FACTORS TO BE CONSIDERED IN THE ADOPTION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE WITHIN A STATE-OWNED ENTERPRISE

A RESEARCH REPORT BY: ATHAYANDA BRUKWE

SUPERVISOR: MARK MASSYN

FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTERS IN PROJECT MANAGEMENT

SUBMITTED TO THE DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT

AT UNIVERSITY OF CAPE TOWN 2021

DEDICATION

This work is dedicated to my husband **Sive Brukwe**, my children (**Othembele and Yeyama**) and my mother **Yolisa Mbanjwa-Mkula**; thank you for your patience, support, and encouragement.

PLAGIARISM STATEMENT

UNIVERSITY OF CAPE TOWN

DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT

DECLARATION

1. I know that plagiarism is a serious form of academic dishonesty.
2. I have read the document about avoiding plagiarism, am familiar with its contents and have avoided all forms of plagiarism mentioned there.
3. Where I have used the words of others, I have indicated this by the use of quotation marks.
4. I have referenced all quotations and properly acknowledged other ideas borrowed from others.
5. I have not and shall not allow others to plagiarize my work.
6. I declare this is my own work.
7. I will submit this submission to Turnitin match overview.
8. "I know the meaning of plagiarism and declare that all the work in the document, save for that which is properly acknowledged, is my own. This thesis/dissertation has been submitted to the Turnitin module (or equivalent similarity and originality checking software) and I confirm that my supervisor has seen my report and any concerns revealed by such have been resolved with my supervisor."

Signature:

Signed by candidate

22 November 2021

ACKNOWLEDGEMENTS

Firstly, I would like to express my gratitude to **God**, for His protection and for allowing me to do this research.

I wish to express my gratitude and appreciation to my supervisor, **Mr Mark Massyn** who has supervised me with greatest professionalism and supported me throughout this research. Your enthusiasm, knowledge and attention to detail has been my inspiration and motivated me to do better with each submission.

I would like to thank my husband **Mr Sive Brukwe** for his love, his support, and his consistent encouragement throughout this journey. Thank you for always being the pillar of strength and always motivating me and encouraging me to do my best.

I wish to express my gratitude to my line manager **Mr Thamsanqa Kunene** for supporting me throughout my studies; and the organisation that I work for, for granting me this opportunity and awarding me a bursary to further my studies.

I would also like to thank **my colleagues** for their time and efforts in filling in the survey, doing the interviews and sharing their inputs on the study. This study would not have been possible without their input.

Finally, I would like to thank the **University of Cape Town and its lecturers**, for an exciting MSc Project Management programme that has expanded my knowledge on the field and has prepared me for dealing with current and future project management challenges in the industry.

ABSTRACT

The aim of the research was to investigate the factors to be considered in the adoption of the matrix management organization structure within State-Owned Enterprises. It also investigated how the employees understand the project matrix management organization structure and its application, how they observe it to be and whether their misunderstanding of their roles in the structure will have an impact on meeting the project objectives and performance. This research also investigated whether the utilization of the project matrix management organization structure promotes the successful completion of project or whether it delays the project.

The problem examined was "the State-Owned enterprise is still experiencing problems meeting project objectives despite implementing the matrix management organization structure which was intended to facilitate the meeting of project objectives within the organization". The misunderstanding on the roles and functions of personnel within a project environment using the matrix organization structure was also investigated on whether it has an impact on meeting project objectives and performance. The research question for this study was: "What are the factors that hinder or support the State-Owned Enterprise with the adoption of the matrix management organization structure to meet its project objectives?"

The research paradigm was interpretivist. The strategy used was empirical, with an inductive approach. The study approach was qualitative with a survey questionnaire and semi-structured interviews as data collection methods and the data analysis was thematic.

The following were the key findings of the study: In terms of awareness of the structure, most respondents advised that the organisation is using a project matrix management organisation structure. The enablers that were agreed on are managing complexity, resource efficiency, communication effectiveness and output quality. The barriers that were agreed on were ambiguous authority and dual reporting, decision-making delays, management of cross-functional teams, lack of a matrix guardian and level of conflicts. The indication in terms of cost performance was that the projects had cost implications. Most projects were completed on budget with 51% indicating that the projects had an overspend. 74% indicated that the projects that they have worked on were completed behind schedule. 16% indicated that the projects were completed on time. The perception is that this type of structure, due to the number of the managers that are involved lacks decision making. The lack of decision making is caused by lack of communication and stakeholder engagement. Stakeholder engagement was also an issue that was highlighted as lacking.

Keywords: Project Matrix management organization structures, Matrix management organization structure, Organizational matrix management organization structure, Matrix organization

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION AND PROBLEM DESCRIPTION

1. INTRODUCTION

This chapter gives a brief overview of the research topic and background to the research problem. The research problem, question and proposition are stated. The chapter provides the background to the research problem; state the research question; provides the objectives of the research; briefly discusses the research design and methodology and the limitations of the study. An overview on the structure of the report is provided as well.

1.1. BACKGROUND TO THE RESEARCH PROBLEM

1.1.1 INTRODUCTION

The Project Management Institute (PMI) (2017), describes the matrix organization structure is a combination of the projectized structure and the functional organization structures (Rose, 2013). The two types of organizational structures mentioned above are extremely different; therefore, the matrix organization structure is a balance of the two structures. Usmani (2012) asserts that in a matrix organization structure, the authority of a functional manager flows vertically downwards, and the influence of the project manager flows sideways. Employees in a matrix organization structure may report to two managers or more. The combined structure may help organizations achieve higher efficiency, readiness, and quick market adaptation; thus, responding faster to market or customer demand while decreasing the lead time to produce a new product or project. This matrix management organization structure is most suitable for organizations operating in a dynamic environment (Usmani, 2012).

Danilovic et. al. (2005) asserts that due to the projects' complexities and the insufficiency of resources; projects are run simultaneously, sequenced, or overlapped, which generates an enormous requirement for an interchange of information between people that are in projects temporarily, the customers, and the suppliers. They further state that this kind of environment is labeled as the multi-project situation and that it requires resources from the operations as well as the project environment; and characterized by the large number of interdependences between projects, tasks and activities, people,

knowledge areas, technologies, products, and components. The timing of different projects, the tasks to be performed, and the assignment of people in different organizational setups meeting the functionality demands of the project are the most significant tasks that management has to consider, understand, and address. The multi-project situation needs to be handled properly as there are shared resources and interdependencies between different projects. It is a complicated task for management and even engineers to understand where interdependencies exist and to manage possible conflicts between departments, in the project teams and between departments and project teams.

1.1.2 OVERVIEW OF THE MATRIX ORGANISATION MANAGEMENT STRUCTURE

Larson et. al. (1987), states that the matrix management organisation structure was introduced in the 1960s in the aerospace industry to meet its organisational needs and that the aerospace firm formed a set of horizontal project groups over their traditional vertical organisations. Knight (1977) asserts that when creating this type of organisation management structure, it was realised that many employees would work both under a departmental manager and a project manager that heads up a project team and that the crossing of the organisational lines was named the matrix organisation.

Archibald (2003) and Cleland et. al. (1972) describe the matrix management organization structure as the structure with dual or multiple managerial accountability and responsibility. Stuckenbruck (1988) proclaims that 'in a matrix management organisation structure there are usually two chains of command, one along functional lines and the other along project, product, or client lines. Other chains of command such as geographic location are also possible. The matrix organizational form may vary from one in which the project manager holds a very strong managerial position to one in which he plays only a coordinating role. To illustrate the organizational principles, a matrix will be considered first in which there is a balance of power between the project and functional managers. It must be recognized that such a balanced situation, considered by some authorities to be ideal, probably seldom occurs in practice' (Stuckenbruck, 1988).

Usmani (2012) asserts that "the matrix management organization structure is more dynamic than the functional structure because it allows employees to communicate more readily across the boundaries, creating a pleasant, cooperative, work environment, which helps to integrate the organization. Employees that have not been exposed to the project environment can broaden their skills and

knowledge areas by participating in different kinds of projects. He goes on to state that the matrix management organization structure provides a good environment for professionals to learn and grow their careers; employees are very skilled in functional departments, and project teams can get these highly skilled employees whenever their services are needed. He further states that employees tend to be loyal to the organization and perform well since there is a sense of job security, and therefore, the efficiency of a matrix organization is higher.

"Projects relying on the functional organization or a functional matrix are less successful than those, which used a balanced matrix or project organization form. (Kuprenas, 2003). Larson et. al. (1987) proclaim that "when the matrix management organization structure is compared with other organizational forms; a matrix organization is a mixed form in which traditional hierarchy is overlaid by some form of lateral authority, influence, or communication. This overlay in a matrix management organization structure creates two chains of command—one along the functional lines, the other along project lines" (Larson et. al., 1987). "Given the complexity of project management in the business world, the matrix management organization structure is often used where the need for strong technical assistance across many areas is required" (Kuprenas, 2003).

An accurately selected, properly implemented and effectively managed organisational structure is one of the key factors that determine the success of a modern organisation (Galbraith, 2014). According to Gos (2015), "the terms 'matrix management organisation structure', 'matrix organisation' and 'matrix management' are used interchangeable in the literature. He further explains that a matrix is any organisation that employs a multiple command system, not only a multiple command structure but also related support mechanisms and an associated organisational structure and pattern; and that these organisations are based on two dimensions". Employees from different functional departments work hand in hand to attain a particular mutual project goal. These employees report to their direct functional line managers and the project managers (Goś, 2015).

Gos (2015) states that "One of the key features of the matrix organisation is the 'overlay' between the functional and project structures, which is coupled with the creation of temporary teams of experts from various departments, which is also the main aspect for both benefits and flaws of matrix management organisation structures. He further states that most matrix advantages are linked to the increased efficiency of horizontal communication, while the disadvantages are linked to the dual or multiple reporting lines and influence".

1.2. DESCRIPTION OF THE RESEARCH PROBLEM

There have been many challenges that have been experienced by project managers working within the matrix organization structure. Usmani (2012) asserts that most of challenges that are experienced by employees are because the employees may have to report to two managers, which adds confusion and may cause conflict within the project team. He goes on to state that this usually happens in a balanced matrix organization where both managers have equal authority and power. He future states that employees may be confused about their role and responsibility if the priorities are not defined clearly, especially when they are assigned a task, which is different from or even contrary to what they were doing in their day-to-day job. The functional employees always prioritize their primary work, which in turn delays the activities that they have to do in the projects.

The matrix management organization form was adopted by a number of state-owned enterprises to facilitate and improved the management of projects managed by these enterprises. Within a number of the state-owned enterprises a number of projects that have been undertaken using the matrix management organization structure have been successfully completed while ~~the~~ others are experiencing delays. The organization that the researcher works for introduced the matrix management organization structure in the year 2015. The organization was struggling with its projects not meeting project objectives and also had a shortage of dedicated project resources. To address this challenge, they implemented the matrix management organization structure which was meant to alleviate the challenges experienced with shortage of dedicated project resources and planned to use the resources that are available within the organization but from other departments. This change was also aimed at freeing the limited project resources to deal with the project management aspects of the project and allow the departmental or operational resources to assist with the operational or functional requirements and information for the project. This hybrid structure was then meant to improve delays that were encountered by the organization and aimed at meeting the project objectives for the projects.

The employees working within the researcher's organization have a perception that the matrix management organization structure have more managers than required, which increases the project overhead costs and adding the confusion of reporting to a couple of managers. In these organizations there is a competition for use of the resources in areas where there are limited resources are few. This causes hostility between the project team members and it could affect the operations or the project at hand. Furthermore, the workload is perceived to be extremely high in a matrix organization because employees have to do the project-related work along with their regular work, which could be

exhausting. There is also a possibility of the employees ignoring their functional responsibilities or project management responsibilities if overloaded (Usmani, 2012). The functional employees within the organisation that are working on the projects always prioritise their functional job requirements over the project requirements. The prioritization of functional job requirements results in project delays (as the projects are done within a set time) and this results into poor performance on the projects in terms of cost, schedule and also affects the project quality.

Within the organization there have been numerous challenges that have been experienced by the project personnel and the project managers when undertaking projects using the matrix management organization structure. The introduction of the project matrix management organization structure to the organization was expected to yield benefits in the form of ensuring that all the issues identified above especially the resources challenge would be resolved by the introduction of this structure.

1.3. PROBLEM STATEMENT

The problem to be examined in this study may be stated as:

State-Owned Enterprises are experiencing problems meeting project objectives despite implementing the matrix management organisation structure which was intended to facilitate the meeting of project objectives within the organisation.

1.4. RESEARCH QUESTION

The research question in this study may be stated as:

What are the factors to be considered in the adoption of the matrix management organisation structure within a State-Owned enterprise?

1.5. RESEARCH OBJECTIVES

- To identify the enablers to the implementation of the matrix management organization structure by functional and project managers

- To identify the barriers to the implementation of the matrix management organization structure by functional and project managers

- To understand the role of the functional manager in matrix organization structure

- To understand the cost and schedule performance of projects undertaken in a matrix organization structure

- To understand the issues or challenges of projects undertaken in a matrix organization structure

1.6. RESEARCH PROPOSITION

A clearer understanding of the factors that hinder or support the State-Owned Enterprise with the adoption of the matrix management organisation structure can improve the meeting of project objectives.

1.7. AIM OF THE RESEARCH PROJECT

The aim of the research was to investigate the factors that hinder or contribute to the adoption of the matrix management organization structure within State-Owned Enterprises. It also investigated how the employees understand the project matrix management organization structure and its application, how they observe it to be and whether their misunderstanding of their roles in the structure will have an impact on meeting the project objectives and performance. This research also investigated whether the utilization of project matrix management organization structure promotes the successful completion of project or whether it delays the project.

1.8. RESEARCH DESIGN AND METHODOLOGY

- **Literature review** - The literature related to matrix management organization structure and matrix organizations was carried out. Keywords such as matrix management organization structure, project matrix management organization structure, matrix organization, project matrix organization were used to source relevant readings in peer reviewed journals and conference proceedings.

- **Data collection –** Data was collected in the form of survey questionnaires and semi structured interviews.

- **Data analysis and interpretation** - Analysis and interpretation of data will be carried out based on the findings of the literature review and survey questionnaire feedback. A qualitative data analysis will be utilized to analyze and interpret the data. The data will be analyzed and grouped into themes.

1.9. LIMITATIONS

The research only focuses on the employees that are working on projects using the matrix management organisation structure or who have worked with projects that have been completed under project matrix management organisation structure (within various locations) of a State-Owned Enterprise of South Africa.

## 1.10.	STRUCTURE OF THE RESEARCH REPORT

- **Chapter 1** – Introduction and problem description: This chapter gives a brief overview of the research topic and background to the research problem. There is also an overview of the problem statement, research question, research objectives and research proposition.
- **Chapter 2** – Literature Review: This chapter provides an extensive literature review on the various aspects of the project matrix management organization structures.
- **Chapter 3** – Research design and methodology: This chapter provides a detailed description of the research methodology applied to address the requirements of the research, limitations of the research and the ethical considerations associated with this research.
- **Chapter 4** – Research findings: This chapter provides the results of the research and findings thereof.
- **Chapter 5** – Discussion of findings: This chapter provides a summary of research findings and recommendations based on the research objectives. The chapter concludes by providing a summary and recommendations for future research.

1.2. SUMMARY OF THE CHAPTER

Problem statement
- *State-Owned Enterprises are experiencing problems meeting project objectives despite implementing the matrix management organisation structure which was intended to facilitate the meeting of project objectives within the organisation.*

Question
- *What are the factors to be considered in the adoption of the matrix management organisation structure within a State-Owned enterprise?*

Objectives
- *To identify the enablers to the implementation of the matrix management organization structure by functional and project managers*
- *To identify the barriers to the implementation of the matrix management organization structure by functional and project managers*
- *To understand the role of the functional manager in matrix organization structure*
- *To understand the cost and schedule performance of projects undertaken in a matrix organization structure*
- *To understand the issues or challenges of projects undertaken in a matrix organization structure*

Proposition
- *A clearer understanding of the factors that hinder or support the State-Owned Enterprise with the adoption of the matrix management organisation structure can improve the meeting of project objectives.*

Figure 1: Summary of Chapter 1

CHAPTER 2: LITERATURE REVIEW

2. INTRODUCTION

A literature review was conducted and focused on the project matrix management organisation structures and organisations which utilise the matrix management organisation structure. This chapter started with the matrix management organisation structure and public organisations; how do public organisations perceive the matrix management organisation structure, why do organisations utilise the structure or what influences them to use the structure. It proceeded with discussing the advantages or benefits or enablers of using the matrix management organisation structure. This assisted in giving a further understanding of why the organisations elect to utilise this type of a structure. The disadvantages or challenges or barriers to using the matrix management organisation structure were also discussed. These assisted the researcher in understanding what they are and if their presence is detrimental to the matrix management organisation structure and if these challenges could be overcome or not. The matrix management organisation structure is said to be full of conflicts, therefore the roles of the project managers and functional managers in a matrix management organisation structure were determined and whether the delineation of roles could assist in making the structure work. Lastly, the matrix management organisation structure and performance were looked at and what can make the matrix management organisation structures to work. The various aspects of the project's matrix management organisation structure were researched; to what extent the matrix management organisation structure could improve the projects performance and how this can be applied to ensure maximum benefit for utilization of this structure. A conclusion was drawn up summarising the above-mentioned points.

2.1. INTRODUCTION OF MATRIX MANAGEMENT ORGANISATION STRUCTURES TO ORGANISATIONS

The introduction of a matrix management organization structure in a project environment is expected to improve the performance of the projects, as there is now an agreed structure to work on the projects unlike requesting resources from the operations as and when required. By sharing highly skilled and capable resources between the functional units and projects, it allows for more open communication lines, which help in sharing valuable knowledge within the organization. It promotes working together with the Operations department such that when the project is complete, the teams would have journeyed with the project (Usmani, 2012).

Larson et. al. (1987) and Usmani (2012), discuss different applications of the matrix management organisation structure. According to Larson et. al. (1987), the matrix management organisation structure can operate in many ways. "They defined three-matrix types: functional, balanced, and project. The amount of authority of the functional manager differentiates between the three types". Usmani (2012) states that there are three categories of project matrix management organization structures, namely: Strong Matrix management organization structure, Balanced Matrix management organization structure and Weak Matrix management organization structure. The author adds that these categories depend on the power of the project manager.

A summary of the types of matrix according to both Larson et.al. (1987) and Usmani (2012) is as follows:

- The first category according to Larson et.al. (1987), is the *Functional Matrix*: "in a functional matrix, staff involved in the delivery process remain under control of the functional manager, while project managers are formally designated to oversee the project across different functional areas. As a result, project managers have limited authority over functional staff and therefore, primarily plan and coordinate the project. Under this form of matrix, functional managers retain primary responsibility for their specific segments of the project". Usmani (2012) names the first category "**Weak Matrix**, where the project manager will have limited power and authority. The project manager will have a part-time role, and no administrative staff will report to him. His role will be more like a coordinator or an expediter. Here, the functional manager controls the project budget".

- The second category according to Larson et. al. (1987) is the **"Balanced Matrix:** in a balanced matrix, the functional manager and the project manager share responsibility for the project resources. Under this form of matrix, project managers are assigned to oversee the project and interact on an equal basis with functional managers. Functional managers and project managers jointly direct project work and approve technical and operational decisions". Usmani (2012) also named the second category **Balanced Matrix**. Usmani (2012) asserts that "in balanced matrix organizations, power and authority are distributed between the functional managers and the project managers. Although the project manager has a full-time role, he will have a part-time project management administrative staff under him. Both managers control the project's budget in this type of structure".

- The third category according to Larson et. al. (1987) is the **"Project Matrix**: in a project matrix, the functional managers authority is the smallest, with functional managers only assign

resources for the project and provide technical consultation on an as-needed basis. Project managers are assigned to oversee the project and are responsible for the completion of the project". Usmani (2012) named the third category **Strong Matrix**. In this matrix the project manager holds more power and authority. The project manager has a full-time project management role and administrative staff under him/her and controls the project budget. The functional manager will have a minimal role within the strong matrix organization.

2.2. MATRIX MANAGEMENT ORGANISATION STRUCTURES AND PUBLIC ORGANISATIONS

Baldwin et al. (1991) suggest that public organisations are different from private organisations as a significance of the purpose they serve in society. Pakarinen et. al. (2016) assert that there are many objectives of public organisations, these objectives are multidimensional and difficult to merge. Public organisations are said to be severely prejudiced by their external environment because they have the responsibility to address public needs, they utilize public resources and "they operate within political, legal, economic, cultural, technical, technological, and psychological conditions". The environment that public organisations operate in creates the need for them to be managed as complex systems (Jonczyk et al., 2014).

Rainey et. al. (1988) and Bozeman (1979) proclaim that public organizations are characterized by the existence "of a system of balanced rules and procedures, structured hierarchies, formalized decision-making processes, stability and predictability". Parker et. al. (2000) added to this statement the fact that the public organizations are also "subject to political controls" (Parker et. al., 2000). "The objectives, structures, and processes of public-sector organizations have often been defined by central bureaucratic agencies or constrained by legislation" (Cole, 1988). Klein et. al. (1987) asserts that the public-sector organizations as a result of being constrained by legislation, had indistinct objectives and the independence of public-sector managers to organizational goals has been suppressed as well.

Goddard et. al. (1992) proclaims that in multifaceted public organizations, matrix organization is perceived to offer value-added management and an improved performance of services and control systems as well as a response to the inconsistency amongst organizational structures. Kuprenas (2003) asserts that "cost savings, improved internal and external project coordination, control and accountability and more effective project management are emphasized when it comes to implementing matrix in public-sector".

Pakarinen et. al. (2016) assert that the matrix organizations have a number of organizational conflicts which are created by a matrix management organization structure. The said conflicts can occur whether the manager works in public-sector organization, or for private company. They continue to assert that the key reasons for conflicts seem to be the decision-making rights and governance practices that are left unfinished. Ford et. al. (1992) suggest that the matrix management organization structure creates multiple reporting relationships. These multiple reporting relationships can cause role conflicts, conflicting and confusing expectations, role ambiguity, excessive demands, or a role overload. The authors further assert that conflicts commonly occur "between functional and cross-dimensional managers over project priorities, administrative procedures, and technical perfection versus performance trade-offs, personnel resources, cost estimates, scheduling, and personalities" (Ford et. al., 1992). Pandey et. al. (2006) proclaims that managers and specialists of public organizations work in perplexing environment, which influences the employees decision-making abilities, organizational structure, vagueness of organizational goals, and ambiguity in employees' roles.

