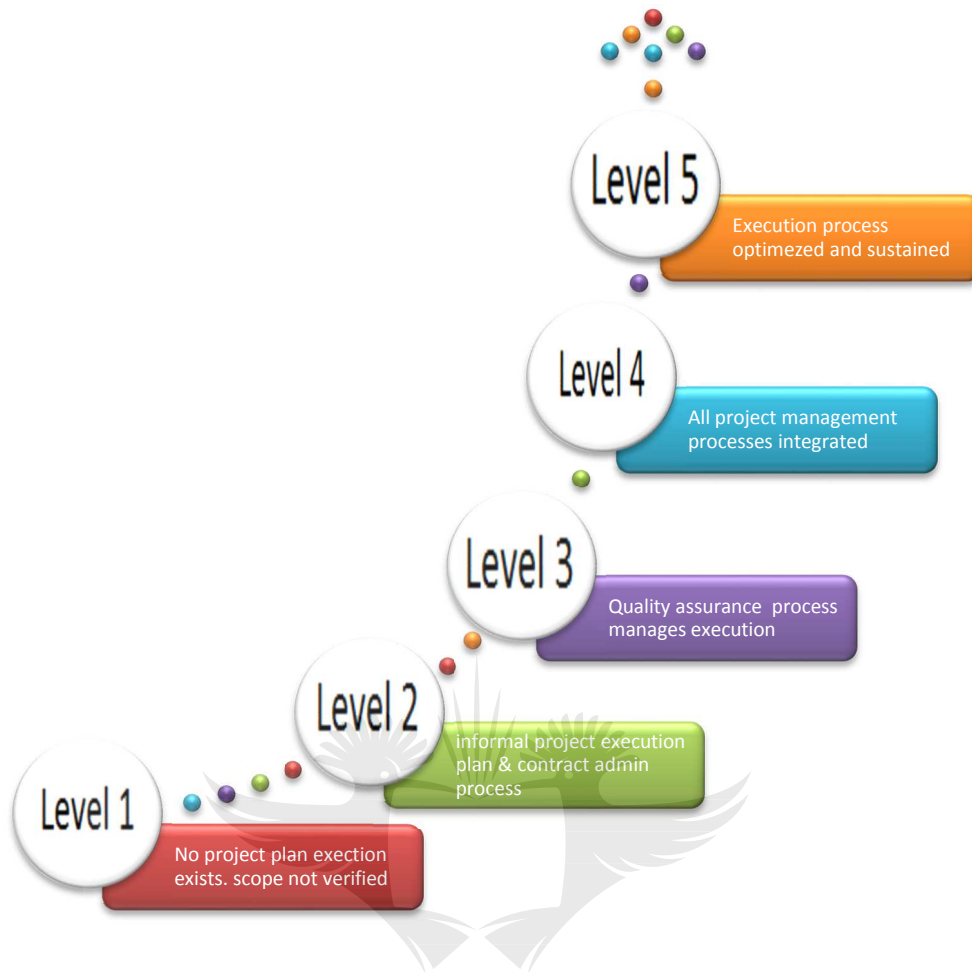


Figure 2-14: Organisation Project Executing maturity

CONTROLLING PROCESS

This process forms part of the executing process (Meridith & Mantel, 2012) as ensures that the activities that are monitored and have deviation can be corrected. To effectively ensure that the controlling process is working there must be effective reporting (Turner, 2009). When a reporting process is based on the plan and there is a defined criterion for control this will show the control that would be needed. The reports should also be made at definite periods during execution as well as discussed in formal meetings. The next aspect about control is to ensure that after the reports have been tabled there should be an effective review. This will entail an adjustment of the project schedule if necessary. Using the data from all the project activities the project progress can be determined. The model has the following classification when it measures an organisation's maturity in view of control processes.

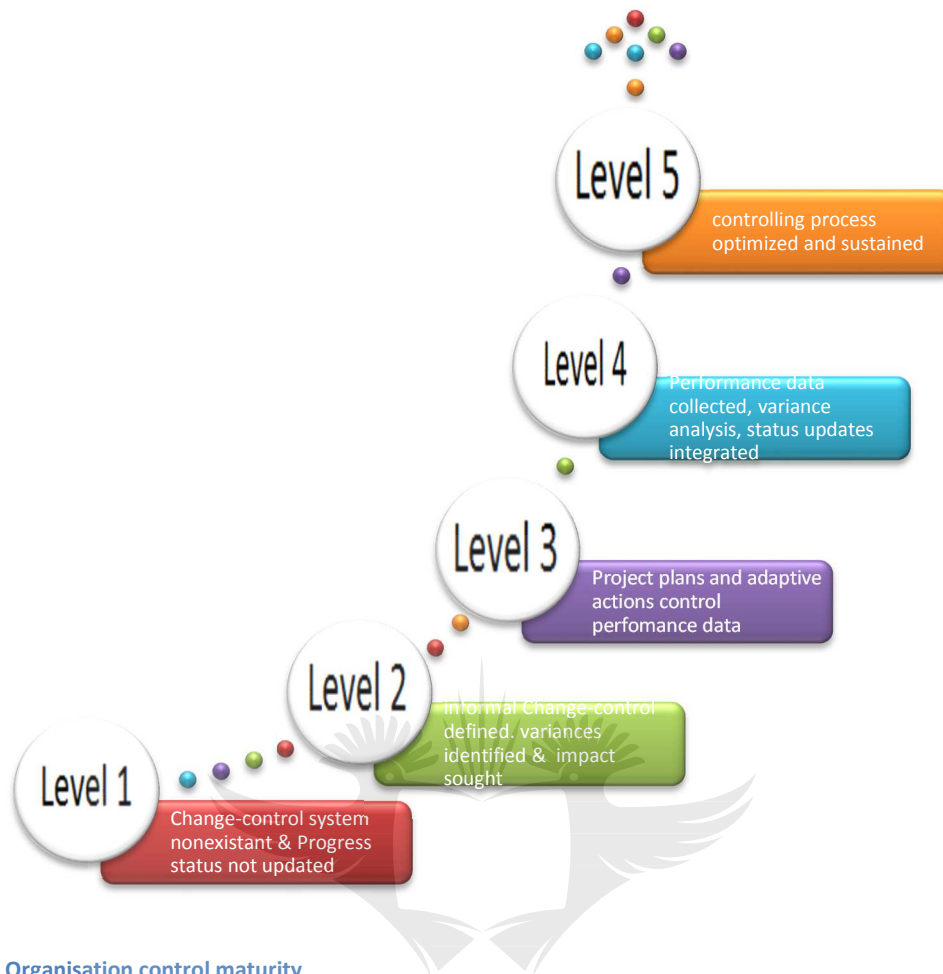


Figure 2-15: Organisation control maturity

CLOSING PROCESS

Project or phase closure must be formalised to facilitate proper acceptance and an orderly end (Sarfraz, 2009). Refraining from project closure can often result in confusion on the project team as well as the end user. This was noted in one project within Transnet Telecommunication department. The project had reached its end and there wasn't any closure, this lead to the end user not knowing if the product had been finished and when maintenance had to commence. This lead to a system that could not be used and thus the project could not be viewed as successful. A project close-out and handover would have assisted in ensuring that the benefits of the investment are realised. Another requirement for project closure includes the communication communiques. These help all the stake holders to know the status of the project. If there are team members that come from functional departments they can be formally released and the product can also be handed officially to the user.

A vital part of the project closure process is the final report (Meridith & Mantel, 2012). Some of the topics that can be covered in this report include the project & administrative performance, organizational structure, techniques of project management. A report like this can be used as a part

of the repository for project management knowledge within the organisation. A process that is implemented within Transnet is the post implementation review. This is done to find the derived value for the project that has been implemented. This guides future investment decisions about project endeavours. The model has the following criterion for measuring the maturity of the closeout process.

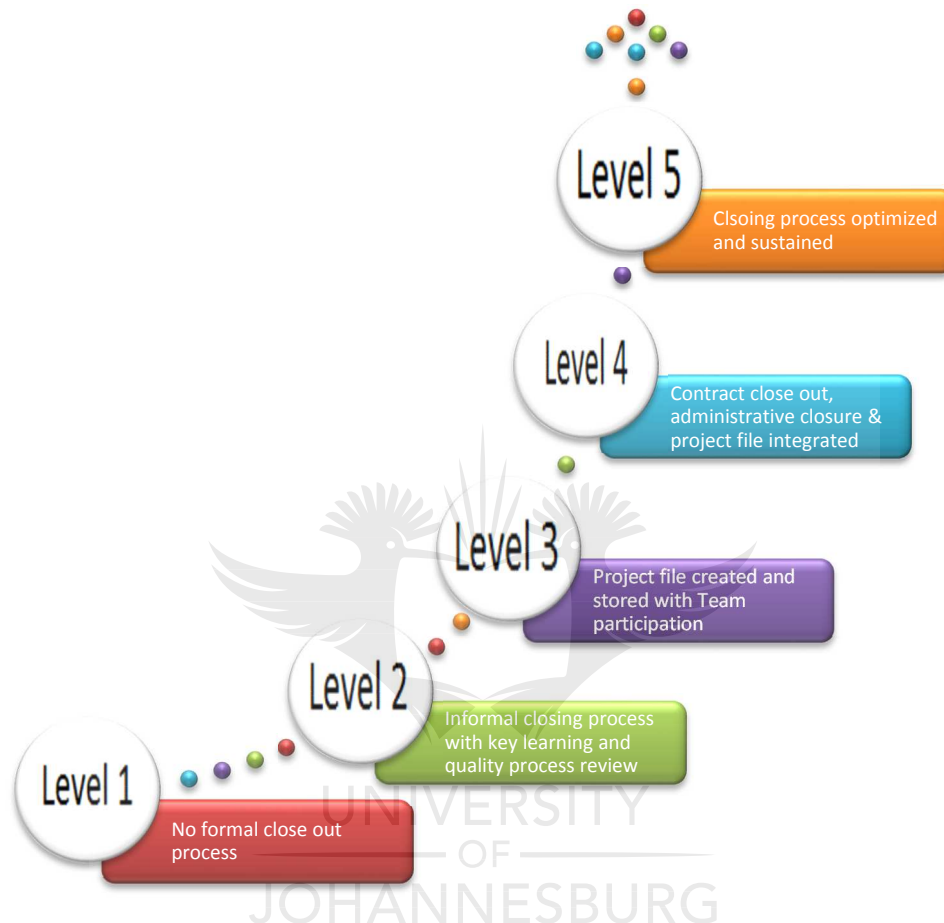


Figure 2-16: Organisation Project closure maturity

2.2.1.3. CONCLUSION

The (PM)² model provides a mechanism for measuring the maturity of an organisations Project management capabilities by using the nine knowledge areas with five project processes. Since it provides a means to identify the different areas it can be used to successfully improve the identified area. However since organisations are different there is no need to have the same level of maturity in all the areas. The model will not be performed for each and every project since the complexity can be different. The model is however an orderly guide to improving project management maturity. There model is also not rigid as it advocates continuous development. The second model for consideration has its roots in the IT industry.

2.2.2. THE CRAWFORD PROJECT MANAGEMENT MODEL

The five level maturity model for project management had its roots in the IT industry. The IT industry thus brought the Capability Maturity model that was developed to monitor software development capability. The IT project management model by J Crawford (Crawford, 2006) has its roots in the capability model and will now be discussed. Many organisations deploy the use of project management, however sometimes attention to improving the Project management skills is only considered when a deficiency is noted (Crawford, 2006). Since the organisation will be in need of skills improvement there is a requirement that they know their current state of project management adoption. The model chosen to determine this must point out a logical path to progressive development from low to high maturity. In the following section the IT inspired project management maturity model will be explored. A benchmarking study (González, Marle & Bocquet, 2007) used this method and the following results were obtained: 88.9% of organisations are at level 1, 6.3% at level 2, about 3.2% are at level 3, 0.8% at level 4 and 0.8% at level 5. This implies that the model should have a clearly marked path to improvement.

2.2.2.1. MODEL DESCRIPTION

The key attributes of the model are the knowledge areas that form part of the PMBOK. The measurement of an organisation's effectiveness in the different knowledge area requires that the area be broken down further into smaller measurable components (Crawford, 2006). A combination between the knowledge areas and the fundamental Capability model from IT gives rise to the PM solutions model shown in Figure 2-17.

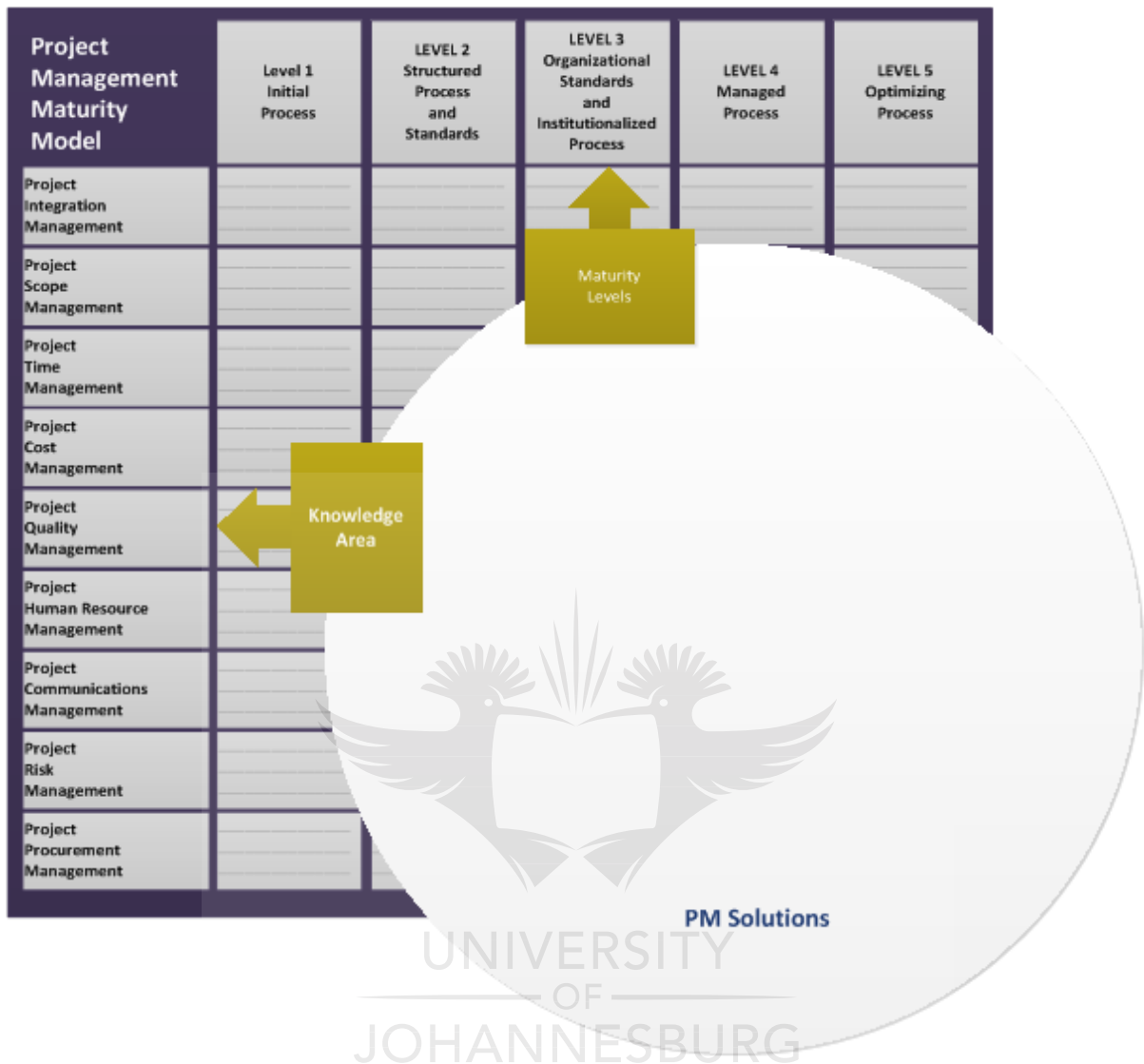


Figure 2-17: PM Solution PMMM (Crawford, 2006)