2.3. WHY DO WE USE MATRIX MANAGEMENT ORGANISATION STRUCTURES/WHAT INFLUENCES THE ORGANISATIONS TO USE THE MATRIX MANAGEMENT ORGANISATION STRUCTURE?

Sy et. al. (2004) assert that "a matrix management organization structure is an organizational structure in which employees report to multiple managers, such as a functional/departmental manager and a project manager. The basic matrix management organization structure is grid-like, with two perpendicular dimensions such as functions and products. By using multiple command structures, the matrix management organization structure permits the companies to address multiple business dimensions".

According to Baber (1990) the matrix organizational structure is alleged "to be more effective than conventional bureaucratic structures in the aspects of: contradictory goals; pressure for high information processing ability; conflict over resources; a changing environment; or a need to resolve and incorporate various perceptions of an organization". According to the matrix management organization structure supporters and academics, matrix organization is more effective in opposing circumstances by appearing to disrupt outdated beliefs of management and administration. The supporters of matrix management organization structure take it as a post-industrial substitute to conservative governmental organizations.

Alcorn et. al. (2012) assert that a matrix management organization structure would be more fitting for organizations with various products or projects which require the use of common functional expertise of the organization. The essential part of a matrix management organization structure is to create a problem-solving solution than functions, products, or geography. Matrix organizations develop knowledge and allow product areas or projects to use that knowledge as needed. In the matrix management organization structure, functional specialists may work on a number of different projects and with a number of project managers over time. The matrix management organization structure promotes creativity and innovation in an organization; is said to be mostly effective for rapid product development and can accommodate a wide variety of product or project activities".

According to Galbraith (2000) and Kilmann (1985), organizations implement the matrix management organization structure for numerous reasons. The matrix management organization structure affords the companies an opportunity to focus on multiple business goals; for as the companies grow, there tends to be a division of labor and the formation of different business groups, which leads to multiple business goals. When companies grow bigger, they are inclined to have more goals to support their growth strategy. Companies that operate in less complex environments can simply prioritize their goals and apply resources; accordingly, whereas companies that operate in more complex environments have to pursue numerous business goals concurrently. The matrix management organization structure assists the companies in pursuing multiple business goals with equal attention (Galbraith, 2000, Kilmann and Company, 1985).

The matrix management organization structure facilitates the management of information. Markets and the environment are changing so fast, and this makes it very critical for organizations to manage the information for company survival and prosperity. In a traditional hierarchical structure, information flows vertically through selected communication points that filter and distribute relevant information to appropriate recipients. This process works adequately in a less complex environment. In more complex environments, the traditional hierarchical structure cannot cope with the amount of excess information and attempts to fix the situation with additional resources. The matrix frees up the gridlock by speeding information vertically and horizontally to the appropriate recipients through the creation of multiple information channels as a result of the structure (Galbraith, 2000, Kilmann and Company, 1985).

The matrix management organization structure also enables companies to establish economies of scale. As companies grow, the human and capital resource requirements also increase. The increase in number of resources also increases the complexity to share resources; the use of the matrix

management organization structure can assist companies to share and influence resources. Moreover, there will be a rapid response from companies to respond quickly to the demands of the environment. The decision-making in matrix organizations tends to be pushed downward to those individuals with the most information, which leads to decision-makers that are more in tune with daily operations. The numerous information channels provide accurate data that leads to precise decisions (Galbraith, 2000, Kilmann and Company, 1985).

According to Burton et. al. (2015), the matrix organisation is complex, expensive, and challenging to manage, and it should be chosen if there is a robust requirement for it and the potential for the organisation to benefit from it. The authors also developed a multi-contingency model which details the reasons for effecting a matrix organisation, which involves the organisations' goals, strategy, and environment. They further assert that the matrix configuration is the best choice when one is focused on both efficiency and effectiveness. The one important driver for a matrix organisation is when internal silos become a hurdle to deal with the environmental changes and complexities in projects. The purpose of the matrix management organisation structures is to meet the demands of the project environment. The authors further assert that the benefits of an enhanced coordination in a matrix management organisation structure should exceed the extra costs of additional skilled managers and the organisation must have a strong purpose for the matrix configuration to succeed.

Sy et. al. (2005) and Galbraith (2000) proclaim the four main reasons for organisations to select the matrix management organisation structure. These reasons are as follows: the matrix-

- "Allows companies to focus on multiple business goals
- Facilitates the management of information
- Enables companies to establish economies of scale and
- Speeds response to environmental demands".

The matrix management organization structure was established to address the organizations' capability to manage large and complex programs, projects, and problems, and for managing these projects or programs with limited resources. The conventional hierarchical management organization could not manage with the added complexity and the massive amount of information that had to be processed, and conventional management theory was of little help in solving these new and unique problems (Stuckenbruck, 1988).

Galbraith (1977) asserts that "management theorists predicted that the lack of any clear-cut single line of responsibility and authority would result in managerial ineffectiveness and there is no evidence to indicate that multiple authority and role conflict lead to ineffectiveness".

The purpose for implementing the matrix management organization structure in a large organization can be pinpointed in the fact that functions and skills are fragmented throughout the organizational structure. Individual functional departments have great difficulty in solving very large problems because of a failure to view the total system and a tendency to sub-optimize or solve the problem within their particular discipline (Stuckenbruck, 1988).

Sy et. al. (2004) asserts that organizations continue to utilize the matrix organizational form as it permits companies to use human resources flexibly, produce innovative solutions to complex problems in unstable environments, increase information flow through the use of lateral communication channels, and leverage economies of scale while remaining small and task oriented. Despite its strengths, the matrix has inherent problems.

More organisations are shifting their organisational structures to matrix management organisation structures that have matrix elements, and he expects the trend to continue in future. The author further asserts that the matrix configuration requires synchronising, and coordination of functional specialities, services and information required across the projects. The author further asserts that the difference between the functional organisation and the matrix organisation is that everything is connected in the matrix organisation and that a matrix can also transmit best practices from one division to another through the functional junction. Matrix organisations can handle more information than other organisational configurations, which makes the matrix management organisation structure a better choice than other structures; and it can recognise the efficiency and the effectiveness of the functional departments (Galbraith, 2008).

2.4. WHAT ARE THE ADVANTAGES/BENEFITS/ENABLERS OF USING MATRIX MANAGEMENT ORGANISATION STRUCTURE?

a) Managing complexity

According to Gos (2015), "the matrix organization and the use of cross-functional teams is one of the responses to increasingly competitive environment and the development of modern tools for

administration and information management to deal with complexity". According to Greiner (1998), "the matrix replaces the formal bureaucratic structure with a more flexible structure based on horizontal communication and exchange. The author further associates the shift to matrix management more with increasing internal complexity but driven by the organization progression". According to the Galbraith (2008), managing complexity is a key advantage of matrix management organisation structures, as it increases the information processing ability of the organization and make it easy to change its operations in response to volatility of the environment. Galbraith (1973) further asserts that matrix organizations can respond to complexity in numerous ways, whether it is internally or externally in collaboration with other organizations.

There is project integration in the matrix management organization structure. There is a solid and practical mechanism for attaining project integration of subsystems and work packages across functional departmental lines. Synchronization of work across functional lines can be accomplished. This integration helps assist managing complexity in projects (Stuckenbruck, 1988).

Numerof et. al. (2002) emphasize that from a manager's viewpoint, the matrix management organisation structure becomes complex, and the managers find it difficult to communicate clearly among a large group of employees that they are connected with, especially when they are addressing external and internal complexity drivers. This further causes confusion among employees who receive contradictory commands from the two manager that they report to (Schermerhorn, 1991).

b) **Communication effectiveness**

According to Galbraith (2008), a key benefit of the matrix management organisation structure is the problem solving. He further asserts that the key contributor to this problem solving is the improved effectiveness of internal communication. According to Gos (2015), in the matrix management organisation structure there is extra formal and informal communication channels, which are not present in the traditional bureaucratic organizations. By implementing the matrix management organisation structure, the organizations' need for vertical communication is reduced as more independent project team focus on one common goal and specific task. Therefore, the communication is improved within different functional departments and project teams as they are forced to maintain a close contact and vigorous information sharing with their cross functional organizational counterparts. This is very important to the project success.

Joyce (1986) argues that even though the matrix management organisation structure has a huge number of horizontal information exchange, the quality of the information changed could be reduced. Joyce (1986) continues to assert that the reduction of the quality of information may be driven by the amount of necessary information, but also by the forcing of horizontal dependencies among departments which would normally have limited access to one another.

A language barrier or use of a different language could be the problem as most functional departments often develop specialized language, using acronyms and technical terms; and most importantly how these departments gather and respond to the information (Goś, 2015). Huft (1995) argues that the use of specialised language and communication within departments makes the communication more effective within the department but makes it difficult at a cross-functional level in a matrix management organisation structure. Huft (1995), further proclaims that employees from a different department, which are unaccustomed with the coding are likely to misunderstand or misrepresent the information from other departments.

Stuckenbruck (1988) proclaims that communication effectiveness is improved by clear project objectives and the flexibility of information flow. Project objectives need not to be visible only on the project office, but also need to be balanced with the objectives of the functional organization. There should be a thorough distribution of information as the dissemination will flow horizontally and vertically. The horizontal of information will flow from functional unit to functional unit, whereas the vertical flow of information will provide for detailed disciplinary information flow from project to project, and to various levels of management. The information that applies to other projects is not locked up within a single project.

The communication effectiveness also assists the team members to be able to take some decisions. This encourages an independent leadership style and increases motivation. The decision-making effectiveness is associated with the following assumptions: information flow is better, and that the lower level must make operational decisions to free up senior management. There is an increase of horizontal communication among departments which allows for better flow of information, which could lead to faster informed decisions (Lawrence et al., 1977, Galbraith, 1973, Kolodny, 1979, Larson et. al., 1987).

c) Output quality

The advantage of the matrix management organisation structure is perceived through the technical excellence and the quality of organizational outputs, which is due to the employees that are sharing ideas and resources and the positive outcome of that (Lawrence et al., 1977, Derven, 2010, Galbraith, 1971, Schermerhorn, 2008). The project teams increase the probability of the project meeting its cost and time objectives as each team member brings to the table a different set of functional expertise. The increased sharing of technical information amongst the technical experts is very beneficial to the matrix management organisation structure. The matrix management organisation structure is very important in terms of facilitating the improvement of informed, technically adept and flexible individuals (Goś, 2015).

Knight (1976) argues "that matrix management organisation structures facilitate high quality and innovative solutions to complex technical problems". Atkinson (2003) and Schermerhorn (2008) proclaim that the increased sharing of technical information among functional experts allows for great improvement to the end product. The enhanced communication also requires the technical staff to become more customer-oriented by connecting them with other departments that are more on the customer front. There is also an increased flexibility in responding to the complex and changing environment and this therefore affords the organisation the opportunity to make rapid decisions and adjust them where applicable (Kerzner, 1984). "Well-organized resource allocation allows for assigning the key talents and financial resources in a way which enhances the end result. The excellence of end products in a matrix benefits from exchange of functional expertise, while remaining flexible and innovative" (Lawrence et al., 1977).

The functional experts and project teams remain even though projects come and go. The retention of disciplinary teams promotes the retention of skills and knowledge of the project teams. This also assists in ensuring that the technology and the knowledge is not lost when a project is completed. Specialists prefer to work with other specialists in the same discipline, this enables them to learn from each other as they will be able to continually exchange ideas and information. In the matrix management organisation structure, experts and equipment can be shared across projects, this promotes the efficient use of resources and prevents losses. Increased innovation and higher productivity is usually attained when a team of functional specialists/experts work together (Stuckenbruck, 1988).

d) Resource efficiency

"Resource efficiency of matrix management organization structures is one of the characteristics which arouse much controversy" (Goś, 2015). Derven (2010) proclaim that in various organizations, a matrix management organisation structure is introduced to address the requirement to do more work with less resources and the organisations are becoming more responsive. Brown et. al. (1982) argue that in the matrix management organization structure there is improved communication, availability of expert personnel, efficient allocation of budget for the equipment as compared to a traditional organization. The enhanced communication and a variety of perspectives among project team members in a matrix management organization structure allow the resources to be quickly and accurately reallocated from unproductive uses to identified, more productive opportunities (Lawrence et al., 1977, Derven, 2010, Larson et. al., 1987).

A functional expert can be allocated to more than one initiative, having many project bosses and one functional manager. The functional expert's technical expertise will be well-kept from being lost or diluted, as he/she will remain closely connected with his/her parent department (Duliniec, 2009). Kolodny (1979) proclaims that a "matrix organization is more open and closer to the external environment. In some matrix forms the project managers have the right to sub-contract services outside the organization that can be supplied internally, but also functional teams have the corresponding right to sell their services to external clients. The internal inter-departmental prices are market-driven, each team is forced to be competitive and organizational waste of resources is minimized".

Whitford (2006) and Lawrence et. al. (1977) oppose the fact that matric structures are efficient in resources. They argue that matrix management also means that there is an increased headcount in the organizational which translates to additional training costs and support system costs. "The presence of dual reporting lines might generate additional headcount, both in terms of management overhead and administrative staff. If the concept of double reporting is interpreted too directly, a matrix indeed might actually double the number of senior managers. In many organizations though, this effect is being reduced by double-hatted positions".

Matrix organization is characterized by the requirement of many meetings, which requires the resources to spend more time on meetings and discussions rather than doing their core work. This is said to be the opposite when compared to a traditional functional structure. On the matrix management organization structure, there need for communication is high more information has to

reach more people either through a digital, written or personal channel (Knight, 1976). Matrix management organization structures require incremental training for employees from all involved functions in order for the structure to be implemented and to function successfully. The trainings in a matrix are not a once-off cost, as they ought to be a continuous process. The authors further assert that implementing a matrix management organization structure incurs the costs of support systems associated with monitoring, controlling and coordinating people, projects and other systems within the matrix management organization structure (Knight, 1977, Whitford et. al, 2006, Larson et. al., 1987).

According to Stuckenbruck (1988), the matrix management organisation structures promote the effective use of resources. The resources can be used to their maximum level if they are scarce in the company. The personnel can be shared within projects and some can be used partially while they focus on their other functional work. The sought-after resources can be negotiated between project and functional management, or corporate priorities may be established. The author concludes by saying that the matrix management organization structures is less costly than other project structures.

e) Motivation and job satisfaction

Stuckenbruck (1988) proclaims that matrix management organization structures are associated with high morale in employees which leads to motivation and job satisfaction. The morale problems are said to occur less frequently in the matrix management organization structure since the workers in the matrix respond to the morale-building experience of working on a successful project resulting in visible achievements. Worker morale is also said to be normally higher when employees can work with their fellow specialists. Also, by retaining their functional departments, the specialists may have a clearer career progression up the functional ladder. On the other hand, if a specialist finds that his talents and interests are multidisciplinary, he can set his career prospects toward the project management office.

"The influence on the level of motivation and satisfaction among employees is a debatable aspect of matrix organizations, with significant groups of authors seeing it as either their strong or weak point. Some of the authors propose that implementing a matrix management organization structure should overall have a positive influence on motivation, job satisfaction, commitment, and personal development" (Larson and Gobeli, 1987, Nesheim and Management, 2011, Turner et al., 1998)

A matrix management organization structure organization encourages and offers opportunities for individuals from various backgrounds and parts of the organization to work closely on a wide variety of

projects with. This leads to employees learning and growing quickly than in a hierarchic structure. This is because the employees in a matrix exchange ideas, information, experiences and perspectives more intensely and working in a matrix management organization structure gives a wider perspective and more opportunities to learn (Nesheim and Management, 2011). Individuals are said to benefit in terms of development of their interpersonal skills, problem solving abilities and project management (Lawrence et al., 1977, Kolodny, 1979).

"The matrix management organisation structure is an excellent training ground for prospective project managers since promising candidates can easily be spotted in the multidisciplinary project environment. This promotes the development of project managers. The author further asserts that the promising candidate who had demonstrated the ability to work across functional departmental lines would be transferred to the project office as an assistant project manager. The career progression would then be to project manager, which is an excellent path leading to top management" (Stuckenbruck, 1988).

f) Balance of power

The strengths of the matrix management organisation structure according to Sy et. al. (2005) are that
- "the matrix management organization structure influences functional economies of scale while remaining small and task-focused
- focuses employees on multiple business goal
- focuses employees on multiple business goals
- facilitates innovative solutions to complex and technical problems
- improves employees companywide focus through increased responsibility and decision making
- allows for quick and easy transfer of resources
- increases information flow through the creation of lateral communication channels; and
- enhances personal communication skills".

When there are two managers (bosses) in a workplace, employees often get confused on who is the real boss. The authority and responsibility should be divided more or less equally between the project and functional managers; however, this is not the case and there is no agreement among the experts as to whether there is a balance of power or not. The question of who the real boss is may be dependent on other factors even if there is a balance of power. The employees recognize the line manager as the real boss in a matrix organisation. This is because the line managers are usually involved in the performance evaluations and promotion processes. Some employees identify with the projects and relate strongly to

them, in these cases they recognise the project manager to be the real boss. There is a continually shifting balance of power between these managers, the onus is on them and the top management's support to ensure that the matrix works. The matrix management organisation structure will not work without the top-management's support. The project manager has to work hard to do the job for the employees that are reporting to him/her to perceive him as the real boss (Stuckenbruck, 1988).

Most authors, given the increased authority in matrix organizations, distinguish balancing the power in them as a big challenge. The need to balance conflicting objectives is deeply rooted in the multidimensionality of this structure type (Galbraith, 2008, Lawrence et al., 1977, Gottlieb, 2007).

2.5. WHAT ARE THE DISADVANTAGES/CHALLENGES/BARRIERS ASSOSCIATED WITH MATRIX MANAGEMENT ORGANISATION STRUCTURE?

a) Misaligned goals

Knight (1977) proclaims that the main challenge of the matrix organisations is aligning goals amongst different dimensions. Further challenges that are associated with goal alignment are:

- "Competing or conflicting objectives between matrix dimensions
- Inadequate process to align goals and detect possible misalignments
- Lack of synchronization
- Coordination and poor timing of work plan and objectives
- Insufficient communication and consultations between matrix dimensions" (Knight, 1977).

According to Stuckenbruck (1988), balancing the goals and objectives of the project manager and the functional manager is a challenge. Project managers may put an emphasis on the constraints of cost and time; while a functional manager may deliberate on technical excellence even if the schedules may be impacted. Senior management needs to ensure that both the project and functional management goals are sustained throughout the project and that there is no conflict. Sy et. al. (2015) asserts that the misalignment of objectives and goals is mainly connected to the types of managers; and this misalignment usually ends in conflict and confusion about loyalty or commitment to the different managers.

Schenck et. al. (2012) assert that there are often opposing and contradictory goals between the dimensions (functions, regions, services, and customers) of the matrix. An example would be a project

that has different goals which are different from those of the functional units supporting the project. The processes for aligning goals detecting misalignments are usually inadequate. The communication between projects and functional areas is regularly stressed and disorganized. Some managers suggest that misalignment can be reduced by constantly communicating and reinforcing the organization's mission and vision.

"Matrix organizations pursue multiple business goals across their business dimensions (dimensions can refer to various structural aspects of the company, such as functions, products/services, geography, and customers). As a result of the multiple dimensions and goals within each successive layer of the organization, a major challenge companies face is to align conflicting or competing goals" (Sy et. al., 2004).

b) Unclear roles and responsibilities

Lawrence et. al. (1977) asserts that the misperception over roles and responsibilities is a problem in almost all matrix organizations. "The following are issues concerning unclear roles and responsibilities:
- Unclear job descriptions and guidelines for roles and responsibilities,
- Ambiguous roles and responsibilities create tension among employees, and
- Confusion on who is the boss, not knowing whom to contact for information".

According to Sy et. al. (2005) "the companies must have four fundamental elements when establishing roles and responsibilities. These elements will also assist in enhancing clarity:

- they should have clear guidelines and descriptions on roles or areas of responsibilities
- there should be assignment of accountability for business objectives
- there should be a single of contact of information or approval for areas of responsibility; and
- a set plan for communication and information sharing".

Almost all matrix organisations experience the confusion over roles and responsibilities amongst their employees, this is caused by the unclear job descriptions, confusion over who's the boss, and no sense of direction or knowing whom to contact for information since the employees report to two managers. Unclear goals and responsibilities create tension that can become dysfunctional. (Schenck et. al., 2012). Kuprenas (2003) asserts that the most significant challenge of the matrix organization is the confusion and conflict over roles and responsibilities between functional managers and project managers.

c) Ambiguous authority and dual reporting

Kuprenas (2003) proclaims that the main challenge that the matrix management organisation structure is usually faced with is the problems of dual reporting to two managers, the conflicting priorities that project managers are faced with regarding their line of work and the project work, the unclear authorities that are largely absent; or disregarded by the project teams as their loyalties usually lie with their functional managers. In addition, project managers in the matrix management organisation structure are likely to become vulnerable to organizational influences like culture as they do not have well-defined authority bases whether it is hierarchical or legal. This is different to external resources that are subcontracted to the project, as these resources are contractually held to their commitments, giving them a clear line of command and a firm legal authority base. The issue is that the project managers are borrowed team members from functional departments and that they do not have full authority over them.

Sy et. al. (2005) proclaim that leaders are not experienced in sharing the decision making and decision rights; and that results to tension and conflict. The leaders in the matrix management organisation structure are said to have accountability without authority as a result of the dual reporting structure. Lawrence et. al. (1977) asserts that a dual reporting structure has all the ingredients to trip up any smoothly running organization, and that it is particularly difficult for organizations evolving from traditional single-report hierarchical structure to a matrix management organisation structure. Moreover, there are issues concerning ambiguous authority as the employees are confused on who makes the final decision, who is accountable and who has the final authority.

Schenck et. al. (2012) proclaim that "the decision makers can sometimes have responsibility without authority in the matrix management organisation structure, this confusion makes it impossible to clarity accountability, which may lead to delays in decision making. They further proclaim that the culture of an organisation plays an important role in ensuring that authority problems are resolved in a matrix organization. In organizations with co-operative cultures, managers are more focused on problem solving and can resolve authority issues through informal negotiation. When the culture is more political, managers tend to focus more on maintaining their status and power than on resolving issues".

Sy et. al. (2004) assert that ambiguity is caused by the external environment. Organizations adopt the matrix form to cater for their growing business needs. As organizations grow, they require changes in

the environment and on the employee's roles and responsibilities. Employees must respond and adjust to new behaviours that are brought forth by these new roles and responsibilities. Some employees are not used to change, and the continuous changes create uncomfortable ambiguity about their roles and responsibilities. Another cause of ambiguity is lack of thorough planning when organizations change to the matrix management organisation structure form. The organizations establish clear roles and responsibilities at the senior levels but fail to address the roles and responsibilities at the mid and lower levels. The Management assumes that the employees will be able to adjust; sometimes they are not able to clarify employees' roles and responsibilities due to the changing business environment and therefore, rely on employees to make the necessary adjustments. Employees are however looking for clarity from management in times of change. This disconnect between the two parties creates ambiguity around roles and responsibilities.

According to Morrison et. al. (2006), projects with multi-functional disciplines are associated with different organisational structures, which are project structures, matrix management organisation structures and virtual project teams. The author continues to assert that the impact of the organisational culture on project management is claimed to be more substantial in the matrix form and the findings of his study were pertinent to matrix organisation. It is said that the matrix management organisation structure is aimed at ensuring that the benefits associated with the structure, in terms of sharing the same resources between functional and project work are reaped. The project matrix management organisation structure has however posed several problems, which is caused by the dual reporting and authority, which results in conflict between functional and project managers. There is also a delicate line of authority between the functional line management and project management; and there is a gap between authority and responsibility which is experienced by project managers when they are exercising their roles in the matrix management organisation structures.

Minavand (2013), asserts that in this type of a structure, the employees experience the confusion of reporting to two managers at the same time; and these managers find themselves in the middle of a conflict over responsibilities and authorities. Also, in this type of structure, the responsibilities and authorities are distributed in these two managers without a clear boundary. The lack of the boundary causes ambiguity and conflict in terms of assigning responsibilities to employees as well as issues of resource allocation. This if not managed closely could lead into power struggles as both managers need to navigate through this while trying to clarify the responsibility and accountability of employees. This is a very big challenge for the project manager as the resources are limited.

Sy et. al. (2005) suggest that the matrix violates the traditional principles of authority as it tends to breed ambiguity and conflict. The major disadvantage is that the personnel working on the project are reporting to two bosses, which could make them find themselves in the middle if there are conflicts that arise. The employees could on the other hand play the bosses against each other (Stuckenbruck, 1988).

Minavand (2013), asserts that the major challenges that are experienced by project managers in the matrix management organisation structure are: authority challenges, cross-functional challenges, and workforce motivation challenges. Most organisations use the existing resources for the new projects instead of employing new employees or outsourcing from other companies. One of the main advantages of a matrix management organisation structure are that the resources are efficiently utilized and are able to provide a rapid and a flexible response to the organisation. Sometimes this interconnection is not possible, and the project managers experience a serious human resource challenge. As the employees are selected for a project and the project manager is introduced as their new manager; they are still employees in their relevant departments and are still responsible for their day-to-day work and the new position makes a dual role for them in the company. These employees find themselves reporting to two managers and they do not regard these managers as equals. They regard one manager as a permanent one and the other as a temporary one. The loyalty of these employees always lie with their permanent managers and they tend to ignore the new temporary manager. This becomes very difficult for the project managers as they will find it difficult to have control and influence over the team members.

d) Lack of a matrix guardian

A "Matrix Guardian," also known as a "Matrix Manager," is an individual whose job it is to see to it that the matrix management organisation structure is functioning effectively and efficiently, and that the principles of matrix management are being applied correctly and fairly. Only a few companies track the performance of their matrix management organisation structure to understand how well the company operates under the matrix management organisation structure. By monitoring the performance, the leaders are in a position to get a full picture of what is happening in the ground. It would also be easier for them to identify any problems and take the necessary steps to fix them. Executives in high-performing matrix organizations believe that those with the most accurate information make the best decisions, depending on the initiative (Sy et al., 2005).

"The key issues associated with the matrix guardian are:

- The lack of consequences and rewards for matrix performance fails to motivate employees to make the matrix work
- Establishing a monitoring process to detect and identify matrix performance problems because employees are reluctant to divulge problems associated with their units
- Ensuring the matrix guardian has senior level support and authority to act
- Preserving the objectivity of the matrix guardian and preventing undue political pressure. The matric guardian should be in a position of influence and well-respected within the organization".

Most organisation measure the activities that they perform. The measures for functional, geographic, and related units are well established. Organisations that have their performance measured are likely to perform well, however Schenck et. al. (2012) assert that it is less likely that organizations carefully measure the performance of projects. The Top-level executives in most cases are unaware of project performance. A matrix guardian responsible for matrix performance can correct many of these problems. Research has shown that lack of consequences and rewards for matrix performance leads to a lack of motivation. The companies should appoint a matrix guardian which would in establishing a monitoring process to detect and identify matrix performance problems and help employees overcome their reluctance to divulge issues associated with their units that are impacting on the project performance. The matrix guardian should have senior level support and authority to make and act on decisions. Additionally the objectivity of the matrix guardian must be preserved and protected from political pressure (Schenck et. al., 2012).

e) Silo focused employees

Goold et. al. (2003), Sy et. al. (2005) and Bartlett et. al. (1990) assert that an employee's behaviour is the most critical challenge that the matrix organizations face. Bartlett et. al. (1990) further assert that as the companies struggle to maintain a constant balance between business dimensions, the balance creates tension among employees. Although the tension is integral to the matrix management organisation structure and desirable, it requires increased levels of collaboration and the organisations must enable their employees to accept the tension and behave as one company (Barlett and Ghoshal, 1990, Kilmann and Company, 1985, Goold and Campbell, 2003).

Joyce (1986) asserts that most employees in large organisations incline toward a silo-focused mentality as they view their membership and loyalty, as belonging to a certain department in the organisation. They subsequently behave in a manner that benefits their subunit but could be detrimental to the organisation as a whole, which has a silo-mentality that impedes the coordination and collaboration required for a successful matrix type (Joyce, 1986). Sy et.al. (2005) assert that the following issues are also encountered in the silo-focused employees – there are personal conflicts between leaders that delay co-operation between units; hiding of resources from other; lack of trust between employees in different business units; employees lacking the necessary skills to function in the matrix and inadequate communication between business units.

Kilmann, (1985), Sy et. al. (2005) and Bartlett et. al. (1990), proclaim that "there are two main reasons for silo-focused behaviours:

- The first reason is with employees being in the same functional unit for a long period of time, interacting with the same system and co-workers and through the years developing a loyalty toward that group.
- The second reason is that matrix management organization structures require high degrees of partnership compared to single report structures, the employees have therefore not developed certain interpersonal skills that are necessary to work with other elements in the organization" (Kilmann et. al., 1985, Sy et al., 2005, Barlett et. al., 1990).

Schenck et. al. (2012) proclaim that most people in organizations tend to be silo focused. This silo-focus mentality and loyalty is usually directed toward the functional unit rather than a project to which the employees are assigned. Most people spend most of their careers in a particular function, this creates loyalty which can result to silo-mentality. These people tend to interact with other professionals, like themselves, and over time develop allegiances to a particular group. Matrix organizations require high degrees of cooperation when compared with single hierarchies. Most employees haven't developed the interpersonal skills that are necessary to make matrix organizations work efficiently and effectively.

Silo-focus is a predominant behaviour that matrix organizations must ensure that it is eliminated as most employees in large matrix organizations tend to have a silo-focused view. The employees commit their membership and loyalty to a certain subunit or department within the organization, rather than the whole organization which inhibits the coordination and the collaboration required to function in the matrix (Joyce, 1986).

Bartlett et. al. (1990) asserts that although communication increases in its frequency in matrix forms of organizations, the quality of communications decreases. Cooperation is also said to decrease in the matrix management organisation structure. Employees' behaviour is in a manner that benefits their sub-unit or department, but that can be detrimental to the organization. Most leaders have difficulty with this adjustment in thinking. Leaders who operate with command-and-control skills that they developed in traditional hierarchical organizations have a difficult time building networks for cooperation in the matrix management organisation structure. "Leaders and employees who are well versed in interpersonal skills, including negotiation and issue selling techniques, perform much better in matrix organizations. More generally, employees can be expected to function better in the matrix when they can build networks that enhance communication and cooperation"(Sy et. al., 2004).

f)   Management of cross-functional teams

The managing of the cross-functional teams is another challenge that the project managers are faced with. The team gets gathered together under the leadership of the project manager and become the responsibility of the project manager. The functional managers supervise their departments according to the specialty of work that they do and that they are part of and have the educational background and experience on. In order to be able, communicate and manage these specialties effectively, the project manager needs to obtain a minimum level of knowledge on these, otherwise there is a risk of the project manager being ignored when making decisions or underestimated. In addition to this, a project manager needs to have confidence and high self-esteem to deal with the professional teams.

According to Jacques (2008), the project manager's needs to apply interpersonal skills and build trust among the team members as it is impossible to study or have experience of the specialties that are in the project team. "Building trust and making friendly relationships with the team encourages team members to participate proactively in project activities and voluntarily put their knowledge and expertise at the project manager's disposal" (Goś, 2015).

Gos (2015) asserts that the success of a cross-functional team highly depends on effective team processes, such as communication, cooperation and, coordination. Cross-functional teams gather individuals with different goals and values to work together as a result of the functional diversity. These diversities create obstructions to effective team processes and make problems in the development of

cooperative relationships among team members, the higher the differences the lower the team cohesiveness. This is a very difficult challenge that the project manager needs to overcome.

The workforce needs to be kept motivated and the project managers are expected to rise up to the challenge of motivating the employees. The employees usually encounter mental and psychological problems which make them to be uncertain about the future. Most projects are done in remote sites which requires some employees to work far from their home bases for long periods of time. There is a high probability that these employees may have psychological problems such as depression, distress, and emotional exhaustion (Minavand et al., 2013).

"Dual management creates a division of authority and responsibility and becomes very complex and unpredictable. The contentious needs of the two managers are not the same which leads to challenges experienced by the two managers operating within the same environment. The co-activity of the functional manager and the project manager must overcome these difficulties to acquire a balanced matrix management organization structure for a productive organization" (Kishore et al., 2019).

The weaknesses of the matrix management organisation structure according to Sy et. al. (2005) are that the matrix management organisation structure:

- "violates principle that authority should equal responsibility
- violates the principle that every subordinate should be assigned to a single boss
- can create ambiguity and conflict
- increases costs resulting from the need for additional management and administration
- increase the likelihood of resistance to change as employees may attribute the matrix with loss of status authority, and
- control over traditional domain."

Galbraith (2008), asserts that the challenges that are faced by the individuals and teams working in a matrix management organisation structure at the cross-functional junction points are numerous, which are as follows:
- "too much information of lack of information,
- heavy workloads, conflicting goals, and superiors,
- time orientation differences,
- incentives,
- incompatibility, etc."

The author adds that if there is a problem at any junction point, there is a potential that it might spread throughout the organisation and cause many delays in the project (Galbraith, 2008).

Sy et. al. (2005) proclaim that the matrix management organisation structure assists the companies to stay small and task oriented whilst utilizing and influencing several resources even though the matrix management organisation structures can be unpredictable and complex. This encourages innovation, fast working, and availability of speedy information. The authors suggest that the matrix management organisation structure requires more managerial and administrative support.

g) Complexity

Stuckenbruck (1988) asserts that the matrix organization is more complex than either a functional or a pure project organization since it is the superimposition of one on the other. The complexity is caused by the number of managers and personnel that are involved and from the number of people that must be kept informed on the project progress. This results in difficulties in monitoring and controlling of the project. There is also a challenge with the complexity of information flow, thus is also caused by the number of people and organizational units that are involved in the project. The functional and project manager must ensure that they communicate with each other for any major decisions in their areas of responsibility. The complexity increases in organization especially when there are two lines of authority and the possibility of conflicting instructions and guidance is also increased (Stuckenbruck, 1988). According to Nesheim et. al. (2011), the challenges of matrix organisations are related to the issue of different interdependencies and considerations that are built into the matrix management organisation structure and not to the dimensions.

The project manager is sometimes faced with a problem of meeting the deadlines as there are far too many people to be consulted when making decisions. Stuckenbruck (1988) proclaims that "the project manager in the matrix usually does not have strong vested authority, therefore considerable negotiation is necessary. Project management was primarily conceived to prevent this problem, but it can be a problem if the management system keeps the project manager from making any decisions without consultation with functional and top management. If the matrix is working, the problem won't occur".

h) Allocation of resources and priorities

When an organization has several projects and scarce resources, that organisation is faced with a big challenge as there will be problems with prioritising projects and allocation of resources. The project

managers will fight for resources as each project manager will consider his/her project to have the highest priority and expect the resources to be assigned to his/her project. This will also be a challenge to the functional managers as they will require their resources for functional requirements, thus expecting the allocation of resources and priorities within his department to take priority. The decision making with regards to which project takes priority and the allocation of resources should be made at an executive level (Stuckenbruck, 1988).

When projects have a resource capacity issue, there is huge potential conflict on the pipeline. When resources are allocated, there are usually conflicting priorities from both the project manager side and the functional manager side, and this is always a potential for conflict as both managers are competing for resources. This conflict of competing for resources is primarily seen as a struggle of power, which may lead to badmouthing, foot-dragging and project sabotage if not adequately addressed from the start. The managers should ensure that they address this and find a solution for it before it degenerates to personal resentment and discord. Even though conflict and competition may also be constructive as an aid to achieving high performance; the managers should remember to keep the conflict constructive and ensure that they are doing what is best for the project (Stuckenbruck, 1988).

i) **Level of conflicts**

According to Stuckenbruck (1988) stress and conflict are inevitable in a matrix organisation and undivided attention should be given to the individuals who will function as both project and functional managers. People operate differently under stress and considerable attention should be paid as the individual's ability to function effectively under stress varies from person to person. The stress and the conflict that may arise from reporting to two bosses can cause stress, anxiety, and reduced job satisfaction especially if both bosses disagree.

According to Galbraith (2008), if the matrix management organisation structure is not set up correctly or well managed, it will not yield any positive results in terms of efficiency and effectiveness. The matrix management organisation structure requires managerial skills that will focus on the entire organisation, own department, and function, be it functional management or project management. The management in the matrix management organisation structure needs to accept uncertain environments and be willing to consider complicated trade-offs and negotiate the realistic solutions that will focus on results. The challenges identified by the author in the management of the matrix management organisation

structure are reconciliation of conflicts between the subordinates (functional and project management), information overload, excessive planning, resource allocation (and meetings thereof) and decision delay which affects the progress of the projects.

j)   Decision making delays

Sy et. al. (2004) states that decisions in the matrix management organisation structure are premature and possibly lack quality. The matrix management organisation structure's key characteristic is the dual reporting structures. In a traditional hierarchical structure, the leaders/managers' decision rights are clear in terms of authority equals responsibility. In a matrix management organisation structure, it is different in the sense of leaders having the responsibility but cannot implement that responsibility as they do not have authority to implement it. This misalignment might lead to decisions that are made in a matrix management organisation structure but not being followed due to the lack of authority of the decision making. Another issue is that of managers/leaders that are not used to sharing decision rights. Some leaders struggle with judging which decisions to solicit input for and also whose input is necessary in the decision to be made. This calls for leaders to be in charge and for making tough calls, collaborate with other leaders and also depending on them for their inputs in the decisions.

Sy et. al. (2004) assert that managers who lack the experience of working with others causes uncertainty over decision rights. This uncertainty usually causes tension and conflict as leaders who are not used to working in the matrix management organisation structure and its new environment tend to fight for control or power. This tension and conflict affects the time it takes to decide as well as the quality of the decision made. When individuals with crucial information are not involved in the decision making because of the power and control issues, the quality of the decisions can be negatively impacted. It is ideal that decisions are made at lower levels, in the operational areas where the employees are familiar with the daily operations of the business and are aware of the impact of the decisions made and how it will affect the project. Most senior leadership make the mistake of disempowering the local leadership by reversing previously made decisions, or not allowing local leadership to make decisions. Also, the time it takes for the senior leadership to make a decision affects the local leadership and the project suffers.

According to Derven (2010), Guterl (1989) and Ludwig (1970), "there are three key sources of negative impact on decision-making which is the opposite of the advantage of decision-making effectiveness. These are:

- internal competitiveness and turf battles
- blurred responsibility
- tendencies for anarchy and Increased bureaucracy.

The conflicting objectives in large matrix organizations often lead to lengthy and unproductive discussions which tend to become a part of the above-mentioned turf wars which lead to confrontations among managers competing for authority and resources. In such cases, decisions in a matrix are often slow and suboptimal" (Derven, 2010, Guterl, 1989, Ludwig, 1970).

The additional horizontal connections of a matrix increase the number of units involved in the decision-making process and therefore might hinder the decision making process (Duliniec, 2009). Davis et. al. (1978) proclaim that matrix organizations have tendencies toward anarchy because of the blurred responsibility, a formless state of confusion where people do not recognize a boss to whom they feel responsible (Davis and Lawrence, 1978).

2.6. WHAT ARE THE ROLES OF FUNCTIONAL MANAGERS VERSUS THE PROJECT MANAGERS IN A MATRIX MANAGEMENT ORGANISATION STRUCTURE?

The matrix management organisation structure is said to be a two-dimensional system, with the first dimension being the functional chain of command the second being a project/product-line chain of command (Lawrence et al., 1977). Kishore et. al. (2019) assert that "the fourth industrial revolution (Industry 4.0) depends more on high performance computing and the co-existence of technology with human resources therefore the focus on this organizational structure is important." They further assert that the matrix-grid is not rigid enough to always maintain a balanced structure. When one of the managers (whether project or functional) in the matrix management organisation structure implements their roles more than the other, this impacts either the project or the employees and resources. The project might fail, or the employees and resources will be adversely impacted. The executive management should guard against an unbalanced matrix management organisation structure, as the disadvantage will be that it will require a higher manager to employee ratio which would increase the cost of the project and the performance would decline as well (Kishore et al., 2019).

Moodley et. al. (2016) assert that project personnel have a technical responsibility towards the project and the project manager. Whilst they have a technical responsibility towards a project manager, they also have a functional responsibility towards the functional manager as their performance and

promotion is determined by the functional manager (Moodley et al., 2016). Larson et. al. (1987) proclaim that there is a predicament of authority versus responsibility which is evident in a matrix management organisation structure. This is caused by the dilemma of what both managers are responsible for, the what which is the functional managers' responsibility and the how which is the project managers' responsibility; these both require shared responsibility and authority over the operational flow of work (Larson et. al., 1987).

Dunne et al., (1978) assert that "the relationship between functional manager and project personnel is a formal reporting relationship depicted as a solid line where functional managers are usually responsible for the expertise, reward, compensation, performance appraisal and development aspects pertaining to their staff" (Dunne et al., 1978). "The dual reporting structure in a matrix presents unavoidable challenges of conflict and confusion experienced by project personnel when responsibility and authority overlap in vertical and lateral structures" (Davis et. al., 1978).

Kishore et.al. (2019) proclaim that "the functional managers have a responsibility to provide the resources to the project manager, who must deliver the project with the resources at hand. The risk of the functional managers and the subject matter experts is that their daily involvement in projects are reducing with the newer project methodologies, thus creating the panic of redundancy of their roles. This awareness therefore creates a gap in these project structures, such that the role of functional managers in matrix management organization structures are unclear or minimal. There is a dependency between the two managers and a relationship needs to be established and well managed to achieve an effective output" (Kishore et al., 2019).

Kishore et. al. proclaim that functional managers are the subject matter experts in their functional departments, they have expertise and are specialists. They are responsible for analyzing and solving technical issues. They therefore are administratively responsible for how tasks will be achieved, who will be performing the task from the team, and exactly what resources to be used to accomplish the task. The major skill that is required for a functional manager is analysis (Kishore et al., 2019).

"The project manager often starts as a specialist in an area and moves towards project management" (Burton et al., 2015). Kishore et. al. (2019) affirm "that the project manager role looks after several functional areas which include their functional management throughout projects; and the main role is to fit the pieces of tasks from different functional areas to make a whole product or service. The major skill required for a project manager is synthesis". They further assert that "the project manager achieves

their project objectives through the project team, subject matter experts and other stakeholders. An effective project manager therefore requires the balance of interpersonal, ethical, and conceptual skills to analyze situations and act appropriately. The role of the functional manger is not to compete with the project manager, but rather complement each other's leadership style. The analytical component of the functional manager requires the tasks to be broken further into smaller elements such that the task can be executed. The synthetic component of the project manager is to bring all the different functional aspects into a complete model" (Kishore et al., 2019).

The project manager is responsible for ensuring that the ten knowledge areas of project management according to PMBOK (A guide to project management) are applied in a project. The functional manager and other stakeholders also need to be involved for the project to be a success.

"When a project is initiated in an organization and a project manager is involved. The knowledge areas exist within different teams and can occur concurrently based on the project methodology applied by an organization. The ten consecutive phases that the project endures are listed indicating the roles that are responsible for the different knowledge areas. The project manager becomes ultimately accountable for the entire project, however, collaboration with the Functional manager and other stakeholders in the matrix management organization structure is vital for the implementation of the project and collaboration of the different personnel" (Kishore et al., 2019).

Kishore et al. (2019) assert that for a project to achieve success, the client must be satisfied. The three constraints/components; cost, time, scope, and quality should reach equilibrium to achieve project success. These components form the three constraints of a project whereby agreed upon by all stakeholders, such that the impact on one of the three components negatively impacts the other two. If more quality is to be achieved, the project must inject more time or cost. The nature of achieving quality in a project is integral, hence the quality measures are stipulated during the planning phase of the project. When the quality of a product or service is compromised during the project then there are correction measures that are put in place.