To define maturity levels the model follows closely the capability model developed by the software engineering institute. The model describes the levels as shown by the diagram below:

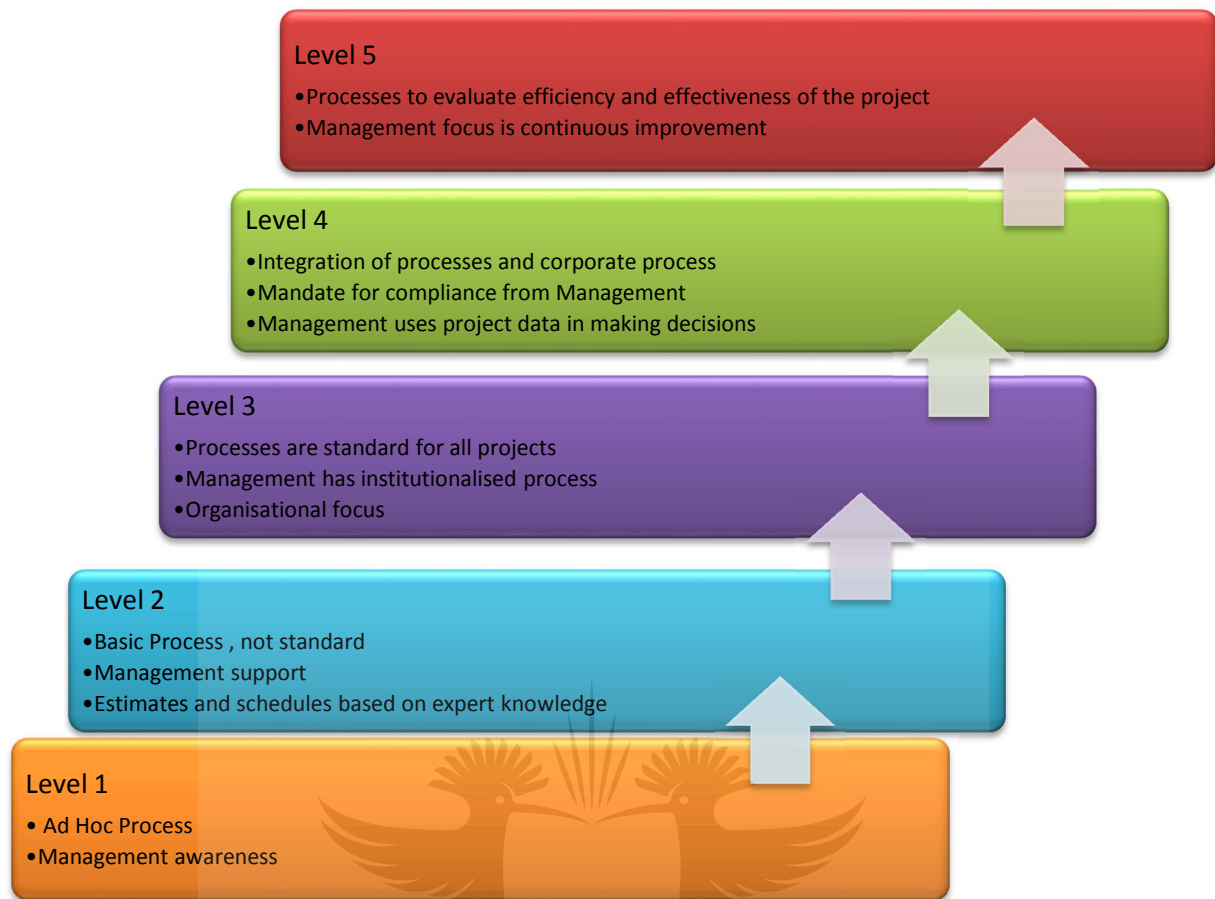


Figure 2-18: PM Solutions Project Management Model Maturity Levels

According to this model an organisation that has a maturity level of 1 has project management processes that are Ad-hoc. Such an organisation has knowledge of the existence of PM tools and techniques however there exist no formal procedure to achieve the objectives of the project. Management within the organisation have an awareness albeit limited of the existence of project management. As the levels of project management maturity increase in the model management becomes more aware of project management usage and even focus on continuous improvement at level 5. The processes in level five of maturity are such that optimisation and efficiency form part of the entire execution of project management.

The measurement of the level of maturity however requires that the different knowledge areas of project management be further broken down into components (Crawford, 2006). An example of this would be the scope management area can be broken down into: scope planning and management, business requirements definition, scope change control as well as the work breakdown structure. An organisation would then be measured within these discrete components to determine the overall project management maturity.

According to the model there are at least 3 areas that contribute to the adoption of project management practices within an organisation, these are: The project office, management oversight and professional development. The following section will explore these aspects.

2.2.2.2. PROJECT OFFICE

The project management office is ideal for organisations that have a lot of projects. The purpose of the Office is to ensure the consolidation of many project management functions (Cleland & Ireland, 2010). According to literature the following is some of the functions that are included in the project office are: Project planning support, Audit, Control support, team support, project management support and executive support. The project office is the proverbial glue that holds everything together (Crawford, 2006). An organisation like Transnet has multiple operating divisions. The location of the project office becomes an important consideration. As noted from chapter 1(also Figure 2-19) the operating divisions execute a variety of projects.

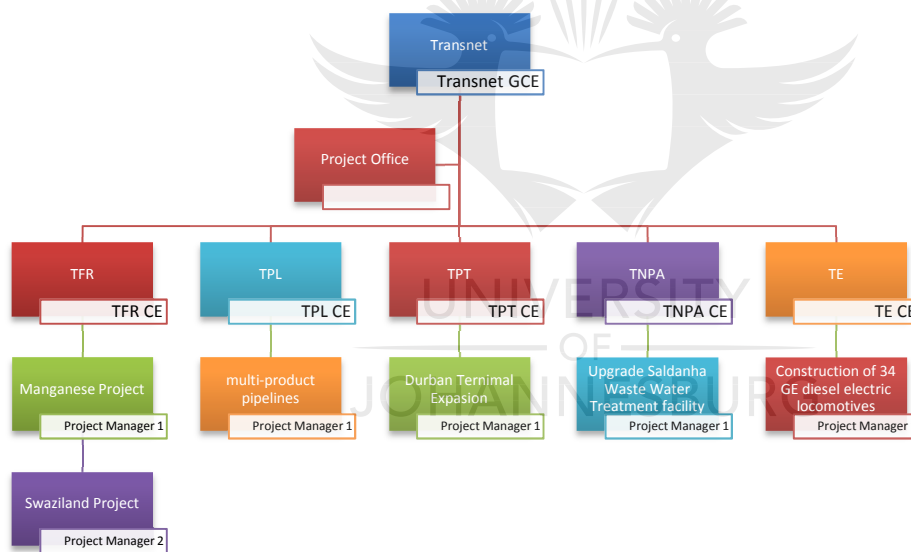


Figure 2-19: Project Office in Transnet Group

The location of the project office in the above figure is at Transnet Group. The only issue with the location is that it lies too far away from the operating divisions. This could lead to the project office not exercising sufficient oversight due to lack of the technical knowledge on the variety of projects. A more efficient structure for the location could be as shown on Figure 2-20. The project offices would be located at the different ODs and would have better oversight. The project offices would then coordinate with the strategic project office at Group level.

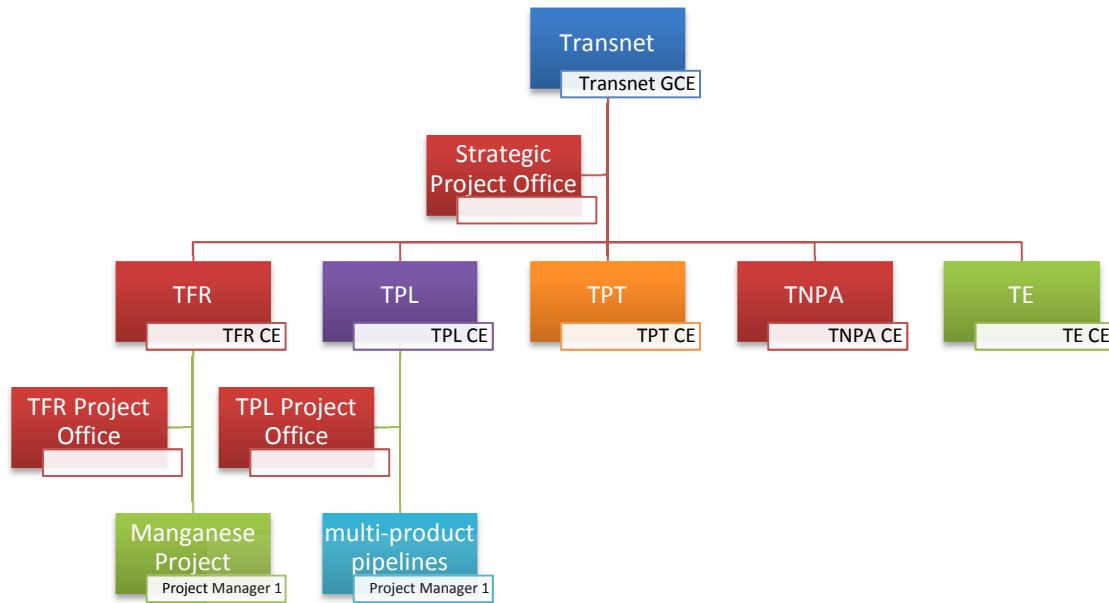


Figure 2-20: OD Project offices with a Group Strategic Project office

2.2.2.3. MANAGEMENT OVERSIGHT

The model (Crawford, 2006) proposes that in order to improve the maturity within the organisation, there is a need for management to have oversight on the project management function. If management is seen to lacking interest in the results of projects execution then there will be no development of project management practices. One of the responsibilities that senior managers have is to ensure that there exists sufficient organisational design for project management (Cleland & Ireland, 2010). Further to this management have to consider whether projects are still fitting the organisations strategy. The interest from senior management will continually sensitise the project manager that he/she is accountable for the work that he/she does. If management use the data they receive from the project team, they can then ensure the advancement of the project management practices. It has been noted from some project within some organisations that the project team can continue with a project for long periods of time, even when that projects no longer meets the strategic vision of an organisation. Thus if senior management continuously monitor the project team they can determine areas which the team may require professional development.

2.2.2.4. PROFESSIONAL DEVELOPMENT

Since project management is a discipline that requires technical, management and leadership skills it is essential that the project managers be trained continuously (Crawford, 2006). The continuous refinement and renewal of skills is mandatory because not all people are naturally skilled in these areas. One way in which organisations ensure that there is continuous development is to maintain formal career paths for their project managers (Frazelle, 2002). Transnet has built a reputation for being an organisation that trains its people. When working for a project function there is a clear path that goes from entry level (project leader) to management level (programme manager).

2.2.2.5. CONCLUSION

This model is largely based on the Software Engineering Institute (SEI) five level model. An assessment of the organisation's level is conducted by interviewing individuals and groups. The results from the assessment should be aimed at mapping a way forward to project management improvement. The results from implementing the assessment will be advocating a culture change within the organisation. This will help to communicate the vision of the organisation and will help all to adopt project management. In closing it is essential for those who implement the assessment to determine the level of project management maturity level that will lead to maximum benefits for the organisation. This means that not all organisations require a PM maturity level of 5. A good measurement of the level of project management maturity that is required is to consider organisations that are concerned with Research and development project, as shown by the next section.

2.2.3. THE R&D PHARMACEUTICAL MATURITY MODEL

The Research and development Pharmaceutical Maturity model (Henceforth referred to as RDP maturity model) is based on the concept of process maturity which in turn was born from the Total quality management movement (Cooke-Davies & Andrew, 2003). The application of statistical process control methodologies lead to maturity of technical process. This maturity then ensures a reduction in the deviations in the process and improvement in the mean performance of the process (Cooke-Davies & Andrew, 2003). With this as the background of the model the next step would be the application on the Capability maturity model developed by the SEI. The RDP model holds that maturity can be measured in two dimensions, namely: technical and human dimension. The technical dimension has the focus of the Project management practices while the human considers the people's

expertise in executing projects. Thus to analyse the model accurately there is a need to talk about the corporate culture.

2.2.3.1. CORPORATE CULTURE

Adoption and application of project management principles is required on the part of the project team. Endorsement by the entire organisation is also pivotal in the successful use of these principles. This requires that the organisation or any relevant department linked to projects, have a culture of project management. Cleland & Ireland (2010: 351) defines culture as:

“Culture is the set of refined behaviours that people have and strive toward in their society”

This definition then means that the behaviour must be such that project management is embedded in the personnel’s psyche. In order to improve the project team culture recent literature has suggested some of the following:

- Keeping the entire project team informed about the latest developments within a project (Cleland , 2007). This would ensure that all the stakeholders of the project should be updated about the success and failure during project execution. At Transnet for example the project/Programme manager tends to have different steering committees which require different information.
- The ability to become a learning organisation with the realisation that all within the organisation must have continuous improvement by retraining (Cleland & Ireland, 2010).
- The elevation on status of project management into an element of the strategy to facilitate change within the organisation (Cleland & Ireland, 2010).

The above list is by no means exhaustive but serves to highlight the importance and practicality of project culture improvement. Gupta & Trusko (2014) have described culture as the glue that will hold everything together. An important aspect of improvement of corporate culture is that the organisation develop a culture of innovation.

2.2.3.2. MODEL DOMAINS

Project managers who are employed by a number of pharmaceutical companies formed a committee of professionals with common interest in the late 90s (Cooke-Davies & Andrew, 2003). During these engagements the different project management knowledge frameworks were developed. A further development was the instrument used to measure the level of project management maturity within these organisations. The following section will show the ten dimensions that are considered when a measurement of project management is done.

PROJECT CULTURE

As discussed in the preceding section it is important that an organisation have a project culture. This dimension seeks to determine the extent to which project management is adopted as a culture for the organisation. Since many organisations have functional areas as well as project areas; what do members of the team identify more with while working on a project? Project managers generally perform their work using personnel from functional areas (Cleland & Ireland, 2010). Thus they rely on the support and cooperation of these individuals within the organisation. An important consideration then becomes; the lowest level at which an individual identifies themselves as a member of a project. Management of this interface is an indication of the culture of project management within an organisation. The increase in identification with a project may largely depend on the leadership of management within the organisation.

ORGANISATIONAL LEADERSHIP

The dimension of organisational leadership has the aim of gauging the level of commitment by upper management to the development of project management capability. The definition of leadership within the context of this dimension is as follows: influencing the attitude and behaviour of individuals (teams) by Upper management for the purpose of achieving a set goal (Katharina & Martin, 2002). Management thus has to indicate to the lower levels the level of understanding necessary to develop a project delivery capability. Katharina & Martin (2002) indicate that staff has to see that management are developing activities that are linked to advancement of project management. Some of the activities include: conception of a project, setting project goals and determining the approach of project culture. All these concepts then require that upper management be fully tuned to the business culture of the organisation that they lead.

BUSSINESS CULTURE

This dimension evaluates the level to which the project team follows governance policies given by the organisation. This measures how the project business goals are influencing the decisions that project teams make. This dimension ensure that the project team does not choose projects that are just exciting but which also feed into the business goals. For example Transnet has the market demand strategy (MDS) for the current period. Every project therefore that is undertaken has to ensure that it contributes to the achievement of this goal. The execution of projects that support the MDS requires the management of multiple projects of various sizes.