Kishore et. al. (2019) proclaim that "the following metrics could be used to measure the effectiveness of managers within a matrix management organization structure:

The measure of effectiveness –

Metrics for the functional manager:

- Retain and develop employees and create a natural progressive career path within an organization. The functional managers need to adapt to the new culture of work ethic and contribute to the organization in a different way or risk becoming redundant
- Engagement score of the team
- High performer resignation rate – the rate of top performers resigning from the team
- Promotions actioned within a fixed period – availability of structures and guidelines which can assist the functional manager to grow their employees through leadership transformation pipeline
- Direct compensation plan (incentives and rewards)
- Absenteeism

Metrics for the project manager:

- Ensure that the team will deliver the project with time, money, scope, and quality required and strive for continual improvements including training and education of the workforce
- Engagement score of the team during the project
- Target delivery
- Workforce utilization" (Kishore et al., 2019).

Kishore et. al. (2019) asserts that both the functional managers and project managers add value to the matrix management organization structure and can be influential in the organization's success and failure; and both managers can eliminate most of their team's inadequacies and allow organizations to deliver projects efficiently through continuous communication and synergy between them (Kishore et. al., 2019). The authors further assert that both managers need to apply continual improvement in their respective areas and that both managers need adequate support and enhancements of current roles of the dual management in the matrix management organization structure for realizing the best value for money invested in the organization of project management (Kishore et al., 2019).

Stuckenbruck (1988) asserts that the roles of the functional manager and those of the project manager should be delineated by asking questions on what the responsibilities of each manager are. The following table differentiates between the responsibilities of a project manager and functional manager. To distinguish, the following questions should be asked for each manager:

"Project Manager Responsibilities (responsible for the overall integration of the total project system):	Functional Manager's Responsibilities (responsible for technical direction in his discipline)
What is to be done?	How will the task be done?
When will the task be done?	Where will the task be done?
Why will the task be done?	Who will do the task?
How much money is available to do the task?	How well has the functional input been integrated into the project?
How well has the total project been done?"	

Table 1: Delineation of Project Manager and Functional Manager responsibilities

The delineation does not guarantee a balance of power but rather indicates where the major responsibilities lie in the project. The author proclaims that an equal balance between functional and project management is almost impossible to achieve because of dealing with different people and different managers (Stuckenbruck, 1988).

Stuckenbruck (1988) proclaims that managers have different personalities with different management styles. These management styles depend on the persuasive abilities of the manager while others depend on or tend to fall back on strong support from top management. The author further proclaims that power is an unstable and constantly changing condition that does not remain the same. The project manager needs to ensure that technical decisions are made on time, key technical decisions reviewed and challenge when necessary. The project manager has the responsibility of evaluation every key project decision and to determine how it interfaces with the other project tasks, and with his schedule and budget. The functional manager on the other hand must assure that the task is technically feasible, instead of getting into what's, when's and how much money (Stuckenbruck, 1988).

2.7. THE MATRIX MANAGEMENT ORGANISATION STRUCTURE AND PERFORMANCE/HOW CAN WE MAKE THE MATRIX MANAGEMENT ORGANISATION STRUCTURE WORK

Burton et. al. (2015) asserts that matrix organisations are usually chosen for strategic reasons and that many organisations that have moved to matrix management organisation structure have found out that

they were not able to attain the benefits that were expected from the matrix management organisation structure. Most organisations expect to just plug in a matrix into an existing structure and expect success. The matrix management organisation structures need to be developed exclusively as organisations are different and also the utilization of the matrix management organisation structure will be unique and different for each organisation. The matrix management organisation structure also affects the individuals and teams working in the matrix as information flow and decision making are different and unique in a matrix management organisation structure compared to a traditional hierarchical organisation (Burton et al., 2015).

Joyce (1986) identified three hypotheses that should be considered when implementing a matrix management organisation structure regarding communication. These hypotheses are as follows: "The amount and frequency of forma communication should increase, Informal communication should decrease, and Directive quality of formal communication should increase". Only the first two hypotheses seemed possible, the last one was not always relevant. For the matrix management organisation structure to work, there should be open communication and speedy problem solving.

According to Parker 2003, the skills and competencies that are required in matrix management organisation structures should be as follows:

- "Team leadership,
- Goal alignment,
- Tactics of fostering internal communication and
- Building bridges to stakeholders outside the team" (Parker, 2003).

a) Critical success factors

According to Burton et. al. (2015), "most organisations, both public and private are changing their structures to complex matrix management organisation structures in order to meet the growing complexity in the world that they operate, and these organisations are battling to reap the benefits of a matrix organisation. Burton et. al. argue that, for the matrix management organisation structure to work, there are three factors that are critical for its success. These critical success factors are as follows:

  i. **Strong purpose:** the matrix management organization structure should be chosen only if there are strong reasons to do so

  ii. **Alignment among contingencies**: a matrix management organization structure can only be successful if key contingencies are aligned with the matrix's purpose

iii. **Management functions** – the success of matrix depends on how well activities at the junctions of the matrix are managed, the junctions at which dimensions of the matrix come together" (Burton et al., 2015).

b) Knowledge and information sharing

"The matrix organisation has both a 'high-tension and high-readiness to change' climate. In a high-tension climate, employees must have adequate resources to deal with change, and their attitude must be open to change" (Burton et.al., 2015). Employees' tension should not be allowed to be high and for them to be on the edge as it affects their performance. According to Burton et. al. (2015), the tension helps to drive performance as people deal with fluctuations in trust and conflict; this makes the people to be willing to change and accept new challenges and opportunities if they believe that their goals can be met. The employees need to understand the purpose of the matrix management organisation structure as this would assist them in understanding the organisation. The key contingency in the matrix management organisation structure is the knowledge development and sharing of information. The interpersonal relationships between team members are key in the matrix management organisation structure as these promote information and knowledge sharing. The teams in the matrix management organisation structure rely on each other's skills and effectiveness to carry the project to success. Matrix management organisation structures should have a higher information processing capacity and easier ways to share information (Burton et al., 2015).

According to Burton et.al. (2015), "a matrix organisation is needed only if the environment is uncertain, because once its configured, there are a number of design elements specified in a multi-contingency model that have to be aligned to the matrix." They continue to proclaim that for the matrix to be successful, it should go beyond the configuration itself, as the matrix requires its own leadership, culture, knowledge sharing, information technology, and incentives. Close inter-relationships among the activities must be created in the organisation when creating a matrix management organisation structure. The organisation should invest in ways of coordinating the work among repetitive tasks and also create a support function for the non-repetitive tasks. Burton et. al. (2015) assert that by doing this, it encourages those who are responsible for the tasks to be creative and develop innovative ways of doing the work, whilst accommodating the needs of the customers in their functional jobs and integrating their work with other departments in the organisation; and above all availing themselves to the requirements of the projects that are being undertaken. In conclusion, Burton et. al. (2015) confirm that the matrix organisation requires 'producer leaders', individuals who are able to delegate and who

have a tolerance for uncertainty and who can manage around at least two dimensions simultaneously (Burton et al., 2015).

c) Senior Management support to the matrix management organization structure

According to Stuckenbruck (1988), for the matrix management organisation structure to work, the senior management must support the employees working in the matrix. A project charter should be drawn up for every project that is performed under the matrix management organisation structure. "This project charter should state the purpose of the project and spell out the responsibilities and authority of the project manager. The charter should also indicate to the fullest extent possible his relationships with the functional managers involved in the project. Functional management must adjust their managerial thinking and their usual operational procedures and activities in order to make the matrix work. There should be considerable change in the way they determine their priorities, project should be put first. Project management must realize that they get their job accomplished primarily through the process of negotiation, and that they should become negotiation experts. If all major decisions are made with the concurrence of the involved functional managers, the project manager finds himself in a very strong position in insisting that the decision be carried out and that the desired goals be accomplished. In addition, the project personnel must be able to adapt to the two-boss situation which can be a traumatic experience when first encountered" (Stuckenbruck, 1988).

d) Project and functional Interface

Stuckenbruck (1988) asserts that for the matrix management organisation structure to successfully function, the project and functional interface and the type of interface relationships between the project and individual functional managers should be very strong. The author asserts that the project manager and the functional managers should ensure that every project decision and action must be negotiated across this interface as the interface is an established natural conflict situation since many of the goals and objectives of project and functional management are different. The interface can be one of smooth-working cooperation or bitter conflict. Both managers will need to ensure that they do not domineer the other or have power play tendencies. The keys to ensuring that the decision making is successful on the project or functional interface is to ensure cooperation of all parties involved and having fair negotiations. The project or functional manager managers should be cautious of making subjective and one-sided decisions as this could lead to or strengthen the potential for conflict. The

project managers depends on the cooperation and support of the functional managers and unfortunately can accomplish little by himself (Stuckenbruck, 1988).

The project manager in a matrix organization interfaces with top management and with functional management. These two interfaces are very important for a project manager. The project manager should develop a very good working relationship with the top management, this will ensure that he/she has access top management support which would be critical for resolving big problems and removing obstacles. Having a good working relationship between the functional management and the project manager will ensure that most problems are resolved at their level and will not have to be escalated or go to top management for resolving. Both managers should communicate with each frequently. Both managers should consult each other when required, cooperate, and meet the needs of the other and offer each other constant support. The relationship between the project manager and a functional manager is very important and it is key to the success of any matrix management organisation structure; it should be carefully nurtured and actively promoted by top management (Stuckenbruck, 1988).

Burton et.al. (2015), claims that for the matrix organisation to work, it is critical that the individuals and teams working on it understand why it was selected for the particular project. The individuals working it should implement, manage, and run it; they should have logic when dealing with contradictory goals, disagreeing bosses, time differences, incentives inconsistency, and etcetera. The management working on the structure, both the functional and project management need to understand and accept the purpose of the matrix management organisation structure and should ensure that it is rolled out effectively in the projects (Burton et al., 2015).

e) Achieving a Balance of Power

For projects to work the management has to work hand in hand and in harmony to achieve the end-goal or result irrespective of the possible conflicting objectives and roles. The matrix management organization structure is set up such that conflict is used as method intentionally to get the job done. This would work if the project team focuses on getting the job done and resolving problems as a team and be less concerned on who solves the problem. The project team should give an emphasis on teamwork and problem solving rather than role definition. The achievement of balance of power between both the project manager and functional manager should be a goal that both managers (with the assistance of project team) should work towards to. The potential power struggles and unnecessary

conflicts should be avoided and minimized at all costs. The author proclaims that it is probably seldom to achieve a balance of power and there is no way to ensure it. The author further proclaims that the approach that can be used to make sure that the balance of power is achieved is to assume that the project manager reports at a higher level in the management hierarchy and has the full support of top management (Stuckenbruck, 1988).

f)   Collaboration

Herzog (2001) asserts that "Collaboration can be described as a social group dependent on trust as a form of capital investment for the attainment of goals and objectives". The author's statement indicates the magnitude the trust and collaboration the group has on each other. The author further states that the foundation for building successful partnerships is trust. (Herzog, 2001). Leufkens et. al. (2011) indicates that the recipe for ensuring proper collaboration on a project is creating relationships and that they are very important (Leufkens and Noorderhaven, 2011). Sy (2005) claims that in some companies the team members collaborate in order to find a solution or complete a task. These team members usually resolve these problems informally, by having informal negotiations. This is done irrespective of who has authority and the collaborative culture assists with overcoming the notorious problem of ambiguous authority. The above indicates that the ambiguous authority lines may be countered by proper collaboration between project team members (Sy et al., 2005).

2.8. CONCLUSION

This chapter reflected on the current literature available on project matrix management organisation structure. The literature review covered various topics that assisted in understanding the project matrix management organisation structures.

The literature review focused on the project matrix management organisation structures and organisations which utilise the matrix management organisation structure. The adoption of matrix management organisation structures by the public organisation is not different from the private organisations. The reasons for adopting this structure remain the same for both organisations even though the public organisations are associated with a lot of bureaucracy. The project matrix management organisation structure poses the same challenges on the public organisation as it is on the private organisations. The reasons why organisations utilise the structure or that influences them to use

the structure are the same with every organisation that has decided to adopt a matrix management organisation structure as an implementation strategy for its projects.

The advantages or benefits or enablers of using the matrix management organisation structure were also researched. These benefits have also provided a clarity and further understanding of why the organisations opt to utilise this type of a structure. Six advantages have been highlighted by various authors which are as follows: "managing complexity, communication effectiveness, output quality, resource efficiency, motivation and job satisfaction and balance of power". Some of the advantages are also appearing on the disadvantages as various authors are indicating the flipside of the coin. Complexity and Communication are the advantages that have appeared on the disadvantages as well.

The disadvantages or challenges or barriers to using the matrix management organisation structure were researched. These have assisted us in understanding what they are and whether their presence is detrimental to the matrix management organisation structure and if these challenges could be overcome or not. A total of ten disadvantages were highlighted by the authors. It was interesting to find out there are more disadvantages that are linked with the structure than advantages. The disadvantages are goals that are misaligned, roles and responsibilities that are unclear, indistinct authority and dual reporting, lack of matrix guardian, silo-focused employees, managing cross-functional teams, complexity, allocation of resources and priorities, level of conflicts and decision-making delays. The fact that most disadvantages were linked or related was interesting; as it was evident that if the managers could eliminate one or two disadvantages; this would result in elimination of more than the initial two disadvantages for their projects.

The matrix management organisation structure is perceived to be full of conflicts, determining what the roles of the functional managers and project managers are in a matrix management organisation structure was crucial in establishing whether this delineation of roles could assist in making the structure work. The finding was that the conflicts that are related with the matrix management organisation structure are not entirely related to roles of the managers involved. There are a host of different aspects that translate to the conflicts that are being experienced. When both managers focus on their roles, this could assist with the ambiguity of roles, misalignment of goals as well as reducing decision making delays.

Lastly, the section covered the matrix management organisation structure and performance and how we can make the matrix management organisation structures work. The various aspects of the projects

matrix management organisation structure were researched; this section looked to close the gap in terms of indicating what can be done to make the project structure perform effectively. The following items were covered on how we can make the project matrix management organisation structure work: critical success factors for the matrix management organisation structure, knowledge and information sharing, the organisation's strong purpose to utilise the structure, the management functions, alignment among contingencies, senior management support to the matrix management organisation structure, project, and functional interface, achieving balance of power and collaboration within the organisation.

The next chapter will discuss the research methodology.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3. INTRODUCTION

This chapter gives an overview of the research design and methodology that was applied in the study and also presents the method of data collection that was utilized. The chapter defines the research purpose, the research philosophy, research strategy or approach, the data collection strategy, the research instrument and its validation and the data analysing techniques. It also discusses the research limitations, ethical consideration and provides a summary of the research methodology and a conclusion of the chapter.

3.1. RESEARCH OVERVIEW

3.1.1. RESEARCH PURPOSE

Leedy et. al. (2005) describes "research as a methodical process of collecting, analysing and interpreting information" (Leedy and Ormrod, 2005). Rugg et. al. (2007), describes research as an exploration of the pursuit of knowledge (Rugg and Petre, 2007). Mouton (2001) on the other hand states that all empirical research conforms to a standard logic made of four elements, which are: a research problem, research design, data collection and data analysis or evidence; and conclusions. The research process starts with identifying a particular research problem. The type of research problem and the kind of data to be collected, define the planning and design of a research project (Mouton, 2001).

The purpose of this research is to investigate the factors that hinder or support the State-Owned Enterprise with the adoption of the matrix management organization structure to meet its project objectives.

3.1.2. RESEARCH PARAGIDM

A paradigm is a belief or an approach that is undertaken by a certain individual. According to Cooper et. al. (2006), a research paradigm is an outline for ensuring that research objectives are

responding to questions posed for the research (Cooper and Schindler, 2006). Collis et. al. (2014) also define "a research paradigm as a choice that one employs relating to methods of addressing a research question" (Collis, 2014). "Research paradigm is the scientific practice of a research community to adhere to a particular set of philosophies, methodologies and methods in the pursuit of knowledge" (Kuhn, 1970).   Lincoln (2005) states that a research paradigm is a combination of beliefs that guide action (Lincoln, 2005).

 "Methodology refers to the procedural framework within which the research is conducted. It is driven by certain ontological and epistemological assumptions and consists of research questions or hypothesis, a conceptual approach to a topic, the methods to be used in the study (and their justification), and consequently the data source. Research methods refer to the various ways in which data can be collected and analysed, can be seen as the techniques or procedures used to collate and analyse data"(Carter and Little, 2007).

There are two main research paradigms, positivistic and interpretivist. Positivistic is linked to quantitative, objectivist, scientific, experimentalist and traditionalist. Positivism seeks to predict events in the social world by searching for regularities and casual relationships between the constituent elements. Interpretivist is linked to qualitative, phenomenological, subjectivist and humanistic. Interprevitism proclaims that the social world can only be understood from the point of view of the individuals who are involved in the activities to be investigated (Lincoln, 2005).

3.1.3. RESEARCH PHILOSOPHY

According to Seale (1999), "the research philosophy relates to the development of knowledge and the nature of that knowledge. The author further assets that philosophy is presented as underpinning the craft of social research, being an arena where various attempts at providing foundations for judging truth claims have come and gone, yet present day opinion seems nowadays, paradoxically, to conclude on ant foundationalism as itself being a philosophical foundation for social research" (Seale, 1999).

There are five dimensions of research philosophy, namely: epistemological assumptions, ontological assumptions, human nature assumptions, axiology assumptions and methodology assumptions. Epistemological assumptions refer to the nature, origin, and scope of knowledge as well as theory of knowledge. Ontological assumptions refer to the nature of reality and nature of being. Human nature

assumptions refer to the relationship between man and society. Axiology assumptions refer to aesthetics, ethics, and justice. Methods refer to methodological assumptions (Lincoln, 2005).

Seale et. al. (2004) proclaims that there are three epistemological classes, which are positivism, interprevitism and critical studies. "Qualitative research may or not be interpretive, depending on the underlying philosophical assumptions of the researcher" (Seale et al., 2004). Goldkuhl (2012) also proclaims the three possible epistemologies, which are interpretive, positivist and critical studies.

The positivisms seek to predict events in the social world by searching for regularities and casual relationships between the constituent elements (Lee, 1992). Seale (1999) and Creswell (2014) describe positivism as an epistemology where ideas only warrant their incorporation into knowledge if they can be tested by way of empirical experience. Positivists see the natural sciences as progressing through the patient build-up of facts about the world in order to produce generalizations known as scientific laws. (Seale, 1999, Creswell, 2014).

The interprevitism can only be understood from the point of view of the individuals who are involved in the activities to be investigated (Schwandt, 1994). According to Gray (2013) the most influential philosophies are positivism and interprevitism (Gray, 2013). Seale (1999) and Seale et. al. (2004) describe interprevitism as an epistemology that advocates that it is essential for the researcher to appreciate differences between humans in their role as social actors. They further assert that interprevitism is an epistemology that advocates that it is essential for the researcher to appreciate differences between humans in their role as social actors (Seale, 1999, Seale et al., 2004).

Amaratunga et al. (2002) asserts that analysis of the interprevitism method applies to a qualitative approach to "inductively and holistically understand the human experience in context-specific settings". They further assert that in the midst of the principal repercussions of the interprevitism method is the need for individuality of the researcher from the subject being observed (Amaratunga et al., 2002).

The philosophy theoretical perspectives are further outlined on the table 4 below:

"PHILOSOPHY	DESCRIPTION
Positivism	- Reality consists of what is available to the senses – that is, what can be seen, smelt, touched, etc. - Inquiry should be based upon scientific objective observation (as opposed to philosophical speculation), and therefore on empirical inquiry - Results of research will tend to be presented as objective facts - Lends itself toward the quantitative approach

	▪ Can provide wide coverage of the range of situations
Interprevitism	▪ Interprevitism asserts that natural reality (and the laws of science) and social reality is different and therefore requires different kinds of method. ▪ The world is interpreted through the classification themes and schemas of the mind ▪ Lends itself toward the qualitative approach ▪ Data-gathering methods seen as more natural than artificial" (Gray, 2013, Creswell, 2014, Amaratunga et al., 2002).

Table 2: Philosophy Theoretical Perspectives

According to Baroudi (1991), the aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their actions. Goldkuhl (2012) asserts that interpretivism is an established, elaborated, and adapted research paradigm for qualitative research. The adopted research philosophy is interprevitism.

3.1.4.   RESEARCH DESIGN

Easterby-Smith et. al. (2002) proclaim that "a research design is about organising research activity, including the collection of data, in ways that are most likely to achieve the research aims". A decision needs to be made about the research strategy which is methodology and research tactics which is method (Easterby-Smith and Thorpe, 2002). The nature of the research question, hypotheses and assumptions made, as well as the nature of data to be dealt with helps the researcher in choosing whether the type of the research will be qualitative or quantitative (Mogorosi, 2009).

A research design should entail the structure of the research problem and the plan of investigation that will be used to obtain empirical evidence. The design helps guide the researchers regarding the critical study issues as to what observations to make to address the research problem and how to make these observations, analyse and interpretation of the data. "The research design is a plan or a blueprint of how one intends to conduct the research" (Mouton, 2001).

According to Blumberg et. al. (2008), a research design is the strategy for the study and the plan by which the project should be carried out (Blumberg et al., 2008). Research design comprises two sets of activities. The first activity involves determining all you aim to accomplish through the research project. This is the conceptual design of a research project and has to do with modelling the content of the

research. The second set of activity is the technical research design and involves how to conduct the research during the implementation stage of the project (Verschuren et al., 2010).

The goal of a formal research design is to provide a valid representation of the current state and to test the hypothesis or answer the research question posed.

3.1.5. RESEARCH STRATEGY

A research strategy is a high-level approach to the research that determines the details of the work that is to be undertaken. It is an expression of the researcher's basic philosophical beliefs (epistemology) and understanding of the research to be undertaken. There are two research strategies, namely, theoretical, and empirical. With theoretical strategy, there is no clearly defined strategy. The empirical strategy is divided into types, which is positivist and interpretivist. This research will be based on an empirical research.

Empirical research draws on experience or observation of primary evidence to understand a phenomenon being investigated. There are two types of evidence, which is qualitative or quantitative. Empirical research is divided into two, which is positivism and interpretivist. Positivism relies on numbers and the researcher's skills as mathematical or statistical analyst. Interpretivist is any type of research that produces findings not arrived at by statistical inference (Strauss and Corbin, 1998).

3.1.6. RESEARCH APPROACH

A research approach is an approach to collecting evidence and analysing that evidence, which can be used to understanding a phenomenon thus contributing to the body of knowledge.

Creswell (2014) asserts that there are three key research approaches, namely: qualitative, quantitative, and mixed methods. The author asserts that the qualitative and quantitative approaches should not be viewed as complete opposites. These two represent the different ends of the range (Creswell, 2014). Mixed methods exist in in the middle of the range, as it includes elements of both qualitative and quantitative approaches (Seale, 1999).

Creswell (2014) asserts that a qualitative research is an approach for understanding the meaning individuals or groups attribute to "social or human problem". This approach includes the development

of questions and procedures, where data is acquired from the participant's environment. The data analysis builds from specific themes to general themes and the researcher constructs the interpretations of the meaning of the data (Creswell, 2014). The main aspect of the qualitative approach is that it allows the researcher to focus on naturally occurring, regular events in natural surroundings, presenting a view on what the real life experience is like from the participant's viewpoint (Amaratunga et al., 2002).

Creswell (2014) proclaims that quantitative research is an approach for testing objective theories through inspecting and examining the relationship among different variables and data (Creswell, 2014). The data in a quantitative research can be measured via instruments, to allow for data analysis using numerical procedures (Jensen and Laurie, 2016). The theme under analysis in a quantitative research is measured though unbiased means (Amaratunga et al., 2002).

"Mixed methods research is an approach to inquiry which includes gathering both quantitative and qualitative data, combining and integrating the two sets of data" (Creswell, 2014, Jensen and Laurie, 2016). The main assumption of the mixed method approach is that with the combination of qualitative and quantitative methods, a comprehensive understanding of the research problem is attained than using the qualitative or quantitative approach individually (Gray, 2013).

The table 5 below provides an overview of the above mentioned research methods, this table has been adapted from (Creswell, 2014).

"QUANTITATIVE	QUALITATIVE	MIXED-METHODS
Pre-determined	Emerging methods	Both predetermined and emerging
Instrument based	Open-ended questions	Both open- and closed-ended
Performance data, attitude data, observational data, and census data	Interview data, observation data, document data, and audio-visual data	Multiple forms of data drawing on all possibilities
Statistical analysis	Text and image analysis	Statistical and text analysis
Statistical interpretation	Themes, patterns interpretation	Across databases interpretation"

Table 3: *Research Approaches*

Collis and Hussey (2014) describe a sampling design as a subset of the population that is selected in order to draw conclusions for the entire population. The authors discuss two types of sampling: probability sampling and non-probability sampling. This study made use of non-probability sampling, particularly convenience sampling. Convenience sampling was utilised, as the researcher chose whomever he could find, to fill in the questionnaire due to the amount of time allocated to the study.

Collis et. al. (2014) further ascertain that the "qualitative research is more subjective and humanistic as the researcher interacts with what is being researched. Qualitative research uses small samples and generates theories". They continue to establish that the qualitative research is prejudiced, and the qualitative research results cannot be generalised to a wider population. Qualitative research is also said to be informal and utilises qualitative words. "The basic assumption of qualitative research design is that reliability can be tested through verification. Validity of the qualitative research design is high" (Collis and Hussey, 2014).

The table below provides further details on the main research paradigms.

Positivistic	Interpretivist
– Quantitative,	– Qualitative,
– Objectivist,	– Phenomenological,
– Scientific,	– Subjectivist,
– Experimentalist,	– Humanistic
– Traditionalist	

Table 4: Details of research paradigms

The research paradigm chosen for this study is interpretivist and qualitative. This research will utilize the qualitative study approach. A formal study in the form of literature review was done on the current situation of the project matrix management organisation structures. A survey questionnaire was used to gather data from the respondents. The data received was further unpacked and validated in the form of semi-structured interviews.

3.1.7.   CASE STUDY

Tellis (1997a) asserts that a case study as a research methodology has been used for almost a century with its first used being in the application of it on social sciences. The author further describes the case

study as "an empirical enquiry that investigates a contemporary phenomenon with its real-life context, especially when the boundaries between phenomenon and context are not clearly evident".

A case study can be dependent on a number of sources available as evidence (Yin, 1994). The author additionally asserts that the emphasis of a case study is to develop a detailed understanding of a phenomenon and its context whilst largely avoiding any changing of the variables. He further advises that conflicting to the views which are different to his from some researchers; the case studies could be actually be utilised as reliable and credible tool for research. The use of the case study should in fact be taken and viewed as the same wavelength as experimental methodologies.

Tellis (1997a) makes a case for the use of single case studies as opposed to the use of multiple case studies to achieve the desired research outcome. He asserts that for use in a unique case, the single case design is suitable. An apocalyptic case or critical case does enable the researchers to research the singularities in depth to gain a greater understanding. Single case studies are well suited to expose new information on a phenomenon that has not been researched or has been previously not having enough information to make it researchable (Tellis, 1997a). Darke et. al. (1998) proclaims that ingle case studies can be planned in such a way that they are best suited for both the exploratory and explanatory research; whereby the outcomes have a documentation that lists the reasons for a phenomenon to take place; which may then be tested in further cases possibly in varying situations.

Tellis (1997a) states that the most important feature of the case study is the unit of analysis. The unit of analysis is a system of action which is opposite to a singular person or a group of people. He further asserts that by utilizing a case study methodology, one is able to focus and pinpoint the selected issues that are very crucial to the system that is being researched.

The unit of analysis for this project was the critical factors that need to be considered when adopting the matrix management organisation structure for the SOE.

3.2. DATA COLLECTION

Mouton (2011) asserts that the data collection aim is to collect sufficient accurate and relevant data to produce a set of stable requirements (Mouton, 2001). Leedy et. al. (2016) proclaim that the purpose of data collection is to capture quality evidence that is translated into data that can be analysed and that will allow the researcher to create a substantial and reliable response to questions that have been asked (Leedy and Ormrod, 2016).

A structured questionnaire which is a survey questionnaire was used for this study in order to get information from the participants. Structured questionnaires provide some control or guidance to the participant in their answers. This may also be described as closed form because the questions are short, requiring the respondent to provide a 'yes' or 'no' response, or checking an item out of a list of given responses. Questions that require 'yes' or 'no' answers are also termed as Dichotomous questions. There may also be multiple choice options from which the respondent selects the answer closest to their own opinion. The respondent's choices are limited to the set of options provided (Annum, 2015).

Questionnaires were drafted and sent to the Project Management Office employees and management; functional departments employees and management; as well as operational departments employees and management. A maximum of 40 questionnaires were sent out. Questionnaires were sent per department, targeting a variety of disciplines required in the project management space. The target was the employees that are working on the matrix management organisation structure or which have worked on the matrix management organisation structure in the past. The participants to this study were kept anonymous. Participants where applicable, were referred to as Respondent 1, 2, 3, etcetera. The data collected in this study and information pertaining to the study will be solely for academic purposes.

On receipt of the survey responses, a follow up interview in a form of a semi-structured interview was undertaken to unpack, discuss and to validate the results of the survey questionnaire. An open-ended or unrestricted type of questionnaire was used on the follow up semi-structured interviews. The questionnaire used on the interview called for a free response in the respondent's own words. The respondent frames and supplies the answer to the question raised in the questionnaire. It also constitutes questions which give the respondent an opportunity to express his or her opinions from a set of options. Spaces are often provided for respondents to make their inputs (Annum, 2015). The nature of questions asked in this type of questionnaire provides an opportunity for the respondent to express his or her opinion. The approach adopted for this research is 'inductive'. Inductive approach is generally associated with qualitative research.

Five participants (Senior Project Managers) were selected from the various offices of the organization, on a first come first serve basis depending on their availability and willingness to participate in the study. The participants were advised that anonymity would be used, and their names or details would not be revealed on the study. Recordings of the sessions were done. The purpose of the recordings

were to assist the researcher with the interview write-up notes. These recordings are kept in a safe place and will be deleted when the research is completed.

A five-point Likert scale was utilized in the survey questionnaire. The advantages of this scale according to Chomeya (2010) is that the consideration criteria is certain and easy to use, even if the questions are limited, they are more reliable than other rating scale types (Chomeya, 2010). The Likert scale is also easier to use and understand for both the researcher and the respondent, while also allowing for an simpler coding and interpretation process (Hasson and Arnetz, 2005).

3.3.   RESEARCH INSTRUMENT/TOOL

Various tools exist to assist researchers to carry out their goals. The tools of research entail the specific strategies or mechanisms that the researcher will apply to collect, process, analyse and interpret data. Figure below shows the process that was undertaken for this research.

Design questions for the survey questionnaire in word format
Submit questions for approval
Obtain approval
Automate questions on the www.surveymonkey.com online survey website
Include the consent form on the first page of the survey
Draft and send an email with the cover letter and the questionnaire link
Email the survey questionnaire to the selected individuals within the organisation
Analyse results
Design questions for the follow up semi-structured interviews in word format
Submit questions for approval
Obtain approval
Arrange and conduct semi-structured interviews
Draft a report

Figure 2: Research process

The table below lists the advantages and disadvantages of questionnaires.

"Advantages	Disadvantages
Wide area coverage	Often low response rate
Remote location access	Incomplete responses
Fairly low cost	Response inducement and/or follow up may be necessary

Respondents in their own environment	High quality instrument necessary
More time available for a considered response	Representativeness may be suspect
No interviewer bias	
Anonymity may allow disclosure of more confidential data	
Time required"	

Table 5: *Advantages and disadvantages of using questionnaires*

The table below lists the advantages and disadvantages of interviews.

"Advantages	Disadvantages
Increase the chance of successful data collection	Requires extensive resources and time
Increase accuracy and completeness of data	Interviewer training is necessary
Data enrichment is possible (interviewer observations)	High cost
Representativeness can be controlled	Risk of interviewer bias
Immediate calibration of validation of response is possible	Risk of interviewer dishonesty
Media other than paper questionnaires can be used	Not suited to highly confidential data requirements (e.g., turnover, profit, etc.)
	Respondent co-operation may wane."

Table 6: *Advantages and disadvantages of using interviews*

3.3.1. SURVEY QUESTIONNAIRE

The survey questionnaire is divided into three sections. **A copy of the survey questionnaire is provided in Appendix C.** The website for the survey only allowed ten questions to be asked on the survey questionnaire.

The first section A was the demographics question. The section was aimed at assessing the demographic profile of the participants. The purpose of this section was to obtain an overview of the participant's experience, in terms of the number of years that they have been working on projects, the department that the participant works in within the organisation as well as the number of years the participant has been working in the organisation.

The second section B assessed the participant's understanding of which type of project structure does the organization use. A brief description of the types of project structure was provided to assist the participants in making an informed choice regarding the type they choose.

The third section C assessed the perception of the participants regarding project matrix management organisation structures. A literature review was conducted for this study. The first three questions (C3-C5) of this section were based on the literature review, where participants were asked to rate the items that were the outcome of the literature review according to their perception and current experience on the projects that they are working on that are using project matrix management organisation structures. These questions were assigned a five-point Likert-scale which looked at whether they agree or disagree with the items. The varying degrees of the scale were whether they: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. The participants were also be asked to add any items that are not covered by the literature review and that they are experiencing on the projects that they are working on or that they have worked on which are using project matrix management organisation structures. The first question asked about the advantages of using matrix management organisation structures, the second question asked about the disadvantages of using matrix management organisation structure and the third question asked about the roles that functional managers should be undertaking on projects that are using project matrix management organisation structures.

The next four questions (C6-C10) asked about the performance of projects that the participants have worked on in terms of cost and schedule for the last three years under the project matrix management organisation structure. The first of the four questions (C6-C9) asked whether there have been any cost implications in the projects that the participants have worked on because of the project matrix management organisation structure being used. The follow up questions asked the participants to indicate whether the projects have underspent by 0-20%, overspent by 0-20% or were on budget. The following question asked whether there have been any schedule implications in the projects that they have worked on because of the project matrix management organisation structure being used. The next question asked the participants to indicate whether the projects have been completed on time, ahead of schedule or behind schedule.

The last question asked the participants to indicate whether they experienced any of the challenges or issues that were listed on the questionnaire because of the use of project matrix management organisation structure. They were also asked to list any issues or challenges that you they were aware of and that were not mentioned.

3.3.2.   INTERVIEW QUESTIONNAIRE

The interview questionnaire consisted of 11 questions. **A copy of the interview questionnaire is provided in Appendix E.** The purpose of the interview was to unpack, discuss and validate the results gathered from the survey questionnaires.

The research instruments or tools chosen for this research were qualitative data collection methods. A survey questionnaire followed up by semi-structured interviews were utilised to collect data.

3.4. RESEARCH INSTRUMENT VALIDATION

The purpose of the research instrument validation is to assess the validity of the research tool in terms of suitability for the study. The researcher conducted a pilot study by asking one participant to assess the reliability and validity of the research instrument. Conducting a pilot study assisted the researcher to determine the responses received from the pilot study and determine whether the participants will be able to understand the language and concepts used, whether the response categories are appropriate, whether participants are able to answer questions easily, whether the format is easy to follow, and the flow is logical. The pilot study also assisted in determining whether the questions that were asked are the right ones and whether they will address the objectives of the research. On completion of the pilot study, certain adjustments and updates were made to the research tool.

The restriction of the online survey method of ten questions probed the researcher to combine some of the questions and remove some of the questions that were drafted in the initial questionnaire. The following changes were made on the questionnaire regarding the questions:

- The first three questions which were asking the participants to state the number of years they were working in projects, the department within the company and the period within the organization were combined into one question which formed question one.

- The fourth question that was asking the participants to tick the types of project structures that they are aware of and the fifth question that was asking the participant which structure from the structures listed with description does the organization use; these two questions were combined into one question which formed question two.

- The eighth, ninth and tenth questions were removed and replaced with one question which formed question ten. These questions were asking about project quality implications that the participant had experienced; project scope or governance implications as well as project performances regarding the scope and governance (audit findings and reports) while working on the project using project matrix management organization structures. This question was replaced by a question listing issues and challenges that are experienced whilst using project matrix management organization structure and the participant was asked to indicate those that they have experienced and indicate if there are others that are not mentioned.

The researcher conducted a pilot interview by asking one participant the interview questions to assess the reliability and validity of the research instrument. The questions were well understood, and the researcher continued with conducting further interviews on the other participants.

3.5. DATA ANALYSIS TECHNIQUE

"Qualitative data includes words and observations, and just like all other data, analysis and interpretation are needed to create order and understanding of the data set"(Renner et al., 2003). The data collected will be analysed and discussed. The importance of findings in comparison to what is already known about the research problem being examined and new findings based on this study will be explained. The discussion will aim to connect to the introduction by the research questions that were posed or hypotheses that was formulated and the literature reviewed (Leedy and Ormrod, 2016).

"Thematic analysis is one of the most common forms of analysis within qualitative research. It emphasizes identifying, analysing, and interpreting patterns of meaning (or themes) within qualitative data. Thematic analysis is often understood as a method or technique in contrast to most other qualitative analytic approaches - such as grounded theory, discourse analysis, narrative analysis and interpretative phenomenological analysis - which can be described as methodologies or theoretically informed frameworks for research (they specify guiding theory, appropriate research questions and methods of data collection, as well as procedures for conducting analysis)" (Braun and Clarke, 2006).

"Thematic analysis is useful for analyzing qualitative data because it is descriptive and allows for identifying, analyzing, and reporting on the patterns emerging from the data. The thematic analysis takes on a deductive approach, this approach begins with the general and ends with the specific arguments based on experience" (Braun and Clarke, 2006).

The method of data analysis utilized in this research was thematic analysis. The following themes were identified for the research:

i. **Theme 1** – Enablers to the implementation of the matrix management organization structure by functional and project managers

ii. **Theme 2 -** Barriers to the implementation of the matrix management organization structure by functional and project managers

iii. **Theme 3 –** The role of a functional manager in a matrix management organization structure

iv. **Theme 4 –** Project performance in terms of cost and schedule for matrix management organization structure projects

v. **Theme 5 –** Project issues or challenges of projects using matrix management organization structure

3.6. RESEARCH LIMITATIONS

All suggested research projects have limitations (Marshall and Rossman, 2016). The main limitation on this research is as follows:

The research only focused on the employees that are working on projects using the matrix management organisation structure or who have worked with projects that have been completed under project matrix management organisation structure (within various locations) of a State-Owned Enterprise of South Africa.

3.7. ETHICAL CONSIDERATIONS

Ethics are defined as a group of moral values that are satisfactory to a wider group or community. The ethical guidelines are described a set of standards in which a researcher is required to assess their own conduct against the prescribed set of standards. Ethical issues of research concern the appropriateness of the researcher's behaviours in relation to the rights of those subjects of the research or who are affected by the research (De Vos et al., 2011).

"Ethical issues are predominant in any kind of research and that the nature of ethical problems within qualitative research studies is subtle and different in comparison to those experienced in quantitative research. These may include the researcher/participant relationship, the researcher's subjective interpretations of data, and the research design itself" (Ramos and Health, 1989).

To ensure ethical consideration was given to this study, on the beginning of the survey, an information page which consisted of the information sheet and participant consent form details describing the nature of the study with the contact details of the researcher and research supervisor was attached. **See Appendix B which is a copy of information sheet and participant consent form.** A cover letter was also attached on the email sharing the survey link. **See Appendix A which is a copy of the cover letter.**

The research procedure was provided to the University of Cape Town Ethics Committee for review and approval, with the survey process beginning once approval was granted. The research instrument was also reviewed and approved by the Ethics Committee at the University of Cape Town. All data and information collection during this study will be stored electronically and will be kept strictly confidential, with the researcher maintaining sole access to the data. Participation will be anonymised to protect the participant's identity. If the participant wishes to receive a copy of the final results of the research, they were advised that they were welcome to contact the researcher and a summary of the final results will be sent to them. The interview instrument that will be administered has been approved by the University of Cape Town Ethics Committee and thus, meets all ethical requirements imposed by the University.

Potential participants were advised that their participation is voluntary and that they have a right to withdraw from the study at any stage. An ethics clearance process was undertaken, and the clearance approval was granted on the 17 August 2020 by the University of Cape Town (UCT) Faculty Ethics In Research (EIR) Committee Chair. **The copy of ethics approval is attached on Appendix D.**

3.8. RESEARCH METHODOLOGY SUMMARY

The table below summarizes the research methodology aspects of this research.

Research paradigm	Interpretivist - qualitative
Research philosophy	Epistemological - interprevitism
Research approach	Qualitative - inductive
Research strategy	Empirical - interpretivist

Research methodology	Survey questionnaire and Semi-structured interviews
Data analysis technique	Thematic analysis

Table 7: *Summary of research methodology*

3.9. CONCLUSION

This chapter had outlined the research process that was utilized to address the research problem. It also looked at the different aspects of research methodology and design. The purpose of research, the research paradigm, the research philosophy, research approach, research strategy and research tactics were discussed in detail. This chapter also delved into details of the research methodology and the research instrument or tool that was undertaken for this research. Research instrument validation, data analysis technique and the research limitation was discussed. The chapter also discussed the ethical considerations that are associated with this research and how the ethical considerations were addressed. The final part of this chapter was the summary of the research methodology summary.

The next chapter will discuss the research findings.

CHAPTER 4: RESEARCH FINDINGS

4. INTRODUCTION

This chapter deals with the collection and presentation of data collected from the respondents. Data was collected from investigating a single Case study. The case used is discussed and then the main themes with sub-themes are discussed and the correlation of the findings and the main issues discussed in chapter 2 are highlighted

A follow up semi-structured interviews were undertaken - to unpack, discuss and to validate the results of the survey questionnaire that was done.

The themes emerging from the data collected are identified and the correlation of the findings and the main issues discussed in chapter 2 are highlighted.

4.1. THE DESCRIPTION OF THE CASE

The researcher works for a Projects Office of a State-Owned Enterprise (SOE). The SOE has introduced the Project Office in approximately 2013 and prior to that, the projects that were undertaken by the organization were done by functional departments. This situation had given rise to a number of 'accidental project managers' that were expected to run projects and work on their functional jobs simultaneously. With the introduction of the projects office, the organization had removed the responsibility of functional departments running the projects and handed it over to the project's office. This transition had not been a smooth one as there were some 'accidental project managers' who had decided to continue doing project management even though a projects office was introduced. There were also complaints of over utilization and high workload by the functional department employees.

The projects office that was introduced by the organization is not fully fledged as it only provided core functions of the project management office and some support services. The services that are provided by the project's office are as follows: programme managers, project managers, construction managers, cost engineers, planners, contracts officers and document control services. The rest of the disciplines which are required in a project environment were not provided for and the projects office had to utilize the resources from the existing operational staff. The resources that are required from operational/functional departments are as follows, Safety and Health, Risk, Finance, Procurement, various Engineering disciplines, Architecture, Legal, etc. The project matrix management organization structure was then introduced to the organization.

The environment that the researcher works in is an operational area and the functional resources that are used for the projects always prioritize the operational work versus projects. This has an influence on the projects undertaken under the project matrix management organization structure and the aim of this research is to check the extent of the impact and whether the continuous use of this structure is beneficial to the project environment.

The organization in question has nine sites with fully fledged project management and functional department teams. The information has been collected from all the nine sites, with varying participation of the various departments.