MULTI-PROJECT MANAGEMENT

Organisations that are large in sizes consist of many teams with different ideas. This often leads to many project proposals that may require funding from upper management. This dimension serves to measure the level of strategic prioritisation of projects. Strategic project selection thus call for a benefit analysis to be applied (Martin, 2014). Determining of benefits can be obvious but sometimes financial instruments can be used. For organisations like Transnet however this can prove to be a deceptive exercise. An example of this would be using the net present value (NPV) and the return on investment (ROI). A calculation of the NPV for a given project (constructing rail-link from South Africa to Botswana) can have a negative value. This however may not take into account the creation of capacity ahead of demand. The demand cannot be accurately determined since it is yet future. Thus each organisation determines a strategic selection of project using its operational environment. The dimension also measures the extent to which resources are assigned to the chosen projects. The resource allocation will be closely linked to the project management structure of the organisation.

PROJECT MANAGEMENT STRUCTURE, METHOD AND SYSTEMS

This dimension evaluates the extent to which project management structure, methods and systems are embedded within the organisation. How widely within the organisations do the systems infiltrate is pivotal in ensuring that the use is universal. The dimension also determines how well the PM systems, methods and process are integrated with the business processes (Cooke-Davies & Andrew, 2003).

DEGREE OF AUTHORIZATION

A project team needs to have authority in order to execute successfully any given project (Cooke-Davies & Andrew, 2003). This dimension then evaluates the level of authority that a project team has in delivering the project strategy. The level of authority needs to be well documented as this can either hinder or assist project execution. An authority that does not reside with a project team can often

cause delays while waiting for authorisation. A project team that has authority would be empowered to locate the project information.

INFORMATION LOCATION

Information within the project must be centralized within the project. This information includes project plans, functional plans and deliverables under the project. The determination of the extent to which information is centralised is essential as a project often has too much data (Cleland & Ireland, 2010). The information is thus needed to assist the decision makers to make timeous decisions.

TEAM TO PROJECT MATCHING

The model has a dimension that seeks to evaluate the level to which a team can be matched to a project. Since most projects within Transnet are formed in conjunction with a specific discipline, often times this dimension would not be used. The team will likely always consist of members of the functional team in the discipline concerned. The only usage of this dimension within Transnet environment would be choosing a Project management for a project. This leads directly to the question of whether the chosen staff will be capable.

CAPABILITY OF PROJECT STAFF

This dimension is concerned with the measurement of the capability of the project staff. The competency would both be technical and project management. Since the bulk of the staff within Transnet projects are from functional areas, the real challenge would be their project management competency. Transnet has implemented the Project Lifecycle Process (PLP) using the front end loading (FEL) feasibility methodology. This dimension would then be used to find out how well the staff is acquainted with this methodology. The project manager has to have the ability of managing the different disciplines rather than the technical. Thus a project manager to be selected can be tested under this dimension for his people management skills. Recent literature (Cleland & Ireland, 2010) indicates that competency is a sum of knowledge, skills and attitude as shown by Figure 2-21.

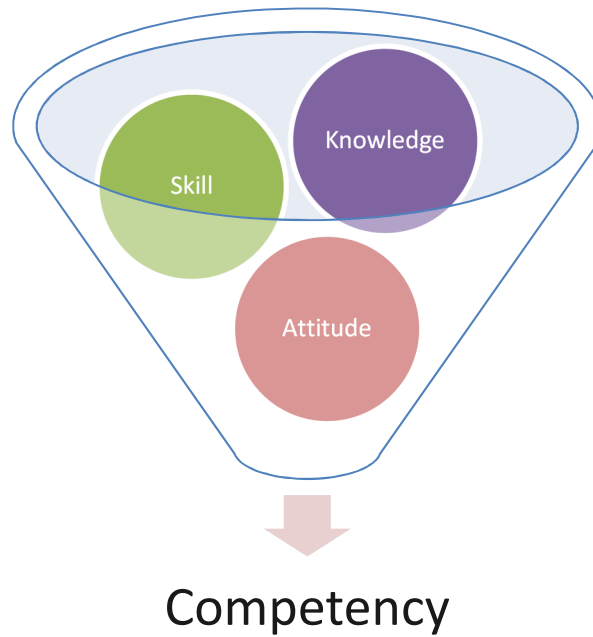


Figure 2-21: Sources of Competency

Thus competency is something that each project team member can develop. This dimension then brings forward the need to evaluate what the strengths are among the functional and project structures.

STRENGTH OF PROJECT VERSUS FUNCTIONAL MANAGEMENT

Transnet as an organisation forms what can be regarded as a matrix type structure. The project managers are concerned with the execution of the project, while the functional manager is concerned with the continuous functioning of existing systems. The diagram below highlights that the project effort and the functional effort are often not entirely aligned.

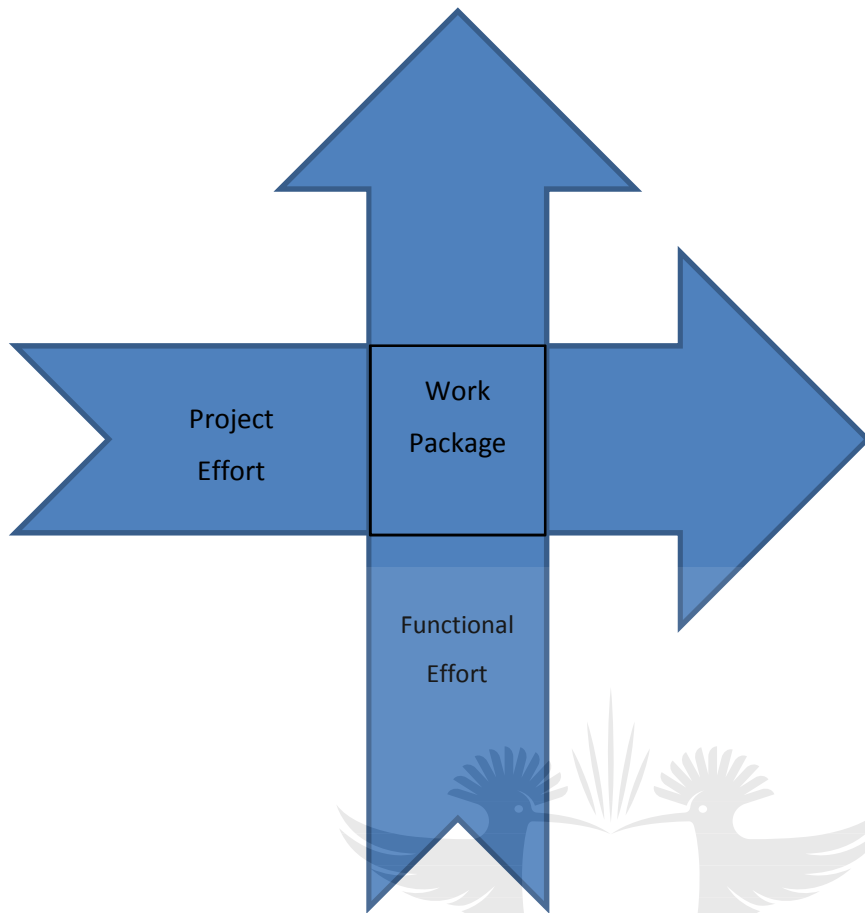


Figure 2-22: Interface of Project and functional effort around a work package (adapted from (Cleland , 2007))

For organisations with strong matrix there is a definition of the individual as well as collective roles for all the team members. If any conflict between the functional area and the project occurs it is promptly resolved (Cleland & Ireland, 2010). The project manager empowered to delegate authority for members of his team. This lead to a project team that works and respects the functional manager.

2.2.3.3. CONCLUSION

The importance of a corporate culture that encompasses project management cannot be understated. Thus this model includes among its knowledge areas aspects of corporate culture to be examined. The model has been used to determine which industries have a high maturity of project management. The results from these studies (Cooke-Davies & Andrew, 2003) have revealed that “industries of origin” have a higher maturity level. The use of this model could require additional tweaking to be applied to the railway industry. A model that explores in greater detail the concept of competency is the Norwegian maturity model.

2.2.4. THE NORWEGIAN PM MATURITY MODEL

2.2.4.1. INTRODUCTION

Many of models that have been considered focused on defining maturity as an operational process. The Norwegian maturity model Andersen & Jesse (2002) defines maturity as the organisation's receptivity to project management. This model seeks to build a close relationship between maturity and competence, which in turn effects project success. As described by Figure 2-21 above competence is thought of as a combination of knowledge, skills and attitude. This model is thus based on three dimensional dependents, namely: action (Ability to act), attitude (willingness to be involved) and knowledge (understanding of impact resulting from willingness and action) as shown in Figure 2-23.

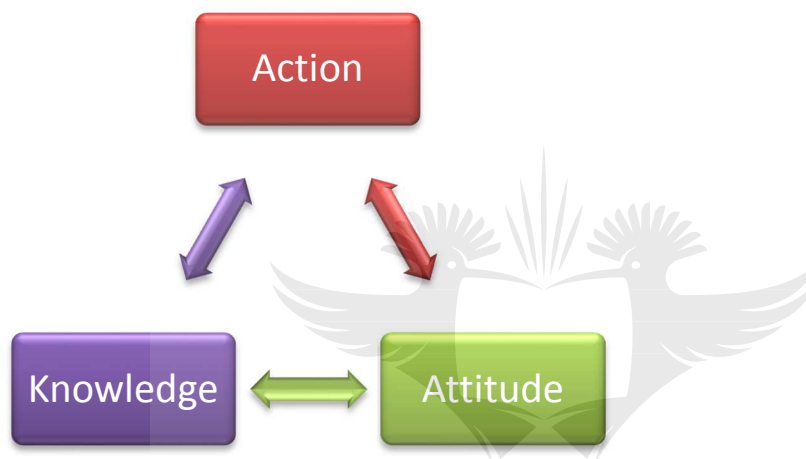


Figure 2-23: Three dimensional maturity dependents

To understand the Norwegian model it will be important to explore all three dimensions.

2.2.4.2. ATTITUDE DIMENSION

Attitude has been described as:

"An attitude is the mental position of an individual or a group of people" - (Andersen & Jessen, 2002:458)

This definition then necessitates the need to develop characteristics that can be used as the measure of attitude. The work of Hofstede (1983) defines at least four cultural dimensions that have been mapped with attitudes towards project management, as follows:

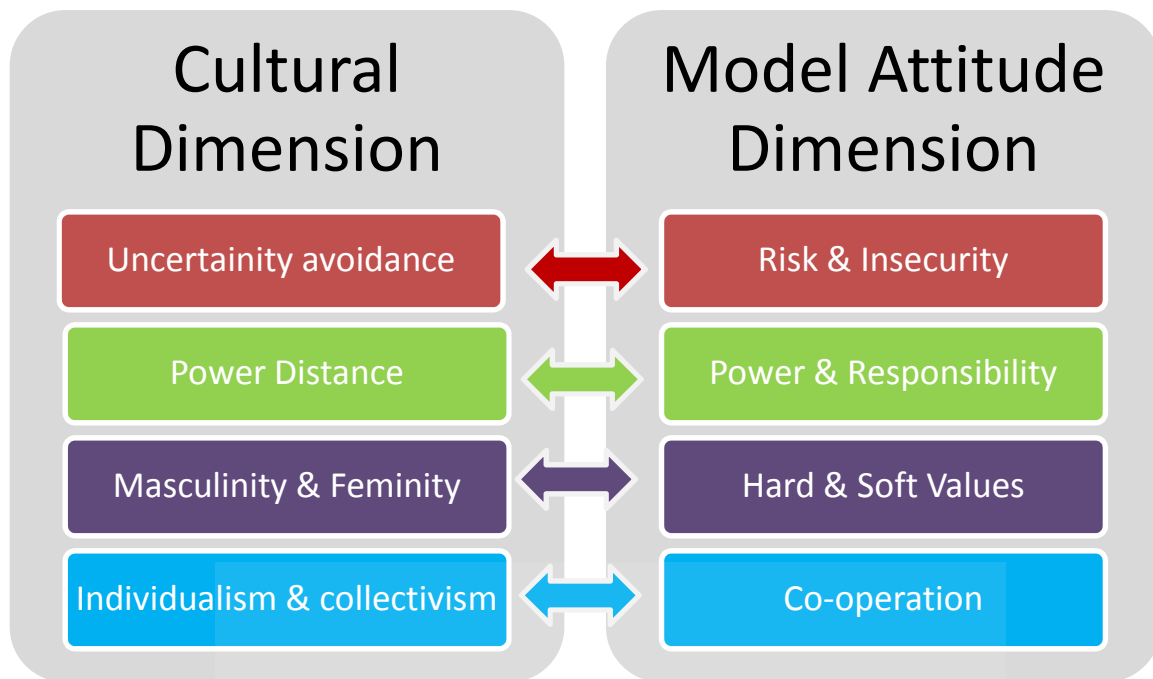


Figure 2-24: Attitudes Mapped With Hofstede Cultural Dimensions

Hofstede (1983) highlights the reality that all individual deal with in regard to the ever present of uncertainty in the human existence. Societies (by extension organisations) that have been conditioned to accept this do not become anxious because of uncertainty, but will take risks during their existence. These societies easily tolerate behaviours and opinions that are different from theirs and as such are considered to have a weak uncertainty avoidance. For the Norwegian maturity Andersen & Jessen (2002) model, positive views of uncertainty avoidance are viewed as indications of a high Project management maturity.

Hofstede (1983) also describes a dimension of power distance. This dimension seeks to show that there is always an unequal distribution of power within a society. Within organisations the power distance is related to the degree to which centralisation of authority is practiced. Thus an organisation which has both functional and project managers the power distance will determine to what level the subordinates submit to temporary authority due to a project. The Norwegian model's power and responsibility dimension is thus made in a way that ensures that a positive score indicates a high project management maturity.

In the dimension of masculinity and femininity there is an accepted reality that society is subdivided within the gender lines. Due to this, most societies have assigned certain roles to the different genders. As shown by Hofstede (1983) these are sometimes arbitrary and cannot always be fully depended on. Roles that require an assertive and dominant character are considered as for man and roles that are service oriented and caring are considered as womanly. Modern society experience shows that these role assignments are being challenged currently. However the Norwegian model assumes that the

femininity indicates the softer skills and masculinity indicate the hard skills. Thus the model is setup to consider how the combination of the soft and hard values infiltrate the organisation. A high score on the hard and soft values is considered to indicate mental willingness to undertake the required project work.

The last dimension to consider in attitude is the individualism and collectivism. According to Hofstede (1983) societies can either be highly individualistic (everyone for themselves) or collectivistic (all for the greater good). Collectivistic society is more integrated, which leads to co-operation. Hofstede (1983) then points out that project management is a task oriented process which necessitates building of relationships in order to perform these tasks. The Norwegian model details that an organisation that is highly co-operative will mean an organisation whose attitude is toward a high maturity. An importance aspect that would assist in achieving an effective collective is the knowledge of the individual members.

2.2.4.3. KNOWLEDGE DIMENSION

The Norwegian maturity model has the following categories of knowledge: suppositions, ways of working, desirable results and totality (Andersen & Jessen, 2002). According to the model the first dimension; Suppositions are the inputs to project management. This would entail that at the outset of a project the team has an awareness of what the critical inputs are. The next dimension of the knowledge of ways of working. These are the processes of working that are relevant in the organisation. In Transnet there are different processes to follow depending of the size of the project. If the project value and complexity is of a high nature there is a need to do the process from FEL1 (Pre-feasibility) to FEL4 (Execution) (Transnet Capital Projects, 2007).

2.2.4.4. ACTION DIMENSION

The model presents four sub-dimensions in the action dimension, namely: strategic action, tactical, administrative and operational. The setting of strategic goals is often set at a strategic business unit (Mohan & Ahlemann, 2014). This often implies that the strategic actions will be categorised into a portfolio of projects for implementation. An organisation with a positive rating for strategic actions has a high maturity since projects are seen as vehicles to achieve organisational goals. The different portfolio of projects is divided into programs which host projects that are usually aligned to achieve similar goals. The tactical action performed in this level ensures that programs are organised and streamlined. The administrative action ensures that all the governance matters are catered for. The operational action encompasses the execution of individual projects to achieve strategic objectives fulfilment. A positive score on the action dimension means that the maturity of the organisation is high.

2.2.4.5. CONCLUSION

The Norwegian maturity model focuses heavily on the three dimension to measure project maturity in an organisation, namely: culture, knowledge and action. The culture dimension helps an organisation to identify what elements of the community culture can be used effectively to ensure project success. Communities that measure highly on the cultural dimension have shown a positive view of maturity. The dimension of knowledge highlights the importance of ensuring that the staff within the organisation are adequately trained in the subject matter. This benefits maturity as individuals know what role they will fulfil in the different stages of project management. The last dimension that the model has is the action dimension. This dimension details the importance of the action from strategic to operational. The model itself identifies the levels that it focuses on as; project management, program management and portfolio management. The counter part of this model would therefore be the organisational project management maturity model (OPM3) develop by the Project Management Institute (PMI).

2.3. TRANSNET PROJECT MANAGEMENT MATURITY MODEL (TPMMM)

2.3.1. AIM OF MATURITY MODEL

As noted in Chapter 1 Transnet is a company that has different organisational divisions. To achieve the Transnet Market demand strategy will require a number of capital investment activities. This then means that there is a need to evaluate the project management entrenching within the different organisations. A model thus was needed to establish the maturity of project management within the organisation. In the previous section we have explored the (PM)², Crawford, R&D Pharmaceutical and the Norwegian project management maturity model. This section seeks to establish which model will sufficiently measure Transnet. The PM squared model established the Project management knowledge areas with project management processes. By measuring the organisations competency within all these areas a maturity rating/score can be achieved. The Crawford model also used the knowledge areas and broke them down to enable measuring. The model also emphasizes the necessity of the project office, the management oversight and the professional development. The pharmaceutical maturity model focused the corporate culture as the main driver for project reception. The model domains included items such as: Organisational leadership, business culture and degree of authorisation as measurements of maturity. The last model (i.e. the Norwegian maturity model) focused heavily on the drivers for competency. The model highlights how the attitude, knowledge and the action dimensions influence the usage of project management within the organisation. The following section will discuss a selection methodology chosen for the appropriate model for Transnet.

2.3.2. CONSENSUS CRITERIA METHOD

Consensus decision making is common within many organisations (Fisher & Fisher, 2011). Since there are 4 models to choose from an application of the Prioritization Matrix Consensus Criteria method will be employed (Pyzdek & Keller, 2014). The excel spreadsheet used for the method was adapted from the Six Sigma Handbook (Pyzdek & Keller, 2014). The following criteria were used in the evaluation of the models: comprehensiveness, adaptability to Transnet, ease of usage, clear path to maturity improvement and model continuous improvement. The scoring of the criteria as well as the weights of the different criteria is shown in Appendix A: Model Selection criteria. Applying the criteria and the consensus matrix leads us to choosing the Project Management Process Maturity model for use within Transnet as shown by the figure below (for a detailed scoring of all the models see Appendix B)

Deployment Strategy	Comprehensiveness	Ease of usage	Path to improvement	Model continuous improvement	Adaptable For Transnet	Totals	Rank of Strategies
Crawford project management model	9	9	3	1	9	6.8	2
Norwegian PM Maturity model	1	3	3	1	3	2.2	4
Project management process maturity (pm) 2 model	9	3	9	9	9	8.4	1
R&D Pharmaceutical maturity model	9	3	3	3	9	6.6	3
Totals	28	18	18	14	30	108	
Rank of Issues	2	3	3	5	1		
Issue Weight	0.2	0.1	0.1	0.2	0.4		

Figure 2-25: Matrix criteria for model selection

2.4. CONCLUSION

Many maturity models have been proposed over the years ever since project management was first implemented. The review only considered four such models, namely: The Project Management Process maturity, Crawford Project management, R&D project management maturity and the Norwegian project management model. Using the consensus Criteria method the Project Management Process Maturity model was chosen as adaptable to the Transnet environment. The next chapter will highlight the research methodology followed to answer the research question.

CHAPTER 3 RESEARCH METHODOLOGY

3.1. INTRODUCTION

The establishment of this research was based on the principle of improvement. Transnet has goals that need to be achieved by use of project management and the thrust of this dissertation has been the improvement of the principles of project management. The research question thus necessitates that the investigation be carried out within the organisation. The question of qualitative and quantitative research methodologies then comes into focus. The aim of this chapter is to convey the methods that have been used to answer the research question, namely: the level of the project management within Transnet and its effect on the delivery of the MDS. Though different, qualitative and quantitative research methods will be required for this dissertation.

3.2. QUANTITATIVE METHODS

Quantitative research is defined in some literature Thomas (2003) as research that is concerned with numbers and statistical methods to answer the research problem. It is further emphasized that careful sampling strategies must be applied and experimental designs must be implemented. Thus in this instance the responsibility of the researcher is to observe and measure the subject matter. Following the framework the following adapted questions about the research have been dealt with of (Balnaves & Caputi, 2001).

3.2.1. IDENTIFY THE PROBLEM

The first aspect of the research problem is the identification of the problem. The problem in this study is the improvement of project management with Transnet. Now the aspects of problem identification, i.e. Goal, significance and testing of theory will be discussed.

GOAL

The goal of this research has been to identify the level of project management maturity within the Transnet group. This will enable Transnet to properly identify areas for improvement in management of projects and thus lead to effective use of the financial resources. The question of significance arises from this research goal.

SIGNIFICANCE OF RESEARCH

Transnet has been entrusted by the government of the Republic of South Africa to ensure movement of freight and lowering of the cost of transport. This would then stimulate the economy and ensure a better life for South Africans in general. To achieve rail, ports and pipeline infrastructure that would satisfy the market demands, Transnet has to undertake many major projects. For these projects to add value they need to be executed efficiently and delivered on time. When these projects are delayed, it poses a risk on the cost of them and also the depriving of benefits to the economy at large. Thus knowing exactly what aspects of project management need to be improved will enable a better management of projects.

THEORY TESTING

It is the aim of this research to determine the level of project management maturity within the Transnet Group. To achieve this a literature review was conducted to determine the maturity model that best fits the operational environment of Transnet.

3.2.2. LITERATURE REVIEW

The aim of chapter 2 was to do a literature review of the current knowledge base. From the literature review a study was conducted to the models that exist in the industry to determine project management maturity. The conclusion of the study was the adoption of the project management process maturity model, which will be aligned with Transnet. The next step in a quantitative research is the determination of the sample for testing and analysis.

3.2.3. RESEARCH SAMPLE AND ANALYSIS

The next aspect that was considered was the sample that would serve to test the hypothesis that has been arrived at. Quantitative research in its nature requires numbers in order to make deductions about the problem at hand. The following sections will deal with the three aspects of sampling used as well as the analysis methods.

DATA PROVISION

The research is focused exclusively at the Transnet's level of project management. Thus for this reason only Transnet employees will be used for the collection of the data about maturity. No external suppliers who execute work on behalf of Transnet will be used in the gathering of the data. Even though such suppliers manage projects on behalf of Transnet their contribution is focused on the solution rather than empowering Transnet in project management. The following process will be followed when a potential individual is considered for data collection.

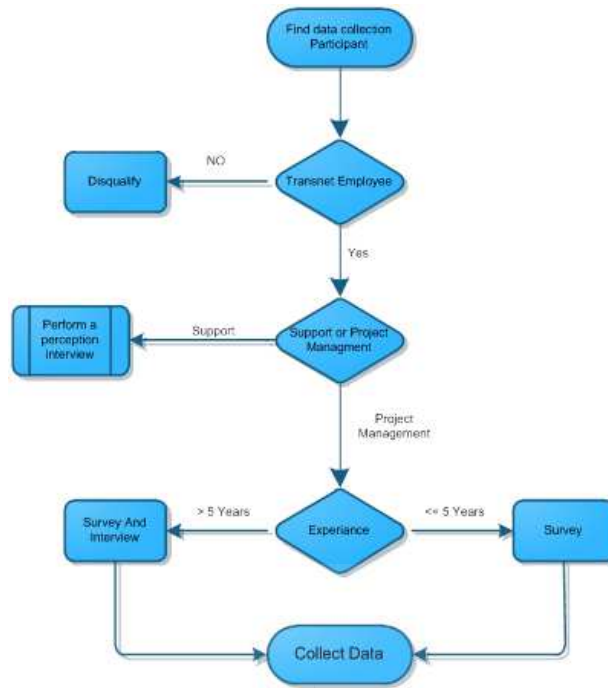


Figure 3-1: Flowchart for choosing data collection participant

Data collection will thus include survey inputs as well as potential interviews with participant that have been doing project management within Transnet for a period longer than 5 years. When collection of information is complete the analysis will commence. If an individual is from a support function (e.g. Finance) a perception of project management questionnaire will be given to them. This will enable an understanding of how those outside of project management view the proliferation of project management in the organisation. Though the sampling of this kind can be at times viewed as biased the purpose is in line with determining how project managers rate the adoption of project management.

SURVEY MEASUREMENT SCALE

As noted from the literature review the levels of maturity are not intervals that have equal discrete levels. Thus the difference between level five and four is not identical to the difference between level two and one. Thus the scales that will be employed by the questionnaire will be ordinal. Ordinal scales have been chosen because the difference between two levels cannot be assumed to be the difference between the two levels (Lane, 2015). Thus this will be an accurate fit to the maturity methods.

DATA ANALYSIS

When the survey results have been collected the analysis will be performed. The analysis that will be applied in this study will be the measures of central tendency and variability (Osborn, 2006). In the central tendency the measures that will be employed will be the mean, median and mode. The mean will be refereeing to the arithmetic mean and will represent an average of all the numbers in the dataset. The median will represent the middle point of the data collected. The mode will highlight the most common occurring number. All these analysis will be applied on the measures of maturity that will have been collected. On variability the measures that will be employed will be the range, variance and standard deviations. The range will signify the range of responses from the sample chosen. The variance will be determined using the following equation (Lane, 2015):

$$s^2 = \frac{\sum(X - M)^2}{N - 1}$$

Where M is the mean and N is the total number of variables.

This formulae is applied as only a sample of the Transnet population will be used for evaluation and not the entire Project management population. The standard deviation will be determined as the square root of the variance. When the numbers have told their story a brief qualitative study will be conducted to corroborate the numbers.

3.3. QUALITATIVE RESEARCH

The simplest form of definition about qualitative research is that it uses words as data (Braun & Clarke, 2013). This means that it relies a lot of the spoken word and pictures and analyses this to form a theory. The goal thus for qualitative research will be to get the human perception on the research question at hand (Stake, 2010). The study of qualitative research in this dissertation will be through interviews and also case studies.

3.3.1. INDIVIDUAL CASE STUDIES

As shown in Figure 3-1 above there will be an effort for interviewing individuals with more than five years' experience in project management. The figure also shows that there will be separate survey or interview of those in the support functions. The purpose of the interviews will not be to test the level of project management maturity level but to establish the experience of Transnet employees about their interaction with project management (Seidman, 2013).

3.3.2. CASE STUDY

Another form of study that will be done will be the evaluation of certain case studies. These studies will be carried out for at least two projects to ascertain the environment of project management within Transnet. Thus in terms of definition on the type of case study the research will be observational and multisite (Merriam, 2009). The projects to be reviewed will be the iron ore line UBRD and WILMA deployment and the Swaziland rail link project. The reason for these project is that they represent medium and large project size.

3.4. CONCLUSION

The research methodology will assist in answering the question of project management maturity within Transnet. The methods to be applied will be both qualitative and quantitative. The quantitative evaluation will involve the dissemination of a survey with an ordinal measurement scale. The survey data will be collected and analysed using statistical methods such as mean, median and mode as well as variability techniques such as the standard deviation. The qualitative research will be carried out using interviews and case studies. The interviews will be carried out on mainly employees that have more than five years in project management and also those in the support functions. The case study will be conducted on two projects that have been selected.

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CHAPTER 4 DATA COLLECTION, ANALYSIS AND RESULTS

4.1. INTRODUCTION

The purpose of this chapter is to show the data collection methodologies and also display the results from the input data. The primary method of data collection will be by means of a survey. The data will then be analysed and results discussed. The case study will then be conducted and the results of the interviews displayed.

4.2. DATA COLLECTION METHODS

The collection of the data will be through a survey. The survey tool to be used will be **Google forms**. All the question will be loaded into the tool and respondents will be asked to take the survey online. The questions of the survey will focus on the nine areas of project management body of knowledge. There will also be five questions for the project processes that are identified by the maturity model. The questions have been limited to 14 to ensure that respondents can remain focussed and answer the questions with a greater deal of thought.

The answers to the questions where set up as descriptions of different levels rather that the levels themselves. This was done to ensure that respondents can give thought to what they feel is the conditions in the areas that they work. The answers were also setup in a manner that was random to ensure that respondents do not choose one level from start to finish. The survey questions have been listed in the appendix C.

4.3. DEMOGRAPHICS OF RESPONDENTS

4.3.1. ORGANISATIONAL DIVISION

The survey was sent to a total of 60 individuals who perform project work within Transnet. The first question was to determine the organisational division the individual was. The majority of the respondents were from Transnet freight rail. This was to be expected as it is the biggest division with multiple projects. The questions Table 4-1 below shows the results of the spread of the responses in terms of organisational division allocations.

Table 4-1: Organisational Participation

OD	Total Responses	Percentage Participation
Transnet Freight Rail	37	88%
Transnet Engineering	0	0%
Transnet National Port Authority	0	0%
Transnet Port Terminals	0	0%
Transnet Pipelines	0	0%
Transnet Capital Projects	1	2.38%
Transnet Foundation	0	0%
Transnet Property	0	0%
Transnet Group	4	9.52%

One of the likely reasons for the lack of responses from other ODs would be that participants didn't know the sender of the requests. The information given by Transnet freight rail should be useful it is the biggest operating division.

4.3.2. GRADE OF THE RESPONDENTS

The next question of the demographics section was the grade of the participant. The question was mainly to determine the level of project management in executive and junior level. It is important to note that project execution is often managed by junior management. The distribution in terms of grade for the respondents is shown by the table below.

Table 4-2: Grades of respondents

Grade	Total Responses	Percentage Participation
B - General Manager	0	0%
C - Executive Manager	1	2.30%
D - Senior Manager	2	4.70%
E - Manager	9	20.90%
F - Junior Manager	27	62.80%
G - First line Manager	3	7%
Other	1	2.30%

Most of projects are executed by E and F managers. The results show that most of the respondents were from these grades. This implies that the results will closely resemble the current state of project management within the organisation.

4.3.3. EXPERIENCE

The last question on demographics was the experience in project management. There were 3 options of experience: one year, less than five years and greater than five years. The table below shows the distribution of experience for the respondents.

Table 4-3: Experience of participants

Experience	Total Responses	Percentage Participation
1 Year	2	4.70%
Less than 5 Years	23	53.50%
Greater Than 5 Years	18	41.90%

The experience as highlighted above also tells of a trend that Transnet should be mindful of in the execution of projects. There are more individuals who have less than five years' experience than any other group. This means a considerable number of individuals who gain project management experience move out of the organisation after 5 years. To ensure that the project management maturity continues to improve there is a need to retain the skills gained by project managers just over five years.

4.4. PROJECT MANAGEMENT PROCESS MATURITY RESULTS

The (PM)² was applied through the survey and now the results will be detailed. Each survey response is linked to a maturity level. In order to enable processing the survey responses were converted to their level equivalent. The first part of the results will highlight the individual project management knowledge and processes. The last sections will highlight the overall maturity for Transnet. Descriptive statistics such as: Mean, Standard error, median, standard deviation and sample variance were employed in the analysis. The descriptive statistics were computed using Microsoft Excel's Data analysis function. Using the data tab on excel you click on "Data Analysis" as shown below.