4.2. DEMOGRAPHICS

4.2.1. SURVEY QUESTIONNAIRES

I. NUMBER OF RESPONDENTS

The respondents were from the following departments: Safety Health Environment Risk & Quality (SHERQ); Infrastructure/Engineering; Finance and Project Management Office (PMO). A total of 31 respondents participated on the survey. The representation of the department participation and the number of respondents per department is shown on figure 3 below.
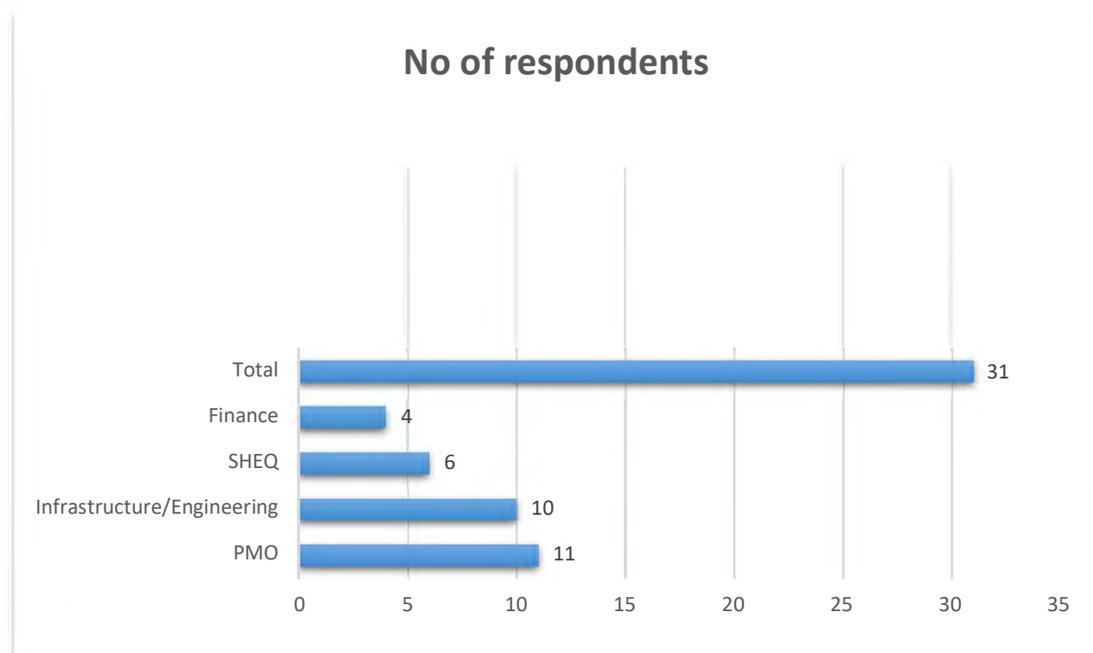
Figure 3: No of respondents

The figure 4 below shows the number of years of experience and the number of respondents per department in the organisation within a certain category.
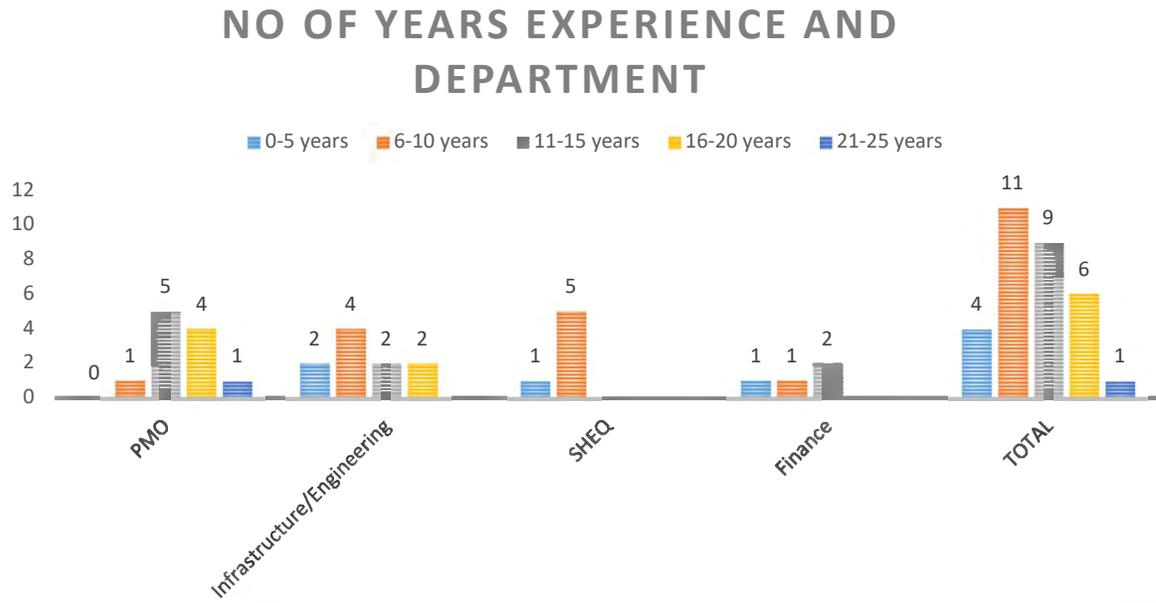
Figure 4: Respondent data

III.   TYPE OF STRUCTURE USED BY ORGANISATION

The respondents were asked, according to their understanding, which type of project structure the organization uses. They were also given a brief description of the types of structures to assist them in choosing the type of structure that in their opinion the organisation is using. Figure 5 below shows the types of structure the respondents thought the organisation was using. 48% of the respondents responded that the organisation is using the project matrix management organisation structure. 39% of the respondents responded that the organisation is using the functional structure. 13 % of the respondents responded that the organisation is using the project-based structure.

TYPE OF STRUCTURE USED BY THE ORGANISATION
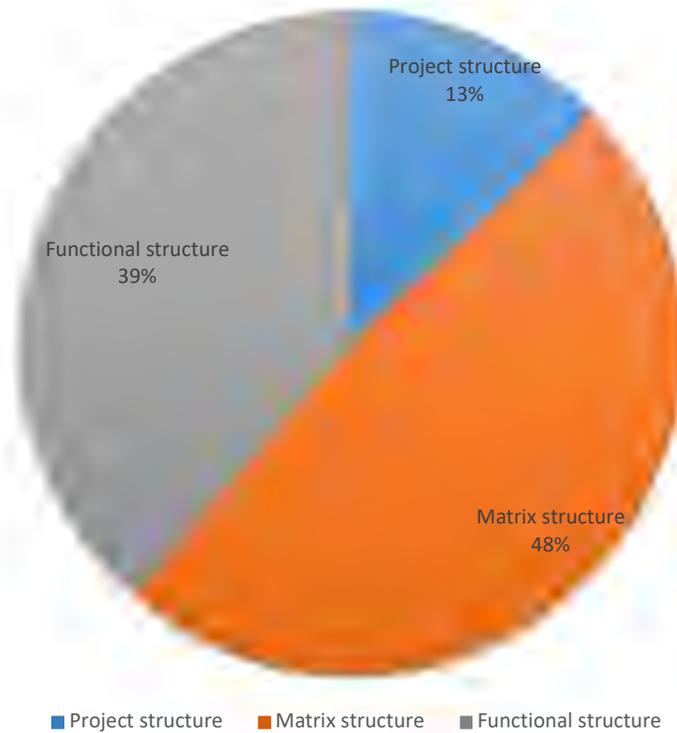
Figure 5: Type of structure used by the organisation

IV.   CHOICE OF STRUCTURE PER DEPARTMENT

The respondent's response to the type of structure that is utilised by the organisation was further analysed in terms of their choices and which department that they come from. The figure 6 below depicts this.
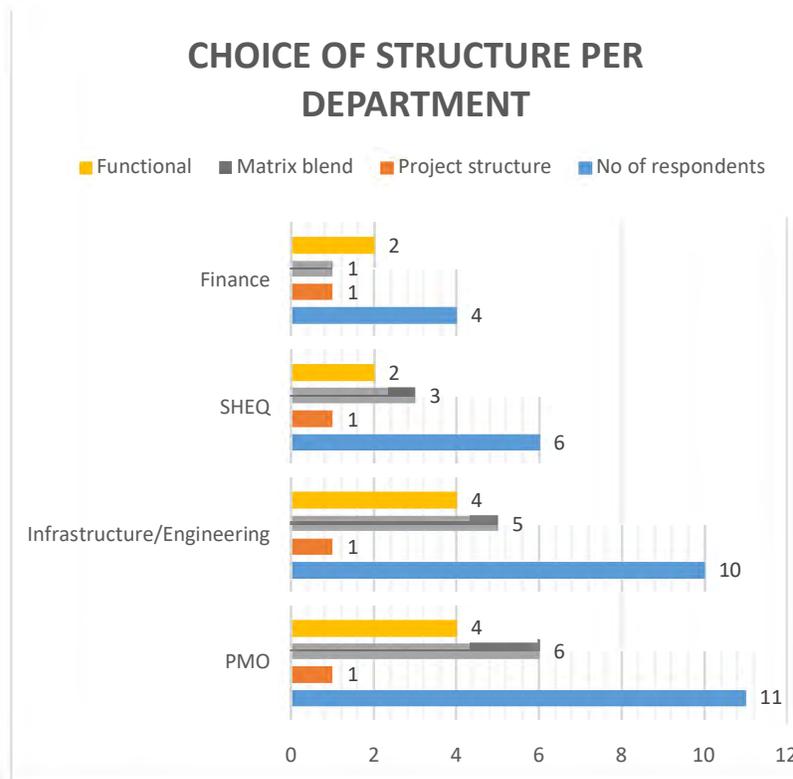
Figure 6: Type of structure used choice per department

- For the PMO department, out of the 11 participants, 9% chose the project-based structure, 55% chose the matrix management organization structure and 36% chose the functional structure.
- For the Infrastructure department, out of the 10 participants, 10% chose the project-based structure, 50% chose the matrix management organization structure and 40% chose the functional structure.
- For the SHERQ department, out of the 6 participants, 17% chose the project-based structure, 50% chose the matrix management organization structure and 33% chose the functional structure.
- For the Finance department, out of the 4 participants, 25% chose the project-based structure, 25% chose the matrix management organization structure and 50% chose the functional structure.

4.2.2. FOLLOW UP SEMI-STRUCTURED INTERVIEWS

A follow up interview in the form of a semi-structured interview was undertaken to unpack, discuss and to validate the results of the survey questionnaire that was done. Five participants (Senior Project Managers) were selected from the various offices of the organization, on a first come first serve basis depending on their availability and willingness to participate in the study.

4.3. THEME 1 – ENABLERS TO THE IMPLEMENTATION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE BY FUNCTIONAL AND PROJECT MANAGERS

The respondents were asked to choose the enablers that contributed to using the matrix management organisation structure that they agreed or disagreed with according to their experience of working with projects that are using the project matrix management organisation structure in the organisation. The enablers were based on the literature review conducted for the study. They were also requested to list any other enablers that were aware of that were not mentioned. The figure 7 below shows the respondents responses with regards to the enablers that they associate with the use of project matrix management organisation structure.
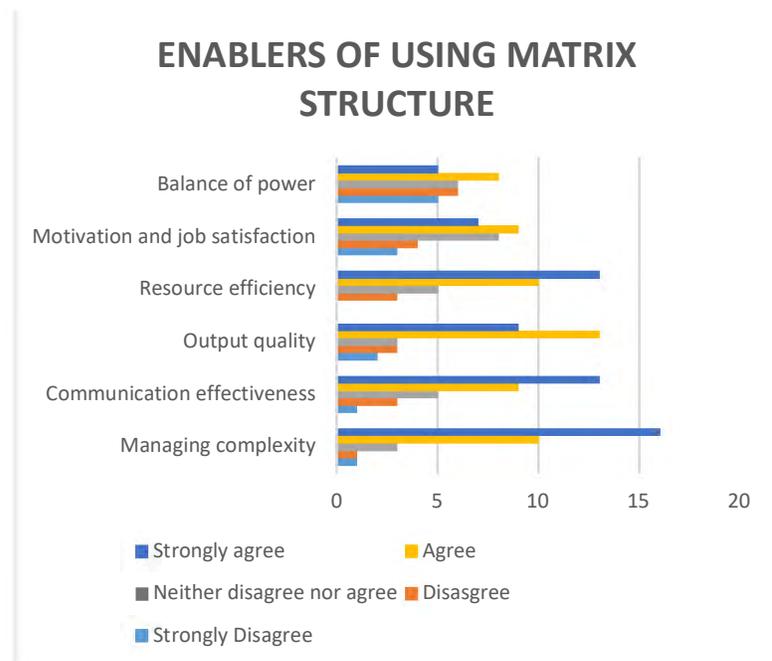
Figure 7: Enablers of using the matrix management organisation structure

The top enablers that the respondents strongly agreed with were managing complexity, resource efficiency as well communication effectiveness. They also agreed with output quality, managing complexity and resource efficiency. Out of the six enablers that were outcome of the literature review, the respondents unanimously agreed that **managing complexity** (26 respondents), **resource efficiency** (23 respondents**), Communication effectiveness** (13 respondents) and **Output quality** (13 respondents) were enablers of using the project structure according to their experience of working with this type of structure.

The top responses of respondents to neither agreeing nor disagreeing with the enablers of using the project matrix management organisation structure, are as follows: **Motivation and job satisfaction** (8 respondents), **Balance of power** (6 respondents); **Resource efficiency** (5 respondents) and **Communication effectiveness** (5 respondents). Even though most respondents have indicated that they agreed or strongly agreed with the communication effectiveness and resource efficiency; some respondents have indicated that in their project experience, they have not experienced these enablers.

The top enablers that the respondents disagreed with were: Balance of power; Motivation and job satisfaction; Resource efficiency; Output quality and Communication effectiveness. They also strongly disagreed with Balance of power, Motivation and job satisfaction and Output. Out of the six enablers that were outcome of the literature review, the respondents unanimously disagreed with the following enablers as compared to their experience of working with project matrix management organisation structures: **Balance of power** (11 respondents); **Motivation and job satisfaction** (8 respondents) and **Output quality** (5 respondents).

The respondents have provided the following comments as additional enablers of using the project matrix management organisation structures:

- Increase in development of employees by equipping in talent
- Clear project objectives
- Coordination of all elements of a project- project integration

The top three rated enablers lead to the adoption of the matrix management organisation structure within the organisation were as follows: **Managing complexity (16 respondents), Resource efficiency (13 respondents), and Communication effectiveness (13 respondents).** The top three rated enablers that the respondents strongly disagreed with were as follows: **Balance of power (5 respondents),**

Motivation and job satisfaction (4 respondents) and Output quality (2 respondents). Follow up interviews were undertaken to better understand the factors identified.

4.3.1. MANAGING COMPLEXITY

Three of the respondents agreed that the matrix management organisation structure help manage complexity of projects.

> *"It would be perfect if managed properly and it needs to be managed properly. If there no proper structures, then it's a problem." (Res3) "This would be achieved by a buy-in of resources, where no resource will prioritise function requirements over projects requirements. On the Matrix management organisation structure within the organisation, all the specialist resources also do their daily operations." (Res4)*

One of the respondents did not fully agree and one totally disagreed.

> *"Do not fully agree. Managing complexity entails getting to engage stakeholders and to resolve project complexity, it requires more effort as opposed to simple projects." (Res5) "No, the matrix management organization structure actually creates more complexity. It does not manage the complexity." (Res2)*

4.3.2. RESOURCE EFFICIENCY

All five of the respondents agreed that the matrix management organisation structure helps with resource efficiency.

> *"Yes, maybe an advantage, with the number of resources involved, you get to use more resources. The Functional Management (FM) and Project Management (PM) resources, PM structures already available. You don't need to procure more PM resources." (Res2) "There is a need to ensure that resources are optimized, as this could lead to redundancy and duplication of resources." (Res3). "Agree when you have a fully-fledged team." (Res4)*

4.3.3. COMMUNICATION EFFECTIVENESS

Four of the respondents agreed that the matrix management organisation structure helps with communication effectiveness.

> *"If there are meeting structures in place, reporting intervals and proper protocols; these would be the benefits, thus improving the communication." (Res3)*

One respond disagreed that the matrix management organization structure helps with communication effectiveness.

"View on the managing of projects, you need one centre of command and communication, with FM and PM resources you end up with conflict in communication. Messages that get to the Sponsors and Leadership are not always constant." (Res2)

4.3.4. BALANCE OF POWER

All five of the respondents disagreed that the balance of power is an enabler to the matrix management organisation structure.

"The matrix management organization structure is complex. PMs do not have power as they do not have 100% DOA, DOA is spread over top management, functional and PM. At the project management level there is imbalance of power. This not an advantage." (Res1) "The balance of power creates a havoc in terms of project politics, as there no focal point of power. The Project Managers should be reporting directly to the Project Steerco and the Project Sponsor; now there are layers in-between like Port Engineers and Functional representatives, they want to have more power." (Res2) "The issues of Delegation of Authority (DOA), the DOAs keep changing. When there is a new management or person in power the DOAs change. DOA's for people are not standard, people apply their powers as they see fit or to fulfill their mandates." (Res3) ". If all members are fully aware of what it means to be in a matrix management organization structure. If they don't understand then it's a problem. If the Project Manager is of a lower level, the Project Manager is taken as a coordinator within the organization especially if the team members are of a higher level. The balance of power is not advantage." (Res4)

4.3.5. MOTIVATION AND JOB SATISFACTION

Three respondents disagreed that motivation and job satisfaction is an enabler to the matrix management organisation structure.

"Not an advantage, it could be an advantage, but it ends up not being an advantage, because depends on how the resource usage was structured and negotiated." (Res1) "Not an advantage, what motivates in the PM space is dealing with the Sponsor directly, no middleman – now there are more people and different reports going to the Steerco, and moreover the roles of the parties are not clear and there is an overlap which causes conflicts. One cannot derive motivation and satisfaction from such a situation." (Res2)

One respondent disagreed that job satisfaction is an enabler to the matrix management organisation structure and agreed that motivation is an enabler to the matrix management organisation structure.

> *"It creates competition between teams and classifies them in terms of their job description. With regards to motivation, yes, it motivates people. Job satisfaction no, the matrix management organization structure boxes you in one place/role and one should be active in that role. It does not allow you to learn on the other disciplines unlike other companies who offer the exposure on other jobs that the resources might be interested on. For an example PMs who are previously from Engineering are torn between the other." (Res3)*

One respondent neither agreed nor disagreed that motivation and job satisfaction is an enabler to the matrix management organisation structure.

> *"In-between. There should be an opportunity to interview potential team members to ascertain the interest in the project. The gap should not be filled in with people who are not interested in working in the project space." (Res4)*

4.3.6. OUTPUT QUALITY

Two respondents agreed that output quality is an enabler to the matrix management organisation structure*.*

> *"Yes, but not in the fact that quality can be improved. People in the Functional departments are protecting their functions, they already know what the functional requirements are thus preparing for operational readiness. By using a different structure this can be achieved as well." (Res2) "*

Two respondents disagreed that output quality is an enabler to the matrix management organisation structure*.*

> *"Not an advantage. However, it could be an advantage if there are systems and processes put in place. Also, if internal resources are dedicated in a certain project. Processes and procedures should be set up correctly and be suitable for successful project delivery." (Res1) "It depends on the quality of the people you have in the organization. If you have inexperienced people, it becomes a problem, depends on who you have working on the projects." (Res3)*

One respondent neither agreed nor disagreed that output quality is an enabler to the matrix management organisation structure*.*

> *"In-between, buy in is required. The quality of the work could depend on the resources that were assigned to the project." (Res4)*

4.4. THEME 2: BARRIERS TO THE IMPLEMENTATION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE BY FUNCTIONAL AND PROJECT MANAGERS

The respondents were asked to choose the barriers that they agreed or disagreed with according to their experience of working with projects that are using the project matrix management organisation structure in the organisation. The barriers were based on the literature review conducted for the study. They were also requested to list any other barriers that were aware of that were not mentioned. The figure 8 below shows the respondents responses with regards to the barriers that they associate with the use of project matrix management organisation structure.

BARRIERS OF MATRIX STRUCTURE
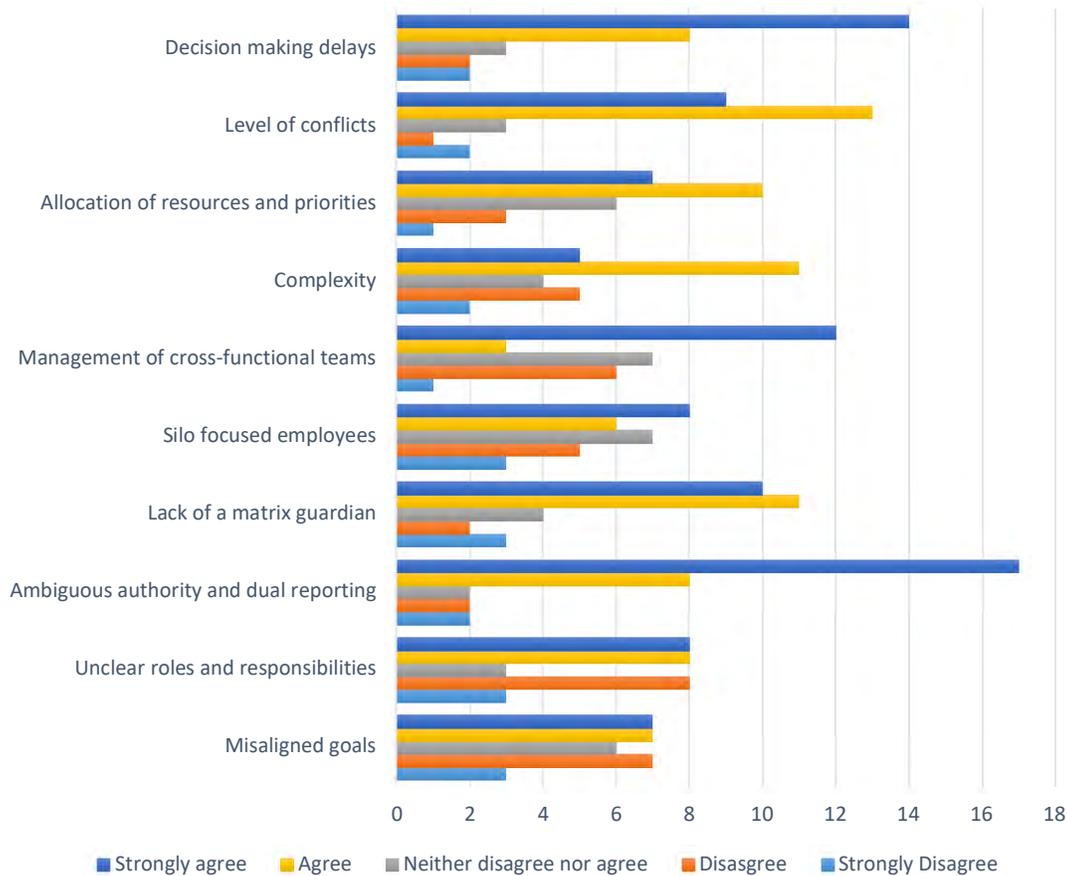
Figure 8: Barriers of matrix management organisation structure

The top barriers that the respondents strongly agreed with were: Ambiguous authority and dual reporting (17 respondents), Decision making delays (14 respondents), Management of cross-functional teams (12 respondents), Lack of a matrix guardian (10 respondents) and Level of conflicts (9 respondents). They also agreed with Level of conflicts (13 respondents), Lack of a matrix guardian and Complexity (11 respondents), Allocation of resources and priorities (10 respondents), Decision making delays; Ambiguous authority and dual reporting; and Unclear roles and responsibilities (8 respondents).