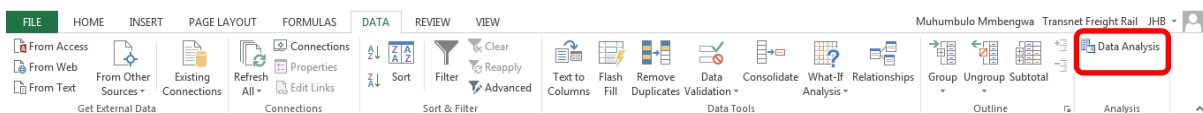


Figure 4-1: Microsoft Excel ribbon with Data analysis tab

From the dialog that follows a section of the descriptive statistics is done yielding a table with all the statistics.

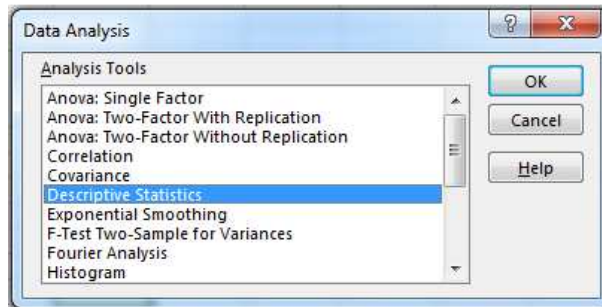


Figure 4-2: Dialog for Data Analysis

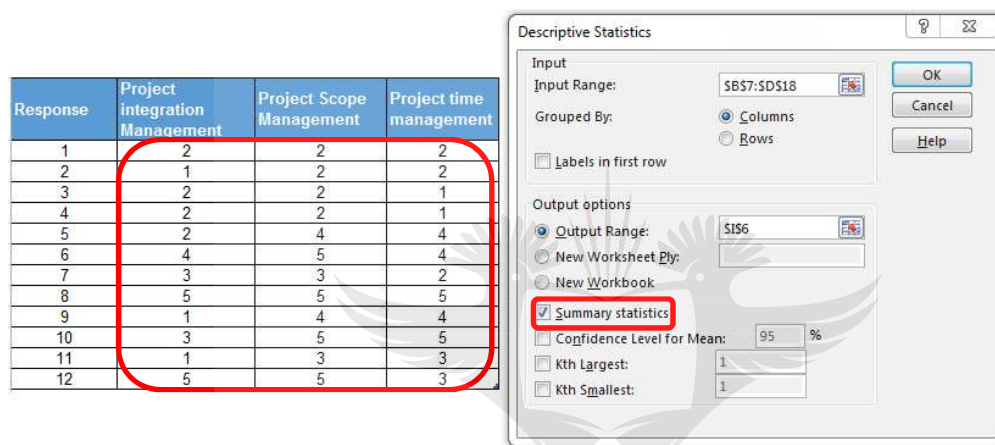


Figure 4-3: Calculation for descriptive statistics for 12 participants

The results from the example above is shown in the figure below

Project integration Management		Project Scope Management		Project time management	
Mean	2.583333333	Mean	3.5	Mean	3
Standard Error	0.416666667	Standard Error	0.379393455	Standard Error	0.40824829
Median	2	Median	3.5	Median	3
Standard Deviation	1.443375673	Standard Deviation	1.314257481	Standard Deviation	1.414213562
Sample Variance	2.083333333	Sample Variance	1.727272727	Sample Variance	2
Range	4	Range	3	Range	4
Minimum	1	Minimum	2	Minimum	1
Maximum	5	Maximum	5	Maximum	5
Sum	31	Sum	42	Sum	36
Count	12	Count	12	Count	12

Figure 4-4: Results of the Data analysis with descriptive statistics

4.4.1. PROJECT INTEGRATION MANAGEMENT

The results for project integration management (PIM) are shown in the table below.

Table 4-4: Project Integration Management Results

<i>Project integration Management</i>	
Mean	3.047619048
Standard Error	0.189603109
Median	3
Mode	2
Standard Deviation	1.228768587
Sample Variance	1.509872242
Range	4
Minimum	1
Maximum	5
Sum	128
Count	42

The results of the PIM as shown in the table above is a mean value of 3.05. As noted from the literature review a value of more than 3 highlights that the organisation has project integration processes that are established. It should be noted however that the standard deviation is 1.23. The mode is also noted to be a level of 2. These results imply that the responses varied considerably as shown in the figure below. The conclusion from the preceding results highlight the need to awareness of integration management within the organisation. Improving this should assist on reducing the variation of the responses.

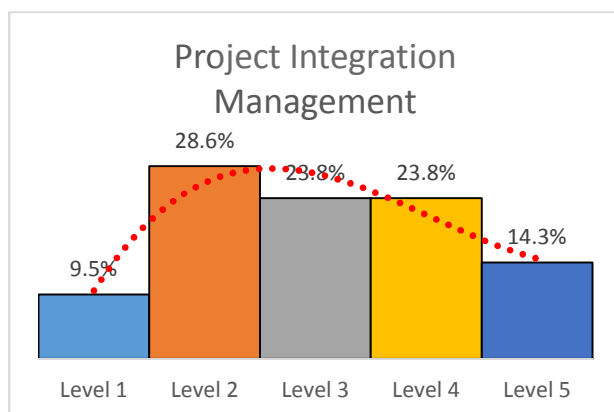


Figure 4-5: PIM distribution

One way to achieve this will be to establish a project information system that can be used for integrating all the projects in the organisation.

4.4.2. PROJECT SCOPE MANAGEMENT

The results for the project scope management (PSM) from the survey is highlighted by the table below.

Table 4-5: Project Scope Management Results

<i>Project Scope Management</i>	
Mean	3.5
Standard Error	0.193536679
Median	3
Mode	5
Standard Deviation	1.25426103
Sample Variance	1.573170732
Range	4
Minimum	1
Maximum	5
Sum	147
Count	42

The maturity level for the scope management is at 3.5. This entails that the scope management is done effectively during the execution of a project. The mode is a five which indicates that most respondents regard this as an area that is well managed. The structure of the projects within Transnet requires the scope verification is done before procurement is undertaken. The distribution below displays the responses for the PSM.

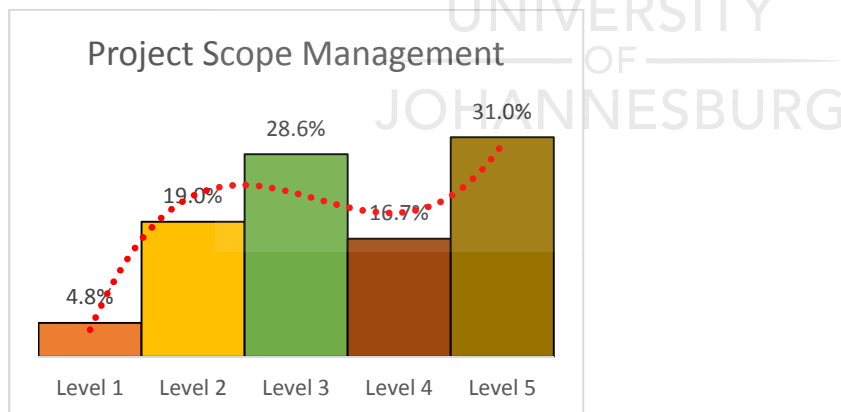


Figure 4-6: PSM Distribution

Since the PSM is relatively high, the focus should be on monitoring the scope management process and continuous improvement by using advance scoping tools. A repository of “Lessons learned” must be established.

4.4.3. PROJECT TIME MANAGEMENT

The analysis of the project time management produced the results as shown in the table below.

Table 4-6: Project Time Management results

<i>Project time management</i>	
Mean	3.047619048
Standard Error	0.201482257
Median	3
Mode	4
Standard Deviation	1.305754262
Sample Variance	1.704994193
Range	4
Minimum	1
Maximum	5
Sum	128
Count	42

The project time management maturity was evaluated to be 3.05. This indicates that time management standards have been established. It is noted however that the standard deviation is 1.3. The figure indicating the distribution for time management below also shows that the second highest response on time management was at level 2. This implies that there is a need to improve project time management.

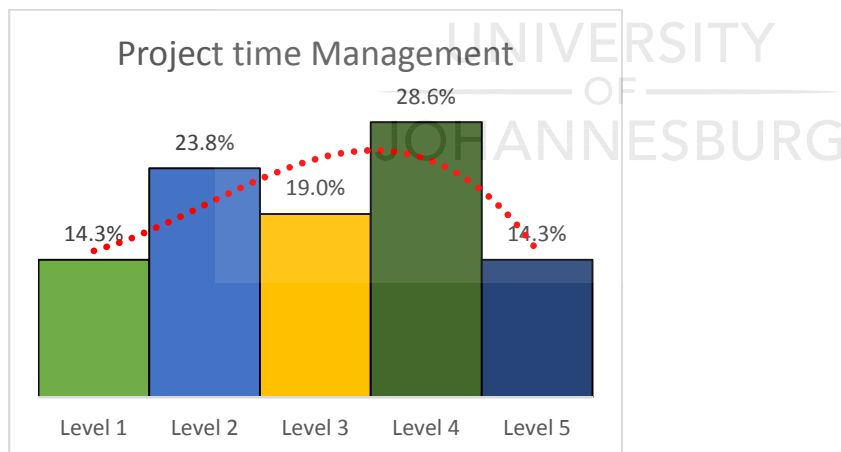


Figure 4-7: PTM distribution

From this results it is clear that there is a need to continue developing scheduling techniques. There is also a requirement to use these tools in order to control the project execution. Some respondents felt that the PTM was integrated, this means that some divisions have a high level of maturity for PTM. Improvement in time management needs to be applied across all project teams.

4.4.4. PROJECT COST MANAGEMENT

The analysis of the project cost management (PCM) is shown by the table below.

Table 4-7: Project Cost Management Results

<i>Project cost management</i>	
Mean	2.761904762
Standard Error	0.173136415
Median	2.5
Mode	2
Standard Deviation	1.12205221
Sample Variance	1.259001161
Range	4
Minimum	1
Maximum	5
Sum	116
Count	42

The maturity level for project cost management was found to be a 2.76. This value is low as it indicates that there is a need to work of the project cost management. As shown by the diagram below, majority of the respondents felt that cost estimating tools were informal

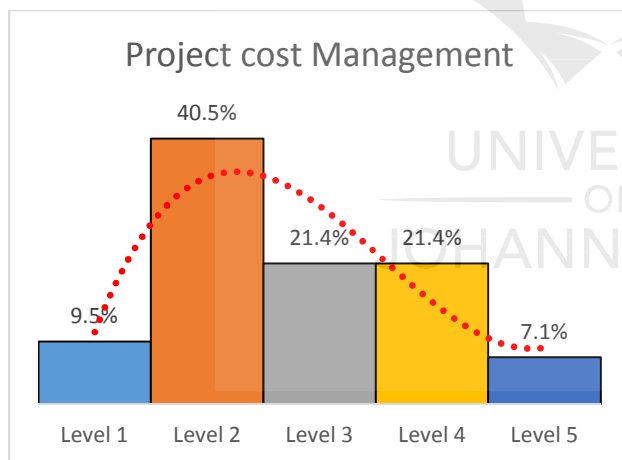


Figure 4-8: PCM distribution

Some of the issues faced by project managers is the estimating of cash flow during the project. There is a need to develop tools that will enable proper estimating as well as cash flow generation. Improving cost management will be a priority to ensure that cash flow is reflected for the entire lifecycle of a project.

4.4.5. PROJECT QUALITY MANAGEMENT

The results of the project quality management (PQM) are shown by the table below.

Table 4-8: Project Quality Management Results

Project quality management	
Mean	2.952380952
Standard Error	0.198579102
Median	3
Mode	2
Standard Deviation	1.286939666
Sample Variance	1.656213705
Range	4
Minimum	1
Maximum	5
Sum	124
Count	42

As shown by the table above the project quality management has a value of 2.95. The mode from the analysis is a 2 which means the majority of individuals consider the TQM to be at level 2. As shown with the distributions below, the response was significantly spread out. This shows that if quality management techniques/methods exist they are not well understood.

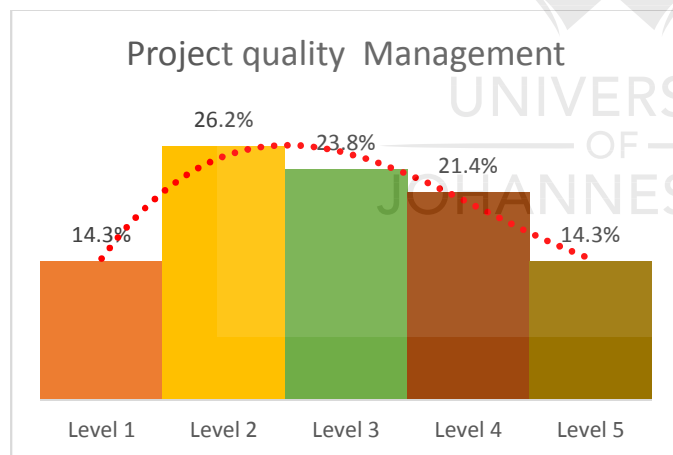


Figure 4-9: TQM distribution

The organisation should set up a quality audit plan as part of the project charter process. Every project must be assigned a quality champion to ensure that quality management forms part of the project review process.

4.4.6. HUMAN RESOURCE MANAGEMENT

The human resource management (HRM) results are listed in the table below.

Table 4-9: Human Resource management results

<i>Human resource management</i>	
Mean	2.928571429
Standard Error	0.190947443
Median	3
Mode	4
Standard Deviation	1.237480862
Sample Variance	1.531358885
Range	4
Minimum	1
Maximum	5
Sum	123
Count	42

The maturity level of the human resource management can in at 2.93. Since the mode was a 4 this appears very peculiar. As shown by the distribution of the HRM below there was a high number of respondents that felt that the project organisational chart are informal.

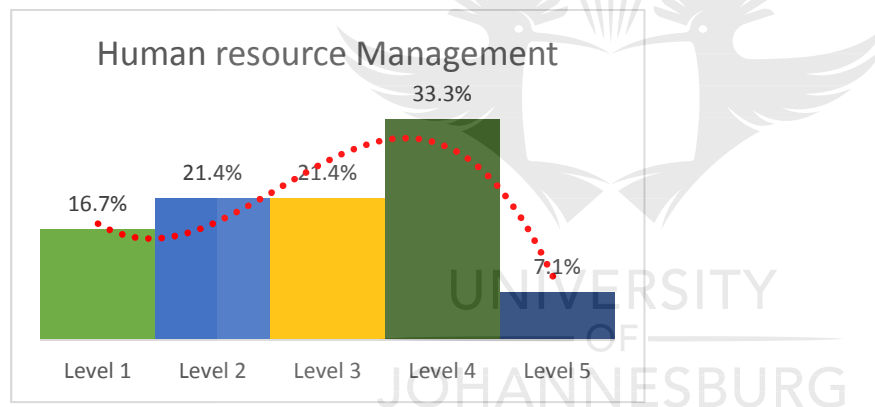


Figure 4-10: HRM distribution

Transnet has to implement a formal project charter with human resource as a components. Secondment to a project must be formal and communicated to functional managers. Also there must be an increase in the perception that both functional and project teams are getting opportunities to grow in their careers. This will eliminate the perceived importance of project teams and thus functional managers will not hold back their staff from being seconded to a project.

4.4.7. COMMUNICATION MANAGEMENT

The results from the communication management (CM) evaluation are displayed in the table below.

Table 4-10: Communication Management Results

Communication management	
Mean	3.047619048
Standard Error	0.195632869
Median	3
Mode	3
Standard Deviation	1.267845896
Sample Variance	1.607433217
Range	4
Minimum	1
Maximum	5
Sum	128
Count	42

The communication management maturity was found to be 3.05 as seen from the table above. The median and mode are also at a 3. As noted from the diagram below the respondents chose level 3 more than any other level.

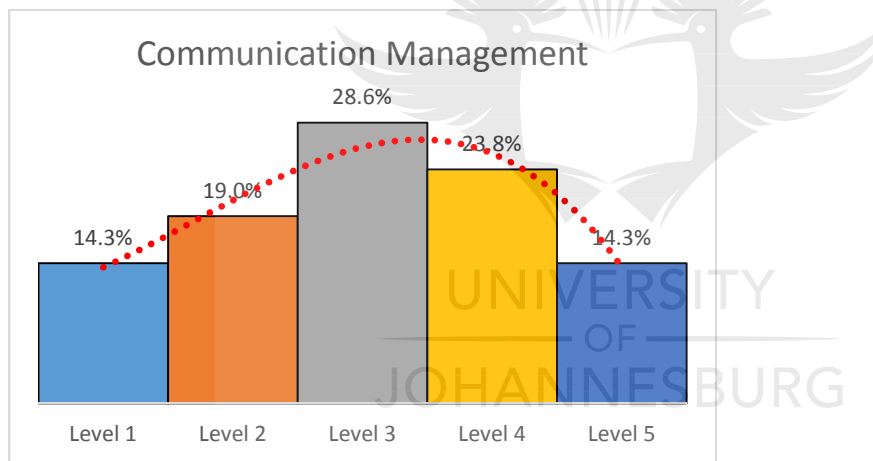


Figure 4-11: CM Distribution

The company has to continue to improve the communication management strategies. There is a need to integrate the communication management into the structure of every project. There is an also a requirement to ensure that all the elements of the body of knowledge are included into project reporting.

4.4.8. PROJECT RISK MANAGEMENT

The project risk management results are detailed in the table below.

Table 4-11: Project Risk Results

Project Risk management	
Mean	3.428571429
Standard Error	0.174250868
Median	3
Mode	3
Standard Deviation	1.129274689
Sample Variance	1.275261324
Range	3
Minimum	2
Maximum	5
Sum	144
Count	42

The project risk management knowledge area was found to have a maturity rating of 3.42. The mode was discovered to be a 3. From the diagrams of the distribution it is clearly identified that Transnet has a formal risk identification and documenting methodology for every project.

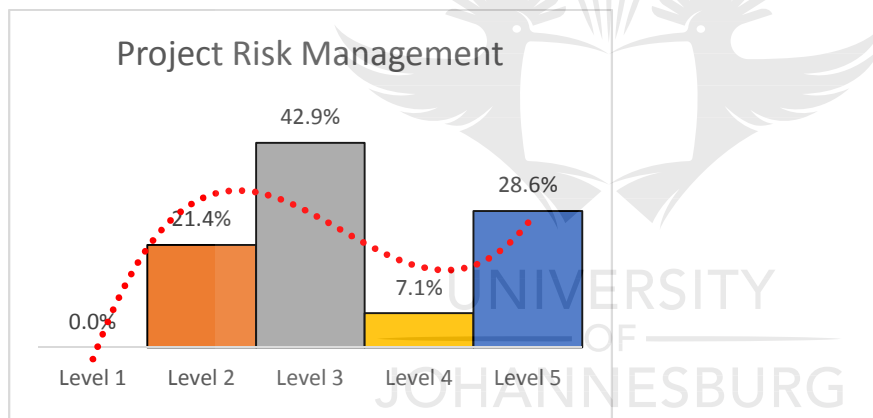


Figure 4-12: PRM Distribution

The aim for Transnet in risk management is to ensure that the risk register during a project does not stay a static document. As new risks are identified during execution they must be recorded and quantified. There is also a need to improve the lessons learnt technique for different projects. A central database should be done with all the lessons learnt so that even new employees in the organisation should improve in their risk management.

4.4.9. PROJECT PROCUREMENT MANAGEMENT

The results for project procurement management (PPM) is shown by the table below.

Table 4-12: Project Procurement Management results

Project procurement management	
Mean	3.452380952
Standard Error	0.149339937
Median	3
Mode	3
Standard Deviation	0.96783341
Sample Variance	0.93670151
Range	4
Minimum	1
Maximum	5
Sum	145
Count	42

The maturity level for the project procurement management was found to be 3.45 as shown by the table above. As noted by the distribution below majority of respondents felt that PPM is well established within the organisation.

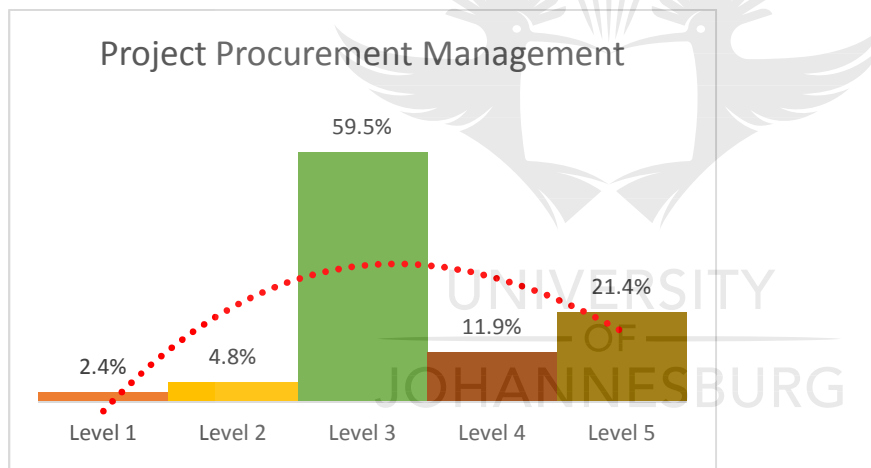


Figure 4-13: PPM Distribution

Almost 60 % of respondents felt that the procurement management is established at a maturity of 3. As a state owned company this is sufficient to ensure project management effectiveness. The knowledge areas have been found to be at a 3.13 level of maturity. A discussion of the project processes will now be undertaken.

4.4.10. PROJECT INITIATION PROCESS

The evaluation of the project initiation process (PIP) is highlighted by the table below.

Table 4-13: Project Initiation Process Results

Project Initiation Process	
Mean	3.142857143
Standard Error	0.142857143
Median	3
Mode	3
Standard Deviation	0.9258201
Sample Variance	0.857142857
Range	4
Minimum	1
Maximum	5
Sum	132
Count	42

The maturity level for the initiation is noted to be 3.14 as shown by the table above. The results highlight the processes for initiation during the start of the project. Majority of the respondents pitched this at level 3 as shown by the diagram below.

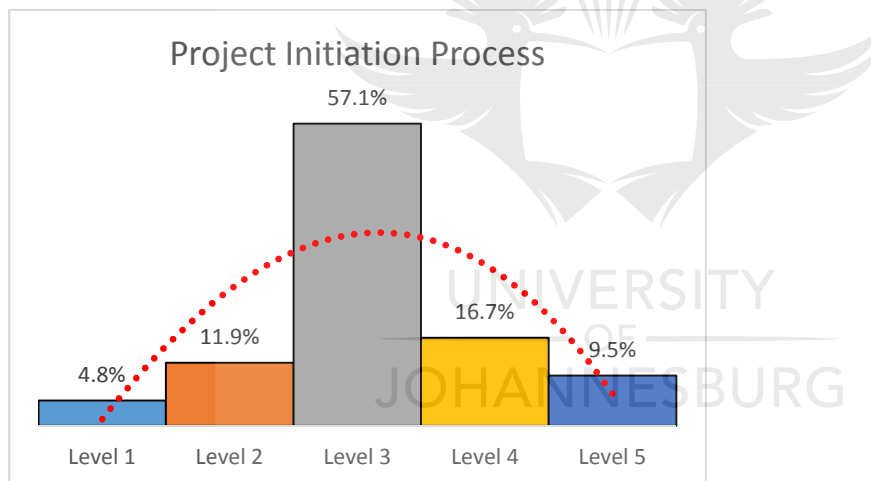


Figure 4-14: PIP distribution

To improve the initiation process there is room to establish initiation processes for every phase of the project. An improvement on these processes will enable a differentiation of the phases which will assist in ensuring project review.

4.4.11. PROJECT PLANNING PROCESS

The results for the project planning process (PPP) is shown by the table below.

Table 4-14: Project Planning Process Results

Project Planning Process	
Mean	3.119047619
Standard Error	0.171087866
Median	3
Mode	3
Standard Deviation	1.108776099
Sample Variance	1.229384437
Range	4
Minimum	1
Maximum	5
Sum	131
Count	42

The planning process was found to be at a maturity level of 3.12 as noted by the table above. Level 3 of maturity was chosen by many respondents but there was a large percentage who chose level 2 as can be noted by the figure below. The planning will be improved by ensuring that all the knowledge areas (to the degree applicable) will be incorporated in the planning process.

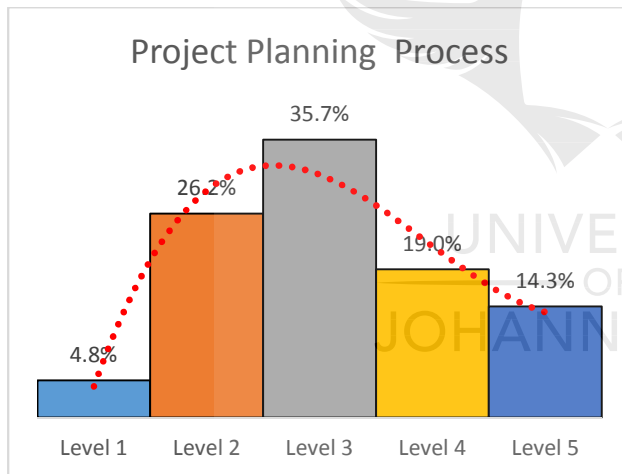


Figure 4-15: PPP distribution

4.4.12. PROJECT EXECUTION PROCESS

The evaluation of the project execution process (PEP) yielded the following results.

Table 4-15: Project Execution Process Results

Project Execution Process	
Mean	3.595238095
Standard Error	0.17060228

Median	4
Mode	4
Standard Deviation	1.10562914
Sample Variance	1.222415796
Range	4
Minimum	1
Maximum	5
Sum	151
Count	42

The maturity level for the execution process was found to be a 3.6 as noted by the table above. This meant that many respondents were of the view that most elements of project management practices are embedded into the execution as shown by the figure below.

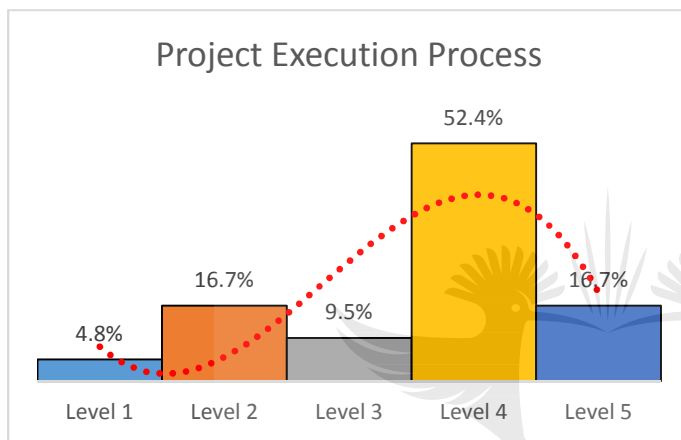


Figure 4-16: PEP distribution

To improve the PEP it would be necessary to ensure that the scope verification, quality assurance and team development is included even in smaller projects.

4.4.13. PROJECT CONTROLLING PROCESS

The results for the project controlling process (PCP) are shown in the table below.

Table 4-16: Project Control Process results

Project Control Process	
Mean	3.261904762
Standard Error	0.177279492
Median	3
Mode	3
Standard Deviation	1.14890242
Sample Variance	1.319976771
Range	4

Minimum	1
Maximum	5
Sum	137
Count	42

The maturity of the project control process was evaluated to be at a level of 3.26 as shown above. As shown in the figure of the distribution below there was a relatively low differentiation between the levels.

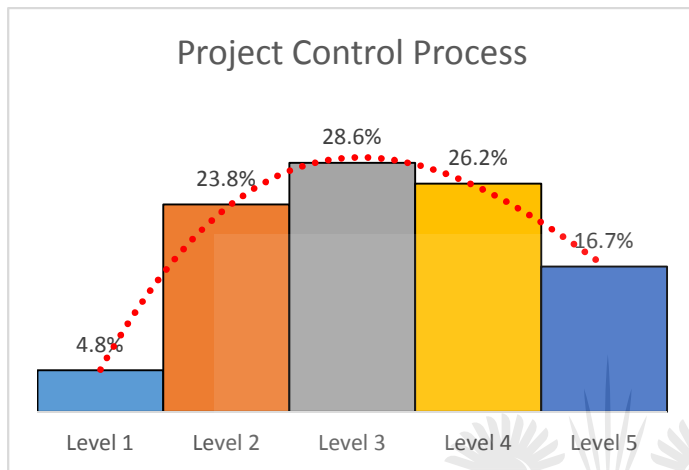


Figure 4-17: PCP distribution

The project control process is an important aspect of good project management. The organisation needs to improve in this process by ensuring participation of all the team members when a project change is established. There is also the need to ensure that the analysis done on the project execution highlight all the necessary indicators to enable effective project change.

4.4.14. PROJECT CLOSE-OUT PROCESS

The results for the project close-out Process (PCOP) is shown by the figure below.

Table 4-17: Project Close-Out Process Results

Project Close Out Process	
Mean	3.380952381
Standard Error	0.163272219
Median	4
Mode	4
Standard Deviation	1.058124917
Sample Variance	1.119628339
Range	4
Minimum	1

Maximum	5
Sum	142
Count	42

The project close-out process was found to have a maturity level of 3.38 as shown on the table above. The mode and median was found to be at a level 4 as shown by the figure below. This shows that the PCOP is adequate in the organisation and should be maintained at these levels.

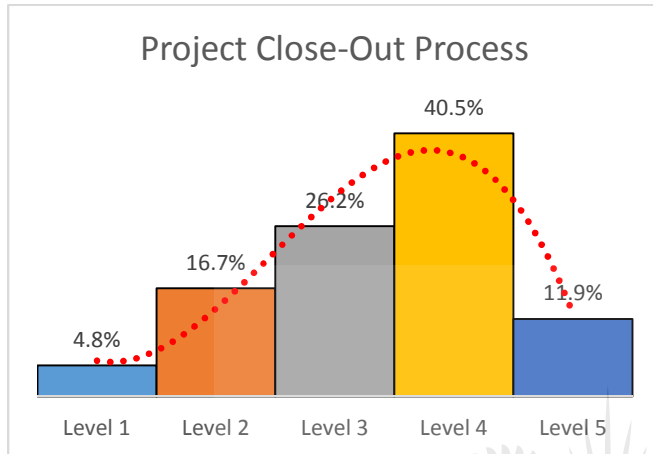


Figure 4-18: PCOP distribution

4.5. TRANSNET PROJECT MANAGEMENT MATURITY

The preceding section has highlighted the maturity levels of all the nine project management knowledge areas and the five project processes. The last step in this quantitative study is to determine the overall project management maturity. Let us first discuss the correlation between the experience and maturity.

4.5.1. EXPERIENCE CORRELATION WITH MATURITY

The maturity level for each individual was calculated and compared with the experience. The experience was divided into three categories, namely: one year, less than five years and more than five years. The aim of this analysis was to determine if there is a correlation between the experience and the perceived maturity. A +1 correlation coefficient means a strong positive correlation between the variables and a -1 means a strong negative correlation. A value of ± 0.1 shows a small correlation between the variables. The results from our analysis shows that the experience and the maturity have a correlation of -0.11. This would indicate that there is a very small correlation in the negative between the experience and the maturity level. This requires a more in-depth study to determine why a

negative correlation exists when one expects a positive correlation between more experience and project processes adherence.