The top responses of respondents to neither agreeing nor disagreeing with the barriers of using the project matrix management organisation structure, are as follows: **Silo focused employees** (7 respondents), **Management of cross-functional teams** (7 respondents), **Misaligned goals** (6 respondents), **Allocation of resources and priorities** (6 respondents) and **Lack of a matrix guardian** (4respondents).

The top barriers that the respondents disagreed with were: Unclear roles and responsibilities (8 respondents), Misaligned goals (7 respondents), Management of cross-functional teams (7 respondents), Complexity (5 respondents) and Silo focused employees (5 respondents). They also strongly disagreed with Misaligned goals (3 respondents), Lack of a matrix guardian (3 respondents), Silo focused employees (3 respondents), Unclear roles and responsibilities (3 respondents), and Decision-making delays; Level of conflicts; Complexity and Ambiguous authority and dual reporting (2 respondents).

Out of the 12 barriers that were outcome of the literature review, the respondents unanimously agreed that **Ambiguous authority and dual reporting** (24 respondents), **Decision making delays** (22 respondents), **Management of cross-functional teams** (12 respondents), **Lack of a matrix guardian** (21 respondents) and **Level of conflicts** (22 respondents) were barriers of using the project structure according to their experience of working with this type of structure.

Out of the 12 barriers that were outcome of the literature review, the respondents unanimously disagreed with the following barriers as compared to their experience of working with project matrix management organisation structures: **Unclear roles and responsibilities** (11 respondents), **Misaligned goals** (10 respondents), **Management of cross-functional teams** (7 respondents), **Complexity** (7 respondents) and **Silo focused employees** (8 respondents).

The respondents have provided the following comments as additional barriers of using the project matrix management organisation structures:

- Conflicts between managers (linked to level of conflicts)
- Increase in overhead management costs
- Functional managers tend to avail the not so desired resources (linked to allocation of resources and priorities).

The top three rated barriers to the adoption of the matrix management organisation structure within the organisation were as follows: **Ambiguous authority and dual reporting (24 respondents)**, **Decision making delays (22 respondents)** and **Level of conflicts (9 respondents)**. The top three rated barriers that the respondents strongly disagreed with were as follows: **Unclear roles and responsibilities (11 respondents)**, **Misaligned goals (10 respondents)** and **Silo focused employees (8 respondents)**. An additional disadvantage that was provided by the respondents was that "the matrix management

organisation structure is associated with increase in overhead management costs", respondents were asked to advise if they agreed with this statement on not. Follow up interviews were undertaken to better understand the factors identified.

4.4.1. AMBIGUOUS AUTHORITY AND DUAL REPORTING

All five of the respondents agreed that ambiguous authority and dual reporting is a barrier to the matrix management organisation structure.

> *"It brings a lot of confusion. It is a huge disadvantage. We have a direct line of reporting with more dotted lines which is more confusing. Information reported differs or reported differently, depending on how each Department wants to report." (Res3)*

4.4.2. DECISION MAKING DELAYS

All five of the respondents agreed that decision making delays is a barrier to the matrix management organisation structure.

> *"If the PM can have 100% DOA in the project. The PM can make sure that the decision-making delays are not there. The hierarchy is too long and there are unnecessary levels to make a decision in the project matrix management organization structure." (Res 1) "We have a lot of delays and red tape in place. Our decision making takes too long, with more processes and red tape contributing to the delays." (Res 3)*

4.4.3. LEVEL OF CONFLICTS

All five of the respondents agreed that level of conflicts is a barrier to the matrix management organisation structure.

4.4.4. UNCLEAR ROLES AND RESPONSIBILITIES

All five of the respondents agreed that unclear roles and responsibilities is a barrier to the matrix management organisation structure.

"It is a disadvantage. If the resources are managed properly and structures are in place without diverting from the plan, these would be not disadvantages." (Res3)

4.4.5. MISALIGNED GOALS

All five of the respondents agreed that misaligned goals is a barrier to the matrix management organisation structure.

"The Project resources are aligned in terms of goals. Functional resources focus on operational goals, as things keep changing on the functional side and on projects all things are cast, and stone and changes are done via approval by the Steering Committee or Project Sponsor. Internally the resources have different goals. Expectations are not aligned." (Res2) "If the portfolio is managed properly, including the programme down to a project, this shouldn't be encountered in a project. The goals tend to differ with each layer and the structure should be set up to properly track these goals." (Res3)

4.4.6. SILO FOCUSED EMPLOYEES

Four of the respondents agreed that silo focused employees is a barrier to the matrix management organisation structure.

One of the respondents also disagreed that silo focused employees is a barrier to the matrix management organisation structure.

"Matrix management organization structure does not encourage silos, it encourages teamwork." (Res5)

4.4.7. INCREASE IN OVERHEAD MANAGEMENT COSTS

Four of the respondents agreed that increase in overhead management costs is a barrier to the matrix management organisation structure.

"Yes, I do agree, this is a disadvantage. There is a duplication of efforts, use of FM and PM resources. The lack of dedicated resources to a project actually caused this. Having a resource that is billed to the project and not dedicated to the project increases the costs, as when that resource is not available to do the work or not performing the work, you will need another

resource to undertake the work. This is adding more man-hours on the resources that were not planned. When individuals are assigned to do functions on the project and are not performing them or not productive, there are man-hours that are agreed on and the use of a different resource is adding on those costs. There are cost impacts linked to both resources." (Res1)

One of the respondents disagreed that increase in overhead management costs is a barrier to the matrix management organisation structure.

"This is not an issue of the matrix management organization structure, rather than an issue of structuring of the project. There is a duplication of resources, the Engineers are not doing Engineering work, they rely on work done by the Consultants and it also depends on the output. These two resources are being paid where the internal Engineer will spend hours reviewing work done by the Consultants. The project might have savings in costs where designs are done internally. To avoid the increase in cost one must do resource structuring, it is very important to get the right people for the right job." (Res3)

4.5. THEME 3: THE ROLE OF THE FUNCTIONAL MANAGER IN A MATRIX MANAGEMENT ORGANISATION STRUCTURE

The respondents were asked to choose the roles that they associate or believe that the Functional Managers should be performing in a project matrix management organisation structure. These roles were
based on the literature review conducted for the study. They were also requested to list any other roles that the Functional Managers should be performing and were not mentioned. The figure 9 below shows the respondent's responses with regards to the roles the functional managers should be performing in a project matrix management organisation structure.

ROLES OF FUNCTIONAL MANAGERS
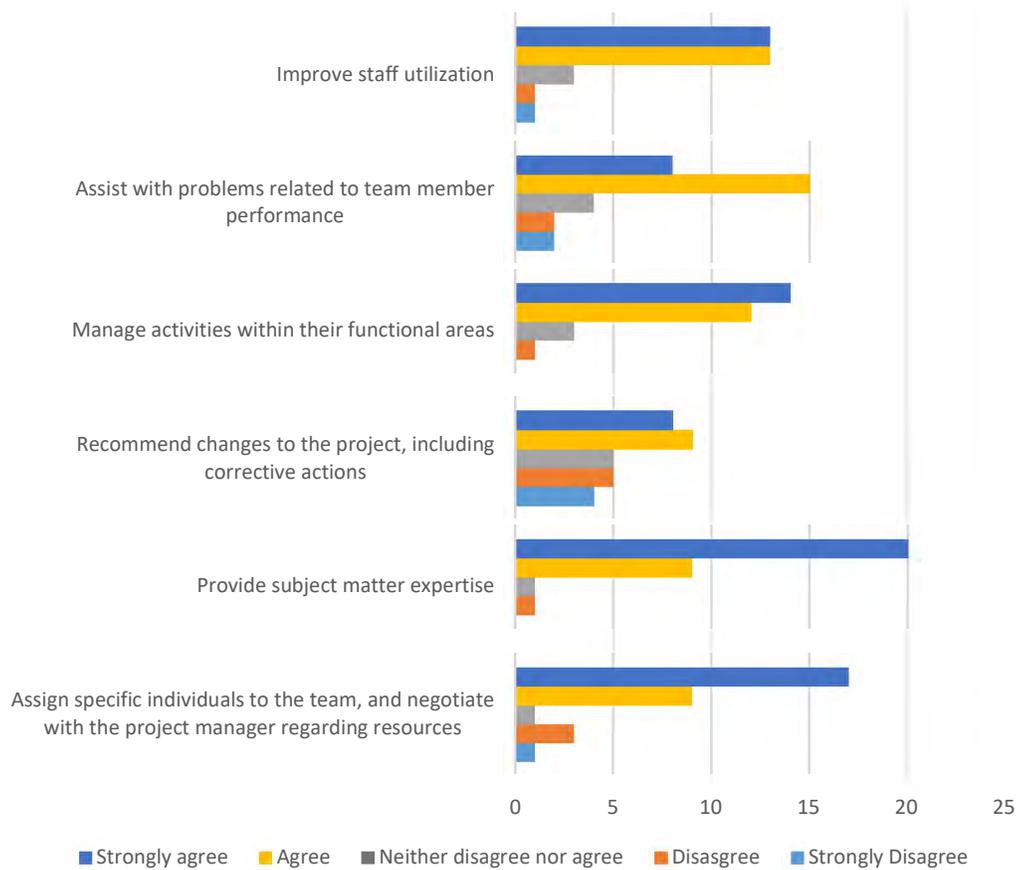
Figure 9: Roles of functional managers

The top roles of functional managers that the respondents strongly agreed with were: Provide subject matter expertise (20 respondents), Assign specific individuals to the team, and negotiate with the project manager regarding resources (17 respondents) and Manage activities within their functional areas (14 respondents). They also agreed with Assign specific individuals to the team and negotiate with the project manager regarding resources (15 respondents); Improve staff utilization (13 respondents) and Manage activities within their functional areas (14 respondents).

Out of the six roles of functional managers that were outcome of the literature review, the respondents unanimously agreed that **Provide subject matter expertise** (20 respondents), **Assign specific individuals to the team, and negotiate with the project manager regarding resources** (32 respondents) and **Manage activities within their functional areas** (28 respondents) were the roles of functional manager in a project matrix management organisation structure.

The top responses of respondents to neither agreeing nor disagreeing with the roles of functional managers in a project matrix management organisation structure, are as follows: **Recommend changes to the project, including corrective actions** (5 respondents), **Assist with problems related to team member performance** (4 respondents), **Improve staff utilization** (3 respondents), **and Manage activities within their functional areas** (3 respondents).

The top roles of functional managers in a project matrix management organisation structure that the respondents disagreed with were: Recommend changes to the project, including corrective actions (5 respondents), Assign specific individuals to the team, and negotiate with the project manager regarding resources (3 respondents), and Assist with problems related to team member performance (2 respondents). They also strongly disagreed with Recommend changes to the project, including corrective actions (4 respondents), Assist with problems related to team member performance (3 respondents), Improve staff utilization (1 respondent), and Assign specific individuals to the team, and negotiate with the project manager regarding resources (1 respondent).

Out of the six roles of functional managers in a project matrix management organisation structure that were outcome of the literature review, the respondents unanimously disagreed with the following roles as compared to their experience of working with project matrix management organisation structures: **Recommend changes to the project, including corrective actions** (9 respondents), **Assign specific individuals to the team, and negotiate with the project manager regarding resources** (4 respondents) and **Assist with problems related to team member performance** (5 respondents).

The respondents have provided the following comments as additional roles the functional managers should be performing in a project matrix management organisation structures:

- All HR related matters (salaries, leave and promotions)

The respondents agreed that these are the roles that should be performed by the functional or departmental managers in the matrix management organisation structure - top two roles: Provide subject matter expertise (20 respondents) and Manage activities within their functional areas (28 respondents). The respondents disagreed that the following roles should be performed by the functional or departmental managers in the matrix management organisation structure - top two roles: Recommend changes to the project, including corrective actions (9 respondents), and Assist with problems related to team member performance (5 respondents). The respondents both agreed and

disagreed with the following role, "Assign specific individuals to the team, and negotiate with the project manager regarding resources", the respondents were requested to choose whether they agreed or disagreed with this role. Follow up interviews were undertaken to better understand the factors identified.

4.5.1. PROVIDE SUBJECT MATTER EXPERTISE

All five of the respondents agreed that provide subject matter expertise is a role that should be performed by a Functional Manager in a matrix management organisation structure.

> "This is within the mandate and capacity of the Functional Manager. When a matrix management organization structure is utilized efficiently, this becomes an advantage. Functional Manager is in control of their resources and that function where the resource has been assigned to in a project requires a subject matter expert." (Res1) "Functional resources need to be able to advise on any technical issues on the project." (Res3)

4.5.2. MANAGE ACTIVITIES WITHIN THEIR FUNCTIONAL AREAS

All five of the respondents agreed that manage activities within their functional areas is a role that should be performed by a Functional Manager in a matrix management organisation structure.

> "The Functional Manager should make a plan on who will undertake the original role of their resource while this resource is performing certain activities on the project and in some instances when performing both their functional roles and project roles. Functional Manager should manage and provide alternate." (Res1) "Functional Manager must manage the assigned resources, as the resources are assigned on a temporary basis not seconded fully to the project." (Res5)

4.5.3. RECOMMEND CHANGES TO THE PROJECT, INCLUDING CORRECTIVE ACTIONS

Four of the respondents disagreed that recommend changes to the project, including corrective actions is not a role that should be performed by a Functional Manager in a matrix management organisation structure.

"They can recommend to the Sponsor or to the Steerco but not directly to the Project Manager. This could end up with challenges. The Sponsor – Project Manager relationship should be hard wired, any input to the project should be via the Sponsor and the Project Steerco, not directly to the team." (Res2) "They can recommend, they should not decide on behalf of the Project Manager. The final decision lies with the Project Manager." (Res3) "Provision of expert advice linked to correction and recommendations should be provided." (Res5)

One of the respondents agreed that recommend changes to the project, including corrective actions is not a role that should be performed by a Functional Manager in a matrix management organisation structure.

4.5.4. ASSIST WITH PROBLEMS RELATED TO TEAM MEMBER PERFORMANCE

Three of the respondents disagreed that assist with problems related to a team member performance is a role that should be performed by a Functional Manager in a matrix management organisation structure.

"This shouldn't be the role of a Functional Manager but rather a role of the Project Manager. The only instance a Functional Manager would be required is when a Project Manager has a problem with a Functional resource and the Project Manager should seek the assistance of a Functional Manager when it affects them to get intervention. What happens in a project is a role of a Project Manager. Team member performance is a role of a Project Manager." (Res 1) "Once a resource is assigned to a project, that resource should report to the Project Manager and if there are issues, the matter should be escalated to the Functional Manager for intervention." (Res2) "The Functional Managers should be involved when the matters has been escalated, then they need to come in and mediate." (Res5)

Two of the respondents agreed that assist with problems related to a team member performance is a role that should be performed by a Functional Manager in a matrix management organisation structure.

"This is a role of the Functional Manager. They are the ones that have assigned the resource." (Res3) "The team member could be overloaded with function responsibilities that are outside of

the project; the Line manager in this instance would be required to assist. The Project Manager can only offer support on project related matters." (Res4)

4.5.5. ASSIGN SPECIFIC INDIVIDUALS TO THE TEAM, AND NEGOTIATE WITH THE PROJECT MANAGER REGARDING RESOURCES

Four of the respondents agreed that assign specific individuals to the team and negotiate with the project manager regarding resources is a role that should be performed by a Functional Manager in a matrix management organisation structure.

> *"As a Project Manager you do not know who is working on which project and who is doing what. The Functional Manager has a bird's eye view of their team members in terms of workload and complexity, this should be a function of Departmental Manager/Functional Manager. The Functional Manager knows the subject matter expertise and which resources have strong skills that are required by the project." (Res3) "This should be the role of a Functional Manager because he/she aware of the departmental resources' workload and will be the one that assigns the resources to the project based on their workload. Also, for growth and exposure purposes. Negotiation will come into play with Functional Manager when the Project Manager advises what they require from the department in terms of skills required." (Res4) "The standards dictate that this should be done by the Functional Manager. Negotiation on the time to be spent by the resources on the project should be done by both the Project Manager and the Functional Manager." (Res5)*

One of the respondents disagreed that assign specific individuals to the team and negotiate with the project manager regarding resources is a role that should be performed by a Functional Manager in a matrix management organisation structure.

4.6. THEME 4: PROJECT PERFORMANCE IN TERMS OF COST AND SCHEDULE FOR MATRIX MANAGEMENT ORGANISATION STRUCTURE PROJECTS

4.6.1.   MATRIX MANAGEMENT ORGANISATION STRUCTURE AND COST PERFORMANCE OF PROJECTS

The respondents were asked if the projects that they have been working on under the project matrix management organisation structure have had any cost implications. The response is indicated on the figure 10 below. 58% of the respondents indicated that the projects that they have worked on had cost implications and that 42% did not have cost implications.

PROJECTS COST IMPLICATIONS
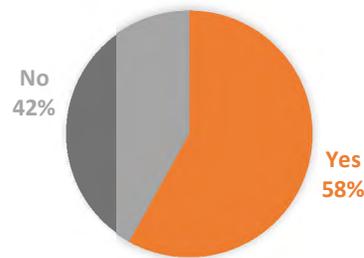
Figure 10: Projects cost Implications

A follow up question was to understand the type of cost implication that the respondents experienced in their projects. Figure 11 below indicated the type of implications as per the respondent's responses. 39% indicated that the projects that they have worked were completed on budget. 51% indicated that the projects that they have worked had an overspending of 0-20%. 10% indicated that the projects that they have worked had an underspending of 0-20%.
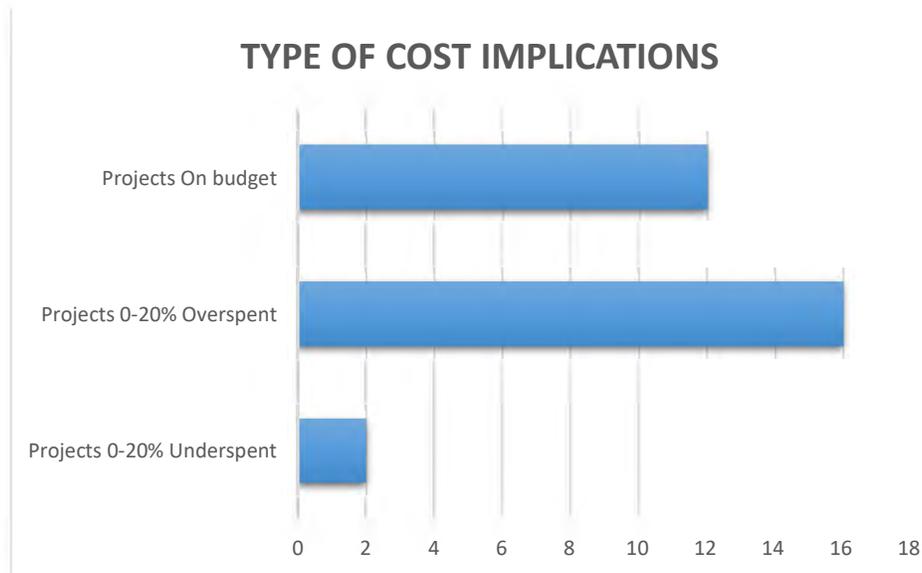
Figure 11: Type of cost Implications

Follow up interviews were undertaken to better understand the factors identified. The respondents were requested to advise according to their experience on working with projects using the matrix management organisation structure, whether the use of the structure has an impact on the cost performance of the project.

Three of the respondents advised that the use of the structure has an impact on the cost performance of the project:

"This is due to lack of 100% dedication to the project by the functional resources. The delays in decision making and also in delivering certain activities in project as the Project Manager does not have 100% authority on the project affect the project costs. The overhead costs are high, they play a bigger role in cost impact while the decision-making process takes place, the costs are accumulated." (Res1) "The use of this structure also depends on the maturity of the organization. FM resources and FM do not manage their costs effectively. On the project structure, there is a full management of resources which includes resource leveling and allocation. You know when and how the project resources will be utilized unlike on the Functional resources. The Function availability is a problem as they are required for function requirements as well as for project requirements." (Res2) "There are delays that are causing cost implications. If managed right from the onset, the projects should not have a cost implication. Depts. are under resourced and resources are overstretched. Often happens that functional staff is involved in other projects. The only way is to be assisted by additional resources with higher

rates, which leads to higher project costs than budgeted and waiting on resources that are not available from the onset." (Res4)

Two of the respondents advised that the use of the structure does not have an impact on the cost performance of the project:

"The structure does not have an impact on the cost of the project." (Res3)

4.6.2. MATRIX MANAGEMENT ORGANISATION STRUCTURE AND SCHEDULE PERFORMANCE OF PROJECTS

The respondents were asked if the projects that they have been working on under the project matrix management organisation structure have had any schedule implications. The response is indicated on the figure 12 below. 74% of the respondents indicated that the projects that they have worked on had schedule implications and that 24% did not have schedule implications.
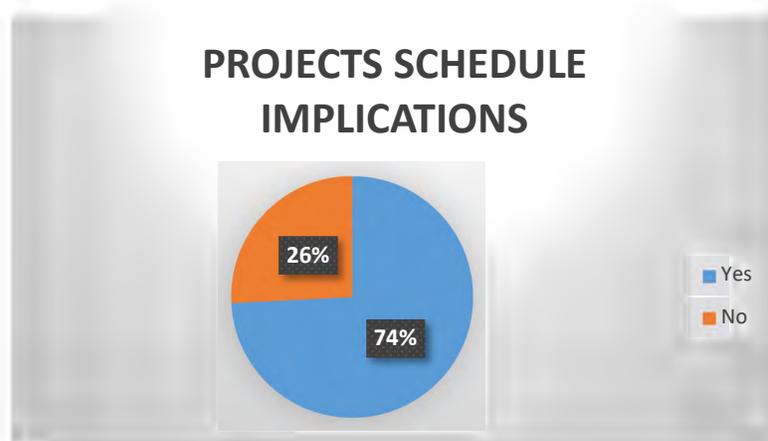
Figure 12: Projects schedule Implications

A follow up question was to understand the type of schedule implications that the respondents experienced in their projects. Figure 13 below indicated the type of implications as per the respondent's responses. 10% indicated that the projects that they have worked were completed ahead of schedule. 74% indicated that the projects that they have worked on were completed behind schedule. 16% indicated that the projects that they have worked on were completed on time.