	<i>Experience</i>	<i>Overall Maturity</i>
Experience	1	
Overall Maturity	-0.107848154	1

4.5.2. OVERALL PROJECT MANAGEMENT MATURITY

The overall project management maturity for Transnet has been found to be 3.19 and determined from the survey. This would indicate that Transnet falls above level 3 of the maturity model. This level of maturity indicates that most of the required systems and techniques are established within Transnet. As shown the preceding section to improve this level there is a need to improve each of the different project management area and processes. The impact of project success will be covered in a future chapter. The following section will highlight some of the results from the qualitative research.

4.6. RESULTS FROM THE INTERVIEWS

As part of the qualitative research a number of interviews was held with some employees from Transnet. The interviews were held to determine the view that different practitioners have on the success of project management as a strategy in the respective role. Three interviews were on note and are highlighted below. A combination of questions asked in the interview is shown in appendix C.

4.6.1. SENIOR MANAGER INTERVIEW

The following are the views expressed by the senior manager who served for a number of years as a project manager. The level of entrenchment of project management principles relies heavily on the size of the project. Larger project tend to have formal structure and are well geared to achieve the project objectives. Project success also depends heavily of the department that has been chosen to execute the project. The departments that are designed for perform capital projects tend to be more resourced and thus execute projects effectively. The determinant therefore of the variance in project results is the competence of the project manager. Thus improving the entrenchment of project management within Transnet will largely depend on the entrenchment of these principles on both the employees executing the work and the project manager.

4.6.2. FINANCIAL MANAGER INTERVIEW

In an interview with the financial manager who works with capital expenditure the following was observed. Financial planning in Transnet is dependant of the project manager. The cash flow projections for projects tend to be missed. This is often the result of a procurement process that takes longer than anticipated. These delays often cause a rollover of funds between financial years. There is a need to fast tract the procurement process and also to introduce methods that lessen the time for doing acquisition of goods and services. In the current economic climate any delay in spending often results in cutting of the budget. It is thus very important for the project manager to build a relationship with the procurement department in order to fast track the procurement and thus stick to the planned cash flow.

4.6.3. PROGRAMME MANAGER INTERVIEW

The following section covers the detail obtained from a programme manager in the Electrical project division. Transnet has a well-defined Project life cycle plan (PLP) to manage projects. The PLP process is aligned or based on the Project Management Book of Knowledge (PMBok). The PLP process specifies the type of project with the guidance of what documents need to be made available in order to pass a gate review process. In many instances the PLP is not followed by project managers. This could be because it is ignored or project managers are not acquainted with it. There is therefore a need to put in place programmes to increase the competency of project managers on the application of the PLP.

4.6.4. INTERVIEWS CONCLUSION

From the interviews it is apparent that Transnet as an organisation has all the necessary tools and methods for project management established. There is a need however to improve the competency in project management of all the project managers. This includes both the hard skills and the soft skills like negotiation. An important consideration is the training on PLP for the project managers as well as all who perform any function on a given project.

4.7. CASE STUDY – IRON ORE VERSUS SWAZI-LINK PROJECT

The next section will compare two projects to the application of the PLP. The iron ore project was medium scale and the Swazi link was a major scale project.

4.7.1. IRON ORE LINE PROJECT

The purpose of this project was to establish an ultrasonic broken rail detector (UBRD) and a Wayside Intelligent Longstress Management System (WILMA). The UBRD is used to detect broken rails and send the alarm to a Centralised Traffic Control to stop a train in the section. The WILMA is used to determine

the stresses on the rail and send the information to a server for analysis. The following section will compare the execution of the project in-line with the Project management knowledge areas.

IRON ORE LINE PROJECT MANAGEMENT AREAS

The project was classified as a type C by the Transnet Classification matrix. A Type C project has the Conceptualisation and prefeasibility combined. The project then proceeds to the feasibility and detailed design phase. The scope management was completed but the process was not rigorous. The communication interface that was chosen was GSM (mobile operator technology). This solution was not tested against the conditions where deployment would occur. As the iron ore line lies predominately in uninhabited area there was no GSM in over 30 % of the line. This meant that scope had to change when the project was over 90% complete. This lead to scope creep, cost overruns as well as delayed completion.

The impact of this delay was that the project was not delivered in time. This caused the company to have no view of the rail breaks for two winters. The prefeasibility was not done and the PLP was not followed.

4.7.2. SWAZI LINK PROJECT

The Swaziland link project has the objective of creating a new line from South Africa into Swaziland. The purpose of the line is to connect the Richard's bay port to the coal fields through Swaziland. The line will run from Lothair to Sidvokodvo and will be a 26 ton axle load line. The following section will show some of the project activities compared with the project management principles.

SWAZI-LINK PROJECT MANAGEMENT AREAS

The project was classified by the Transnet classification matrix as a Type E project. This means that it is large project and very complex which means that the full PLP should be followed. The project integration was handled using a number of stakeholder engagements. The environmental, stakeholder, engineering etc. were all integrated using a formal engagement session.

The development of the scope for the project was handled by both the internal staff of Transnet and contractors. To manage the scope all the disciplines would work independently to develop a project schedule along with their work breakdown structure. Scope integration predetermined dates were setup at the outset of the project. This planning ensured that the time management was successfully managed. Using internal resources for doing the designs ensured that the cost were managed efficiently.

The quality management was accomplished using the gate review process. During these gate reviews experts in the different field evaluated the designs and plans from the project team. The human resource management was a bit of a challenge for the internal staff as they didn't get enough support. The communication management was done using the multi-tier engagements and was guided by a communication plan. The normal tools for managing communication were used. Risk management was held in different spheres and the procurement was guided by official documents. As a summary the project followed all the necessary PLP steps. The designs were delivered on time and in budget.

4.7.3. CONCLUSION ON THE CASE STUDY

As noted in the preceding section Transnet has the PLP process as a methodology for project management. Transnet also provides a matrix that helps a project manager to determine what type of project he is undertaking. But as noted by the two examples above what the project manager decides to incorporate determines the project management effectiveness. When a project manager follows the PLP process the results are often positive for project execution.

4.8. CONCLUSION

The collection of the data to determine the project management maturity was done using a survey tool. *Google forms* was used as a tool to collect responses to questions that focused on all the knowledge areas and the project processes. The options on every question were not arranged in terms of the levels but randomly to avoid respondents' bias. All the knowledge areas and the project processes were evaluated for maturity and recommendations were given. The project management maturity for Transnet was found to be at a 3.19. The interviews and the case study confirmed that Transnet has that maturity level. The next chapter will discuss the possible impact that the maturity of 3.19 will have on the execution of the MDS.

CHAPTER 5 MATURITY IMPACT ON THE MDS

5.1. INTRODUCTION

The last objective of the dissertation was to determine the impact that the project management maturity level would have on the delivery of the market demand strategy (MDS). This chapter will find the impact that the maturity has on projects. The sections will try and present project success and project management success and their link. An evaluation of other organisations with different maturity levels will be done. The conclusion will detail the predicted impact that the project management rating of 3.19 will have on the delivery of the infrastructure projects that help to deliver the MDS.

5.2. PROJECT MANAGEMENT SUCCESS VERSUS PROJECT SUCCESS

Many individuals think of project management success as the definition that a project was successful. Though similar the two mean slightly different things. Project success is the overall fulfilment of the stakeholder's objectives (Cooke-Davies , 2002). These would be the realisation of the goals that the owner had. The project management success on the other hand is the achievement of goals within the allocated budget, time and quality. This distinction is valuable as it will help identify the success criteria, which is the measures by which failure or success of the project will be judged. It also enables the identification of success factors that detail items to be included in a project to ensure its successful completion.

5.3. IMPACT OF THE PMM OF TRANSNET

Organisations that have a mature project management level have been known to manage projects more effectively and have consistent improvement (Rasid, Mohammad & Long, 2014). It has also been noted that the top four success factors for a project are; the project team, understanding of user needs, the communication infrastructure and requirement definition. Thus there is need to establish the impact of each knowledge area on the project success. The diagrams below show the summary of the project management maturity as found in chapter 4.

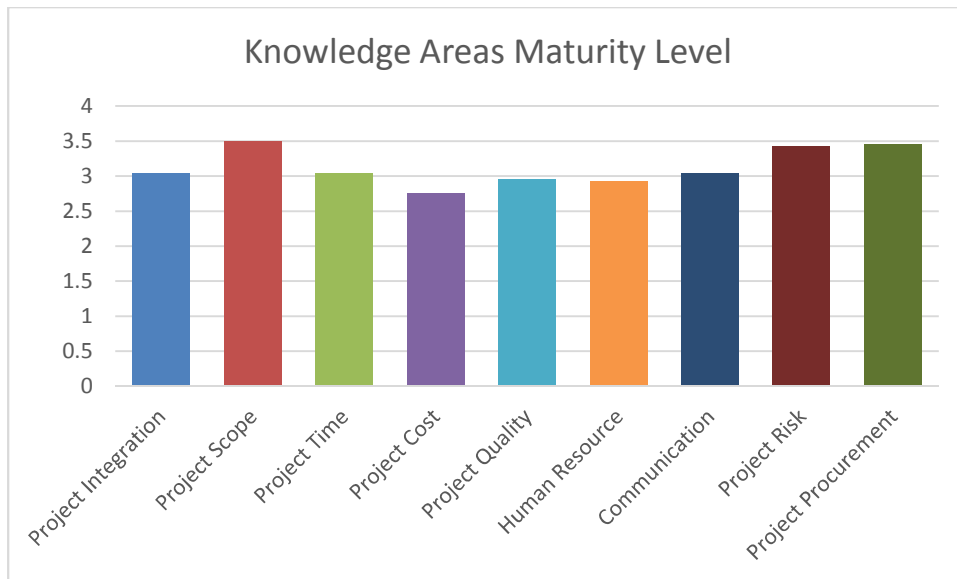


Figure 5-1: Knowledge Areas Maturity

A recent research was conducted to determine the influence of project management maturity on the telecommunication companies in Zimbabwe (Murambiwa & Barry, 2012). The result implied that high performing organisations have the following sequence when it comes to the nine knowledge areas: Risk, quality, HR, integration, scope, time, cost, procurement and communication. The performing organisations were found to have an overall maturity of 3.4. Looking at Figure 5-1 above Transnet has an overall maturity rating of 3.19. In order to be considered a high performing organisation there is a need to improve the cost, quality, human resource with immediate effect. The next stage would be to improve the Communication, Time and project integration.

Cost management will thus be pivotal in determining the delivery of the MDS successfully. This is because cost management is also included as one of the issues that are required to enhance the success of projects (Uys & Barry, 2008). Another aspect highlighted was the importance of the planning process. As shown by Figure 5-2 the planning process has been found to be the least mature even though it is high than a 3. The level of maturity for the execution process is among the highest in Transnet. This could prove to be a problem as it shows that not enough planning is done before a task or the project itself. This would indicate that execution is done on plans that might not be fully accurate. An improvement of the project planning is thus a must.

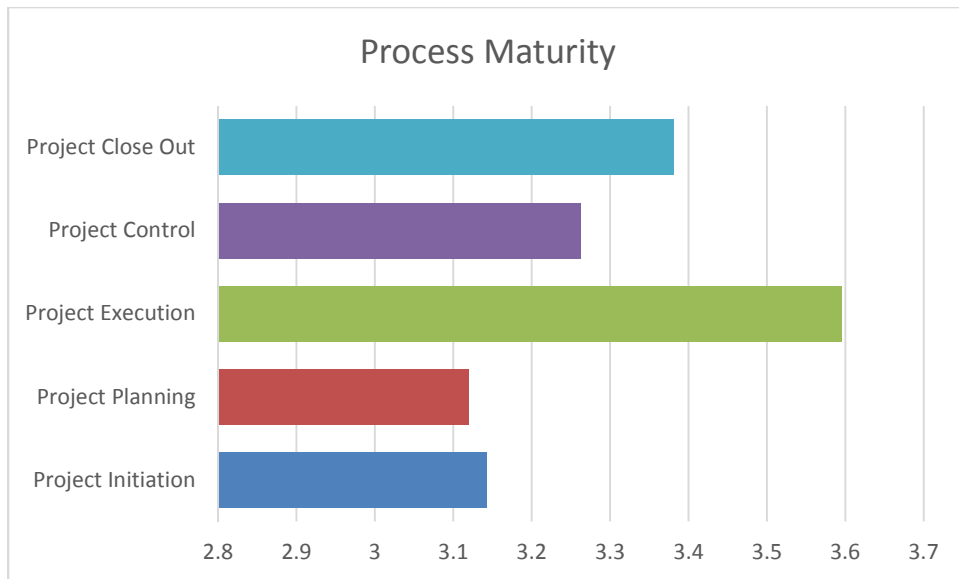


Figure 5-2: Process Maturity Level

5.4. CONCLUSION

The execution of projects that support the MDS is important to Transnet. The project management maturity level was found to be at a level of 3.19. This indicates that most project management processes and procedures are established within Transnet. In order to positively impact the MDS related projects it is important for Transnet to improve the cost management, quality management and human resources. This levels should be improved to at least 3.4 on the maturity rating. It is also imperative that Transnet improves the planning process. The planning process can be improved on both the entire project and the individual stages. The Transnet PLP process will go a long way in achieving this objective. If all these improvements are made this will assist Transnet to be a world class freight logistic company that positively impacts the South African economy. By lowering the cost of doing business Transnet will serve as a catalyst for economic growth and thus contribute to the empowerment of all South Africans.

CHAPTER 6 CONCLUSIONS AND FUTURE WORK

6.1. INTRODUCTION

This chapter details the overview of the dissertation and some of the lessons learned. An overview of how the goals were achieved will be highlighted in the following section. A brief discussion on future work will also be done.

6.2. OVERVIEW OF THE RESEARCH

Project management continues to be one of the best solutions to the achievement of a new product or service that organisations require for their business objectives. The research was dedicated to understanding of what level of project management maturity is within Transnet. The literature review that was required was conducted mainly on internet resources. The internet resources that were used included Google Scholar, Google books and the university's Libguides.

Chapter 1 highlighted the position of Transnet as an organisation within the logistics space in the country. The different divisions were highlighted along with their operations. The research question was then highlighted. Chapter 2 focussed on the review of the literature. This included the review of four maturity models, namely: the project management process maturity model, the Crawford project management model, the R&D pharmaceutical maturity model and the Norwegian project management maturity model. Chapter 3 highlighted the methodology employed in research to get results. Chapter 4 detailed the quantitative analysis of the data that was collected using a survey tool. The Chapter 5 highlighted the impact that a maturity level will have on the rollout of the MDS that Transnet is busy implementing.

6.3. RESEARCH QUESTION

The research goal was to determine the level of project management maturity within Transnet. A further goal was to determine the impact of the level on the execution of multiple projects that are resulting from the Market Demand Strategy. Using the literature review the Project management process maturity model was chosen as the tool to use for measuring the maturity level. Using the model the level of project management maturity was found to be 3.19. The majority of the respondents were from TFR, which is the largest division. Most of the project management principles are developed from this OD and therefore there is a high level of confidence that it represents the overall maturity level within the group. This indicated the majority of procedures and processes have been established. The areas that require improvement were the cost, quality and human resources management. The interviews confirmed that the maturity is perceived to be at a defined level.

To ensure that the MDS is achieved successfully there is a need to improve the overall maturity to 3.4. Other research has shown that at this level majority of projects can achieve the triple constraint of cost, scope and time. Transnet must continue to improve the establishment of procedures to manage all the knowledge areas.

6.4. FUTURE WORK

Future research can focus on the relationship between the experiences in project management versus the achievement of project success. This would help to answer the question of the time needed to ensure that project managers are equipped to deliver successful projects. Further research on the finding correlation between models used in different logistics companies, both rail and road.



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CHAPTER 8 APPENDICES

8.1. APPENDIX A: MODEL SELECTION CRITERIA

This appendix shows the criteria used to project management maturity model that would be used to measure maturity within Transnet. The criteria is applied to the consensus criteria method to come to a weighted average of the different models. The scale that was chosen was 0, 1, 3, and 9 ensuring a clear distinction between criteria.

8.1.1. COMPREHENSIVENESS

This criteria seeks to establish the completeness of the model. The model should be able to independently give the organisation an indication of its maturity. A comprehensive criteria will have the following ranking.

Table 8-1: Completeness Ranking

	SCORE	INTERPRETATION
	9	Model sufficiently addresses all the areas of project management
	3	Model has majority of project management practice with some exclusions
	1	Certain elements exist, however method lacks complete fundamentals of project management
	0	comprehensiveness cannot be determine as method lacks needed information

8.1.2. ADAPTABLE FOR TRANSNET

This criteria evaluates the ability of the model to be adapted effectively to Transnet as an organisation. The model should be usable for Transnet without too many changes.

Table 8-2: Criteria for adaptability to Transnet

SCORE	INTERPRETATION
9	The model can be used within Transnet with Little to no changes
3	The model can be used for Transnet with minor changes
1	The model can be used within Transnet with major changes
0	The adaptability of the model cannot be determined.

8.1.3. EASE OF USAGE

The aim of this criteria is to check the ease at which the model can be applied. The model should be intuitive enough that a new evaluator should be able to master it in a short learning time. The following table shows the ranking of the ease of usage

Table 8-3: Ease of Use ranking

SCORE	INTERPRETATION
9	The model is easy to use and results in short learning time.
3	The model can be used with ease. The learning time is slightly long.
1	The model is difficult to use and results in long learning time
0	The ease of use cannot be determine.

8.1.4. CLEAR PATH TO MATURITY IMPROVEMENT

The clear path to maturity improvement criteria seeks to determine the models ability to sketch a path for the organisation to improve their project management maturity. The model should guide the organisation on which area require attention and thus improve the overall maturity. The following table shows the ranking for the clear path criteria

Table 8-4: Path to improvement ranking

SCORE	INTERPRETATION
9	The path to improvement exists and can easily be deduced from the results of the evaluation.
3	Path to improvement exists but I detailed study of the results required to establish it
1	It is difficult to see a path to improvement for any of the model's elements
0	The model's Path to improvement cannot be established

8.1.5. MODEL CONTINUOUS IMPROVEMENT

An important constraint on a model is that it should be designed for continuous improvement. When new knowledge is brought to the subject there should be an easy method to incorporate such change. The following ranking will be used for the model continuous improvement criteria.

Table 8-5: Ranking for model continuous improvement criteria

SCORE	INTERPRETATION
9	The model has been designed for continuous improvement

3	There exists was to continuously improve the model that need specialised knowledge of the model.
1	The methods to improve the model are difficult to implement
0	Continuous improvement of the model cannot be established.

An important aspect of the criteria is to determine the weight for each criteria. The next section will detail this.

8.1.6. WEIGHT OF THE CRITERIA

In order to perform the prioritization matrix the different criteria must have weights that sum up to one. The table below displays the weights for all the criteria. The sum of the criteria weights is equal to 1. In order to achieve the weights of the criteria, a rating of each was done by a number of project managers and the weighted average is calculated.

Table 8-6: Criteria weights

CRITERIA	WEIGHT
Comprehensiveness	0.3
Ease of usage	0.1
Path to improvement	0.3
Model continuous improvement	0.2

8.2. APPENDIX B: CONSENSUS CRITERIA METHOD APPLICATION TO TRANSNET

This appendix will detail the scoring of the different models relative to the different criteria. An analysis of the reasoning of assigning a score to a model is also detailed. The analysis was conducting using a spreadsheet on file “Consensus Method for Transnet.xlsx” which is on the CD-ROM with the submission.

8.2.1. CRAWFORD MODEL ANALYSIS

The Crawford model scores a 9 for the comprehensiveness criteria since it covers most of the project management body of knowledge. The different areas are then decomposed into measurable activities. For the ease of usage criteria the model scores at 9 since the decomposed aspects can be easily measured. For the path to project management improvement the model scores a 3. This is due to the fact that the model places emphasis on the project office, management oversight and the personnel development. It doesn't however indicate what tangible effort is need to achieve the improvement in all these. For the model continuous improvement the model scores a 1 since it doesn't indicate whether it can be upgradable. With regard to the last criteria the model score 9 since the decomposed aspects can be tailored and also the emphasized areas are applicable to Transnet. Thus the model's overall rating is 6.8 as shown below.

<i>Deployment Strategy</i>	<i>Comprehensiveness</i>	<i>Ease of usage</i>	<i>Path to improvement</i>	<i>Model continuous improvement</i>	<i>Adaptable For Transnet</i>	<i>Totals</i>
Crawford project management model	9	9	3	1	9	6.8

8.2.2. NORWEGIAN PM MATURITY MODEL

The Norwegian maturity model scores a 1 for the comprehensiveness criteria. This is due to the fact that the model is based extensively on exploring competency. The different aspects thus can be applied to all disciplines rather than only project management maturity. The model is therefore too general in its approach. The model scores a 3 for ease of usage as the different competency dimensions can be structured depending on the organisation. There is however no consistent way of measuring the organisation's maturity. On the path to improvement the model scores a 3 since it highlights the level of maturity in every dimension. The criteria for model continuous improvement is a 1. This is because there was no indication of any methodology to improve the model. For the adaptability of the model to Transnet the model can be considered a 3 since it can be adapted to most disciplines. The overall performance for the Norwegian model is thus a score of 2.2 as shown below.

<i>Deployment Strategy</i>	<i>Comprehensiveness</i>	<i>Ease of usage</i>	<i>Path to improvement</i>	<i>Model continuous improvement</i>	<i>Adaptable For Transnet</i>	<i>Totals</i>
Norwegian PM Maturity model	1	3	3	1	3	2.2

8.2.3. PROJECT MANAGEMENT PROCESS MATURITY (PM) ² MODEL

The PM squared model scores 9 for the comprehensiveness criteria. This is because it covers the knowledge areas as well as the project management processes. Thus it covers all the aspects of project

management application. For the criteria of ease of use the model is a 3 since all the areas and processes are decomposed to individual measurable components. Since all the areas are covered this can result in a longer evaluation. The model scores a 9 for path to improvement. This is justified as the model brings the results of the individual knowledge areas and thus whatever has a low maturity can be improved. The criteria for model continuous improvement can be regarded as a 9 as the model itself includes improvement when knowledge expands. The model measures at a 9 for adaptability for Transnet. Since Transnet uses project management in all the organisational divisions it is imperative that a model include all the knowledge areas. The overall rating for the model is thus 8.4 as shown below.

<i>Deployment Strategy</i>	<i>Comprehensiveness</i>	<i>Ease of usage</i>	<i>Path to improvement</i>	<i>Model continuous improvement</i>	<i>Adaptable For Transnet</i>	<i>Totals</i>
Project management process maturity (pm) 2 model	9	3	9	9	9	8.4

8.2.4. R&D PHARMACEUTICAL MATURITY MODEL

The R&D pharmaceutical maturity model measures scores 9 on the comprehensiveness criteria. This is because the model covers the culture of the organisation as the start. This enables the model to build from the corporate culture to the technical skills. The model scores 3 on the ease of use as there is no one method to measure most of the dimensions. For both the path to improvement and the model continuous improvement the model measures at a 3. This is due to the model not showing a clear path to improve the maturity. It contains findings that tell the organisation the current standing only. For adaptability within Transnet the model scores a 9. This is due to the model fitting well with the Transnet push for a strong corporate culture. If that corporate culture can include project culture this could be effective. The model thus measures an overall score of 6.6 as shown below.

<i>Deployment Strategy</i>	<i>Comprehensiveness</i>	<i>Ease of usage</i>	<i>Path to improvement</i>	<i>Model continuous improvement</i>	<i>Adaptable For Transnet</i>	<i>Totals</i>
R&D Pharmaceutical maturity model	9	3	3	3	9	6.6

8.2.5. SUCCESSFUL MODEL

After all the models are applied the following is the results.

Deployment Strategy	Comprehensiveness	Ease of usage	Path to improvement	Model continuous improvement	Adaptable For Transnet	Totals	Rank of Strategies
Crawford project management model	9	9	3	1	9	6.8	2
Norwegian PM Maturity model	1	3	3	1	3	2.2	4
Project management process maturity (pm) 2 model	9	3	9	9	9	8.4	1
R&D Pharmaceutical maturity model	9	3	3	3	9	6.6	3
Totals	28	18	18	14	30	108	
Rank of Issues	2	3	3	5	1		
Issue Weight	0.2	0.1	0.1	0.2	0.4		

Replace the labels below for up to 12 Options to be evaluated

Replace the labels below for up to 12 Criteria for evaluation

Replace the weights below for each Criteria. Weights must sum to 1.0.

Instructions:

1. This Workbook is Protected; Only Cells allowing data entry are editable. Password to Unprotect is "SixSigma" (without quotes)
2. Enter into each cell in matrix the impact of the strategy on the issue using following score:

No entry: No impact	Project management process maturity (pm) 2 model	Path to improvement	0.1
1: Slight impact	R&D Pharmaceutical maturity model	Model continuous improvement	0.2
3: Moderate impact		Adaptable For Transnet	0.4
9: Strong impact			

8.3. APPENDIX C: SURVEY QUESTIONS

PM MATURITY WITHIN TRANSNET SURVEY

Please take time to complete this survey. This survey aims to determine the level of project management maturity within Transnet. This forms part of a dissertation to determine the impact that PM maturity has in the execution of Projects.

*** Required**

FORMALITIES

This section is to identify your role in the organisation

Name (Optional)

Transnet Organisational Division *

Which OD do you work in?

- Transnet Freight Rail
- Transnet Engineering
- Transnet National Port Authority
- Transnet Port Terminals
- Transnet Pipelines
- Transnet Capital Projects
- Transnet Foundation
- Transnet Property
- Transnet Group

What is your Grade? *

- B - General Manager
- C - Executive Manager
- D - Senior Manager
- E - Manager
- F - Junior Manager
- G - First line Manager
- Other:

Experience in Project Management *

- 1 Year
- Less than 5 Years
- Greater Than 5 Years



PROJECT MANAGEMENT KNOWLEDGE AREAS

- 1. What statement accurately describes the Project Integration Management within your area of operation**
 - a. Project Plans are not prepared in a structured format
 - b. Informal Project Plans and organizational structure defined
 - c. Formal PM methodology is established and managed
 - d. Project control processes are integrated and coordinated across different knowledge areas and projects
 - e. The entire process of integration management is planned, optimized, and sustained for continuous PM process improvement.

- 2. What is your view of Project Scope Management during project execution**
 - a. Informal work breakdown structures and scope-change control processes are defined
 - b. scope-change-control and verification process are documented and integrated
 - c. Scope planning, definition, and verification processes are managed
 - d. No methodology to initiate and control the projects
 - e. The entire process of scope management is planned, optimized, and sustained for continuous PM process improvement

- 3. What statement describes how Project time management is handled within projects**
 - a. Informal schedules for planning and tracking are developed
 - b. Formal schedule control processes and practices are integrated
 - c. A variety of scheduling tools and techniques are available for effective schedule control
 - d. No standard templates for project schedules exist and schedule development is unrealistic and out of sequence
 - e. Formal project time management tools are optimized and sustained for continuous PM process improvement

- 4. Which statement resonates with your experience with regard to Project cost management**
 - a. There is no cost estimating process available
 - b. Resource planning and cost estimating are well coordinated and life-cycle costing is used and managed.

- c. Cost baseline, resource requirements and Work breakdown structure defined to enable informal cost estimating
 - d. Formal cost estimating tools and techniques that are optimized and sustained for continuous PM process improvement
 - e. Formal resource planning, cost estimating, and budgeting processes are integrated
- 5. How do you perceive project quality management in your projects**
- a. No quality audits, quality assurances, or quality control processes leading to reworks
 - b. Informal quality management systems and noncompliance is addressed though audits if mandated by project
 - c. Formal quality policies and standards are established
 - d. Project progresses toward accomplishing project quality are quantified, implemented, and integrated (Level)
 - e. The quality management system is optimized and sustained for continuous PM process improvement
- 6. Which statement best describes the human resource management activities during projects**
- a. Conflict exists between functional and project managers
 - b. The human resource management system is optimized and sustained for continuous PM process improvement
 - c. Improvements in both individual skills and team capabilities are integrated to perform effectively
 - d. Customers and suppliers are often included as members of the project as stakeholders
 - e. Informal organizational chart and staffing management plan are defined
- 7. How is communication management handled during projects**
- a. No formal project performance reporting systems and project review is held only when requested by the contract
 - b. An information retrieval and distribution system is defined and informal performance reports and reviews are conducted
 - c. Project data are maintained in a structured format and project performance data are regularly analyzed, reviewed, and revised for project assessment
 - d. Communication management processes and techniques are integrated with an organizational structure
 - e. Systematic communications management system that is optimized and sustained for continuous PM process improvement is embedded

8. Which statement accurately describes the risk management activities during the project

- a. Project risks are informally identified and analyzed
- b. Formal risk management tools and techniques are employed
- c. No processes for project risk identification with no formal risk management plan
- d. The risk management system is optimized and sustained for continuous PM process improvement
- e. Lessons learned information is used across multiple projects for risk identification, response, and control

9. Which statement describes the procurement management process during projects

- a. Procurement or solicitation plans are not prepared in conjunction with a market condition analysis
- b. Informal project procurement management process is defined
- c. Formal procurement management tools and techniques are managed and procurement data are analyzed and documented
- d. Procurement audits are integrated with the entire procurement process
- e. A procurement management system is optimized and sustained for continuous PM process improvement

PROJECT MANAGEMENT PROCESSES

10. How are projects initiated in the organization

- a. There are no initiating plans or processes available to develop a project proposal
- b. Informal project proposal plans are defined and evaluated for approval from the participating organization
- c. Project proposals are formally reviewed and evaluated for approval
- d. The project proposal development processes are integrated to manage multiple projects
- e. an initiating process is optimized and sustained for continuous PM process improvement in the organizations

11. Which statement closely describes the project planning process for projects

- a. Key PM knowledge areas are integrated into the planning process
- b. The planning process is optimized and sustained for continuous PM process improvement

- c. No formal planning session is conducted
- d. An informal schedule is developed and the cost estimating process is defined
- e. Planning is managed by using formal PM tools and techniques and project team engaged for input

12. What is the state of project execution within the organization?

- a. The executing process is optimized and sustained for continuous PM process improvement
- b. A quality assurance process manages project execution
- c. Project plan execution process is unavailable, scope not verified and project team not organized
- d. Informal project execution plans are defined
- e. The project plan, scope verification, team development, quality assurance information distribution, and contract administration process are integrated into the execution process

13. Which statement closely resembles the project controlling process during a project

- a. The project controlling process is not defined or established
- b. Informal project-change-controlling process is defined and variances identified
- c. Project plans and adaptive actions control the project performance data
- d. Project performance data collection, variance analysis, and status updates are integrated
- e. Controlling process is optimized and sustained for continuous PM process improvement

14. Select a statement that closely describes the project close-out process in projects

- a. All closing activities are completed and the project files are stored and managed
- b. No formal closing processes that close all deliverables and contracts
- c. Informal closing process is defined
- d. Contract close out, administrative closure, and documentation of project file are integrated
- e. Closing process is optimized and sustained for continuous PM process improvement

INTERVIEW QUESTIONS

1. How do you view the level of project management entrenchment within Transnet as an organization
 - a. [Text Box]

2. What are some areas of project execution that you think need to be improved?
 - a. [Text Box]
3. General Comments
 - a. [Text Box]



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