SCHEDULE IMPLICATIONS
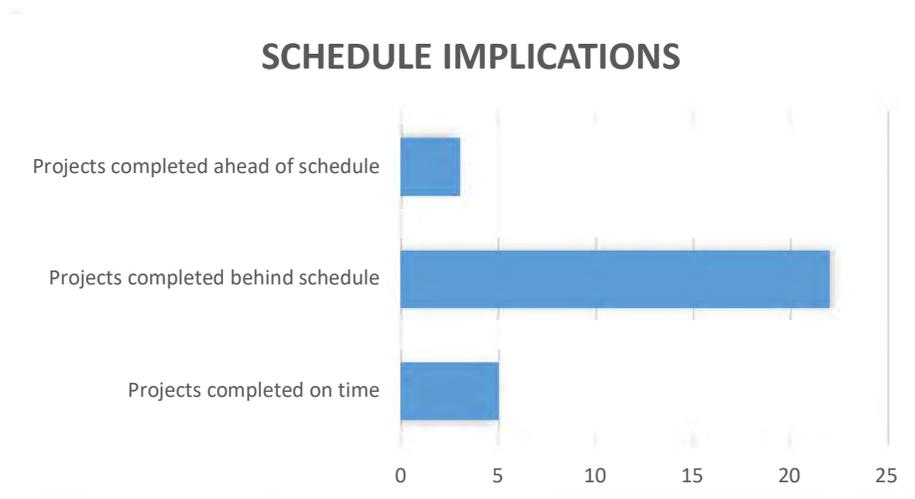
Figure 13: Type of schedule Implications

Follow up interviews were undertaken to better understand the factors identified. The respondents were requested to advise according to their experience on working with projects using the matrix management organisation structure, whether the use of the structure has an impact on the schedule performance of the project.

All of the respondents advised that the use of the structure has an impact on the schedule performance of the project:

> *"The reasons are the delays in decision making, lack of dedication by functional resources as well as delays in decision making. These delays are also affecting the schedule." (Res1) "FM staff may be forced to stop projects for a while to attend to operations. While the resource is busy with a task, they must stop the function within a project and attend to operations e.g., for two weeks at a time." (Res2) "The structure has an impact on the project schedule basing on the approval processes that the projects need to go through including control of funds." (Res3) "The resource constraints do contribute to the schedule impact. The impact on the project schedule could be minimized by addition of another resource which pushes costs up." (Res4)*

4.7. THEME 5: PROJECT ISSUES OR CHALLENGES OF PROJECTS USING MATRIX MANAGEMENT ORGANISATION STRUCTURE

The respondents were asked to choose the project issues or challenges that they experienced on the projects that are using project matrix management organisation structure. They were also requested to list any other project issues that were not mentioned. The figure 14 below shows the respondent's responses with regards to the project issues or challenges in a project matrix management organisation structure.
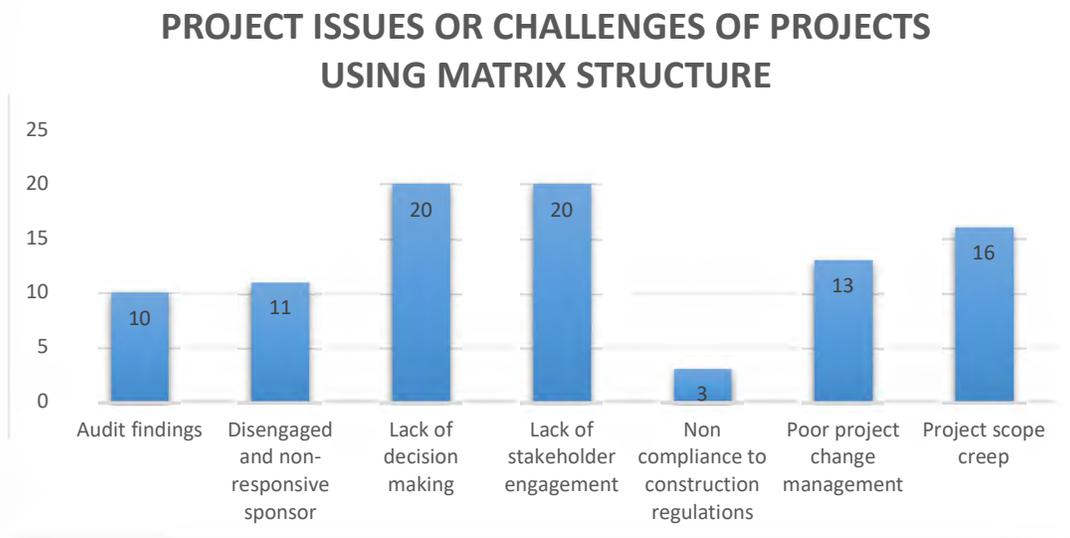
Figure 14: Project issues or challenges of projects using matrix management organisation structure

The highest rated issues or challenges were as follows:

- Lack of decision making - 67.74%
- Lack of stakeholder engagement - 67.74%
- Project scope creep - 48.39%
- Poor project change management - 45.16%

The respondents have provided the following comments as additional project issues or challenges that are experienced when using the project matrix management organisation structures:

- None of the above
- People tended to prioritize those projects that they enjoyed or received most recognition and reward for - at the expense of other projects that they were also assigned to
- No one taking responsibility for the overall targets.
- Under performance from other departments/team members

Follow up interviews were undertaken to better understand the factors identified (highest rated issues or challenges).

4.7.1. LACK OF DECISION MAKING

All of the respondents agreed that the lack of decision making is a project issue or challenge that is experienced when using the project matrix management organisation structures:

> *"Very serious. This is caused by lack of project leadership which is very poor. Project sponsors do not know their roles and what they are supposed to do which leads to lack of decision making. The matrix management organisation structure is set up wrong. It is what is making a problem to our projects. The different forums (project meetings and statutory meetings) are not speaking to each other, the structuring is not correct." (Res2) "The biggest issue is the approval of projects as the process takes long." (Res03) "Another challenge is the lack of understanding of the structure and how it works. Simple or straightforward projects could be done without using the structure, the more complicated the projects the more complex the structure can be. With experience the use of the structure can be improved. It depends on the project at hand." (Res5)*

4.7.2. LACK OF STAKEHOLDER ENGAGEMENT

All the respondents agreed that the lack of stakeholder engagement is a project issue or challenge that is experienced when using the project matrix management organisation structures:

> *"Biggest issue, as stakeholders and sponsors are usually not involved in the project and when the decision making needs to take place, it becomes an issue." (Res3)" This contributes to other*

challenges as well. People are not empowered to make decisions and the only way to empower is to engage." (Res4)

4.7.3. PROJECT SCOPE CREEP

Three of the respondents agreed that the project scope creep is a project issue or challenge that is experienced when using the project matrix management organisation structures:

"Highest. This is caused by lack of stakeholder engagement if there's no buy in and no one knows what is done. People are usually left behind on stakeholder engagement." (Res4)

Two of the respondents disagreed that the project scope creep is a project issue or challenge that is experienced when using the project matrix management organisation structures:

"This can be managed not an issue." (Res2) "This is slowly being controlled and managed well, so this is not an issue." (Res3)

4.7.4. POOR PROJECT CHANGE MANAGEMENT

Three of the respondents agreed that the poor project change management is a project issue or challenge that is experienced when using the project matrix management organisation structures:

"Our change processes are very bad. Conflicting decisions are made. There are different processes on how to manage change." (Res3)

Two of the respondents disagreed that the poor project change management is a project issue or challenge that is experienced when using the project matrix management organisation structures:

"This can be managed not an issue." (Res2) "Only poor if there are people that are not engaged in the project, people that are only involved at a later stage." (Res4)

4.8. CONCLUSION

The researcher started off by describing the case and the current situation of the organisation that she works in; this has provided the reader with a background and context for the study. Data was gathered from the surveys and follow up interviews were done to unpack discuss and validate the results of the

surveys. The findings of the study were outlined and discussed on this chapter. The findings were grouped into themes which were discussed and linked into the literature review that was undertaken for this study.

The next chapter will discuss the analysis and results of the data obtained and summarise the research findings and interpretations based on the research questions of this study as well as the recommendations for future research.

CHAPTER 5: DISCUSSION OF FINDINGS

5. INTRODUCTION

This chapter discusses the analysis and results of the data obtained and summarises the research findings and interpretations based on the research questions of this study as well as the recommendations for future research.

5.1. RESEARCH OBJECTIVES REVISITED

The first step of this research was to determine whether the employees were aware of this type of the project management structure which is currently being used by the organisation that the researcher works for. A description of the three project structures was given to assist the respondents in responding and aligning their answers to the description that most resembles the status of the project management within the organisation. 48% of the respondents responded that the organisation is using the project matrix management organisation structure. 39% of the respondents responded that the organisation is using the functional structure. 13 % of the respondents responded that the organisation is using the project-based structure.

The organization for the longest time did not have a dedicated Project Management Office with fully fledged resources that are required to support a project. The organisation was using a functional project structure before the introduction of a dedicated projects office. When the project matrix management organisation structure was introduced, there was no formal introduction of the projects office, which resulted in some employees not being aware of the new type of project structure that was used, which is the project matrix management organisation structure. There was a bit or resistance at first, with some employees continuing to prioritise their functional work even though they are also assigned to project work. The organisation has never used the project-based structure at any point.

 Even though most of the respondents have responded that the organisation is using a project matrix management organisation structure, there is a need for an awareness of the project matrix management organisation structure to the employees. A roadshow or workshop needs to be done to fulfil this purpose. An awareness of the of project matrix management organisation structures, how they work, advantages, disadvantages, how can we make them work and the roles of the employees

working on this type of structure needs to be done. When employees are aware of the whole picture, instead of understanding a small part of the picture; they will be more likely to perform better as they will understand what their role is on the success of the project; and the importance thereof. The researcher has done extensive literature review on this case which will assist the organisation in doing an extensive awareness of the project matrix management organisation structure.

Even though a high number of employees indicated that the organisation is using a project matrix management organisation structure, a high number of employees indicated that a functional structure is used which was phased out when the organisation introduced a PMO department around 2015. The organisation now uses a project matrix management organisation structure. The organisation has never used a project structure. A robust awareness needs to be undertaken. A roadshow or workshop needs to be done to fulfil this purpose. An awareness of the of project matrix management organisation structures, how they work, advantages, disadvantages, how can we make them work and the roles of the employees working on this type of structure needs to be done. The matrix management organisation structure also needs to be implemented correctly by having an awareness session for all the departments and disciplines that are involved or work in projects.

5.1.1. TO IDENTIFY THE ENABLERS TO THE IMPLEMENTATION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE BY FUNCTIONAL AND PROJECT MANAGERS

The summary of enablers that the respondents agreed or disagreed to according to their experience with working with project matrix management organisation structures are shown on the table 9 below.

AGREE AND STRONGLY AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE AND STRONGLY DISAGREE	RESPONDENTS INPUT
Managing complexity (26 respondents)	**Motivation and job satisfaction** (8 respondents)	**Balance of power** (11 respondents)	**Increase in development of employees by equipping in talent**
Resource efficiency (23 respondents**)**	**Balance of power** (6 respondents)	**Motivation and job satisfaction** (8 respondents)	**Clear project objectives**

Communication effectiveness (13 respondents)	Resource efficiency (5 respondents)	Output quality (5 respondents)	Coordination of all elements of a project-project integration
Output quality (13 respondents)	Communication effectiveness (5 respondents)		

Table 8: Summary of enablers to the implementation of project matrix management organisation structure

The respondents agreed that the enablers to the implementation of the project matrix management organisation structure are managing complexity, resource efficiency, communication effectiveness and output quality. In addition, the respondents added the following enablers: Increase in development of employees by equipping in talent; Clear project objectives and Coordination of all elements of a project-project integration.

The awareness or workshopping the employees on this type of structure will assist with improving the understanding that the employees have of this structure. When they are aware of the enablers or benefits or advantages that are associated with this structure, their understanding will change. They will be more open to working with the structure and realising that the advantages are working in their favour and the project performance will improve**.**

5.1.2. TO IDENTIFY THE BARRIERS TO THE IMPLEMENTATION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE BY FUNCTIONAL AND PROJECT MANAGERS

It is important for the employees to understand the barriers of using the project matrix management organisation structure. Understanding these barriers will assist the employees in identifying them, working around them, or finding ways to ensure that these barriers do not work against the project but are used as steppingstones to ensure success. Being aware of the barriers will also enable the project team to work together in finding solutions towards them.

The summary of barriers that the respondents agreed or disagreed to according to their experience with working with project matrix management organisation structures are shown on the table 10 below.

AGREE AND STRONGLY AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE AND STRONGLY DISAGREE	RESPONDENTS INPUT
Ambiguous authority and dual reporting (24 respondents)	Silo focused employees (7 respondents)	Unclear roles and responsibilities (11 respondents)	Conflicts between managers
Decision making delays (22 respondents)	Management of cross-functional teams (7 respondents)	Misaligned goals (10 respondents)	Increase in overhead management costs
Management of cross-functional teams (12 respondents)	Misaligned goals (6 respondents)	Management of cross-functional teams (7 respondents)	Functional managers tend to avail the not so desired resources
Lack of a matrix guardian (21 respondents)	Allocation of resources and priorities (6 respondents)	Complexity (7 respondents)	
Level of conflicts (22 respondents)	Lack of a matrix guardian (4respondents).	Silo focused employees (8 respondents)	

Table 9: Summary of barriers to the implementation of project matrix management organisation structure

The respondents agreed that the barriers to the implementation of the project matrix management organisation structure are ambiguous authority and dual reporting, decision making delays, management of cross-functional teams, lack of a matrix guardian and level of conflicts. In addition, the respondents added the following barriers: conflicts between managers, increase in overhead management costs and functional managers that tend to avail the not so desired resources.

Making the project teams aware of the barriers or disadvantages of project matrix management organisation structure will assist the project teams in coming up with ways to resolve the negative issues or work-around the issues that are barriers and finding working solutions for future projects.

5.1.3. TO UNDERSTAND THE ROLE OF THE FUNCTIONAL MANAGER IN A MATRIX MANAGEMENT ORGANISATION STRUCTURE

The roles of the project manager are easily understandable in the way that the project manager is the overall responsible person for a project. When it comes to the project matrix management organisation structure, the project manager duties are shared with that of the functional managers. In many cases there are blurred lines when it comes to the distinction of these roles and it sometimes results in conflicts. These conflicts are caused by a number of things, but the biggest contributor is ambiguous authority and dual reporting.

The summary of the roles functional managers should be performing in a project matrix management organisation structure that the respondents have agreed or disagreed to according to their experience with working with project matrix management organisation structures are shown on the table 11 below.

AGREE AND STRONGLY AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE AND STRONGLY DISAGREE	RESPONDENTS INPUT
Provide subject matter expertise (20 respondents)	Recommend changes to the project, including corrective actions (5 respondents)	Recommend changes to the project, including corrective actions (9 respondents)	All HR related matters (salaries, leave and promotions)
Assign specific individuals to the team, and negotiate with the project manager regarding resources (32 respondents)	Assist with problems related to team member performance (4 respondents)	Assign specific individuals to the team, and negotiate with the project manager regarding resources (4 respondents)	
Manage activities within their functional areas (28 respondents)	Manage activities within their functional areas (3 respondents).	Assist with problems related to team member performance (5 respondents)	
	Improve staff utilization (3 respondents)		

Table 10: Summary of roles of functional managers in a project matrix management organisation structure

The understanding of the respondents in this question assisted the researcher in understanding which roles do the employees expect the functional managers to do and which ones do they feel that they should not be done by the functional manager. The delineation of roles and responsibility would assist with equipping the employees in terms of knowing what roles they should expect from both the functional and project managers as these roles are different. For the matrix management organisation structure to work, each individual needs to perform their job accordingly.

In addition to each party understanding their roles and responsibilities within a project, a formal appointment letter needs to be done citing each parties' responsibilities, discussed, and signed off. The delineation of roles and responsibility would assist with equipping the employees in terms of knowing what roles they should expect from both the functional and project managers, including those of employees involved in the project. For the matrix management organisation structure to work, each individual needs to perform their job accordingly. A responsibility assignment matrix, also known as Responsible Accountable Consulted Informed (RACI) matrix/chart should be used, which will assist in describing the participation of different roles in the project in terms of their tasks or responsibilities or deliverables within the project. This chart could assist with ensuring that the issues of decision making, and project change management (including scope changes) are eliminated in a project.

5.1.4. TO UNDERSTAND THE COST AND SCHEDULE PERFORMANCE OF PROJECTS UNDERTAKEN IN A MATRIX MANAGEMENT ORGANISATION STRUCTURE

Project management focuses mainly on three key metrics as measures of project success which are cost, schedule, and performance. The cost and schedule are key performance indicators for projects. The project's successful deliver is measured by the overall cost performance and the ability to meet the project deadlines which is schedule performance.

Most respondents indicated that majority of their projects had cost implications (58%) and that most projects had an overspending of 0-20% variance (51%). There is a small percentage of respondents (10%) which indicated that the projects that they had worked on had an underspending of 0-20% variance.

74% indicated that the projects that they have worked on were completed behind schedule. 16% indicated that the projects that they have worked on were completed on time.

The responses that were received for this question have indicated that the use of the matrix management organisation structure has a bad impact on the performance of projects; the projects that the respondents have worked on using this type of structure have performed badly in terms of costs and schedule.

A matrix guardian needs to be appointed. This does not need to be a new position in the organisation but rather an appointment within the existing management to play this role. A matrix guardian needs to be a person that is well aware of all the company processes and have an extensive knowledge in project management. This person should be senior to the project management staff and needs to play an oversight role in terms of ensuring that the projects are running smoothly. Most companies do not track the performance of their matrix management organisation structure to understand how well the company operates under the matrix management organisation structure. By monitoring the performance, the leaders are able to get a full picture of what is happening in the ground. It would also be easier for them to identify any problems and take the necessary steps to fix them.

5.1.5. TO UNDERSTAND THE ISSUES OR CHALLENGES OF PROJECTS UNDERTAKEN IN A MATRIX MANAGEMENT ORGANISATION STRUCTURE

The respondents were asked to choose the project issues or challenges that they experienced on the projects that are using project matrix management organisation structure. They were also requested to list any other project issues that are associated with the adoption of this type of structure. The highest rated issues or challenges were the lack of decision making, lack of stakeholder engagement, project scope creep and poor project change management. The respondents also added that people who worked in the matrix management organisation structure tended to prioritize those projects that they enjoyed or received most recognition and reward for - at the expense of other projects that they were also assigned to. They also added that there is no one taking responsibility for the overall targets of the projects that they worked on. Finally, there was an under performance from other departments/team members that are working on the projects under this type of structure.

The understanding of this type of structure plays a huge role in the ability of the employees to understand and comprehend a concept. On grasping the concept and being familiarised with it, one then is able to perform well when they understand the concept. This is the case with the use of the project matrix management organisation structure. When the employees are aware of what the structure aims to achieve, how it works and what the benefits of using it are; and also, what challenges are associated with it. The research was aimed at understanding the factors that hinder or contribute to the adoption of the structure and understanding and knowing how it works would assist the SOE a great deal. It is important to check what the understanding of the employees is with regards to the structure; what has driven this understanding and whether the factors behind are unfounded or not.

The respondent's understanding is that this type of structure, due to the number of the managers that are involved lacks decision making. This is due to the lack of communication and stakeholder engagement (which is also an issue that was highlighted as lacking). Due to the number of managers that are involved having a say in the project, the project scope creep is a challenge or issue that the employees have raised. The lack of proper signed off project structures and involvement of many managers also results in poor project change management; even though change management processes are in place. The delineation of roles and setting up of project structures to support the change management process could assist with minimizing the challenges and issues that are experienced when using this type of project structure.

 A responsibility assignment matrix, also known as Responsible Accountable Consulted Informed (RACI) matrix/chart should be used, which will assist in describing the participation of different roles in the project in terms of their tasks or responsibilities or deliverables within the project. This chart could assist with ensuring that the issues of decision making, and project change management (including scope changes) are eliminated in a project.

Employees working on project matrix management organisation structures need to be inducted prior to the involvement of them in the project. A project alignment meeting should be set up where all the parties involved in the project should be gathered and inducted on this type of project structured. The advantages and advantages should be discussed with the aim of informing the employees working on this structure on what they should expect and where to address any concerns that they have.

Whilst some of the employees indicated that there were no issues that they experienced; some employees did indicate the fact that the prioritization of work by some employees was affecting the performance of the projects and the underperformance that comes with this issue. Employees working on this structure should be thoroughly inducted, their roles and responsibilities should be clearly indicated upfront and if possible, the duration that they will be required to work on the project if they are Operational staff. In instances where the requirement for a resource clashes with the resource's main functional job; this should be discussed upfront to avoid conflicts that might arise during the duration of the project. The reporting lines should be clear and decision makers should be clearly indicated to avoid delays during decision making. The communication should be set such that it flows freely between all the resources in a project and a Project Manager should ensure that communication takes place and all the parties involved in the project are always on the same page.

The overall understanding that the employees have of this structure is poor. Employees working on project matrix management organisation structures need to be inducted prior to the involvement of them in the project. A project alignment meeting should be set up where all the parties involved in the project should be gathered and inducted on this type of project structure. The advantages and advantages should be discussed with the aim of informing the employees working on this structure on what they should expect and where to address any concerns that they have. A project specific organogram should be drawn up for every project, indicating the stakeholders as well as the Sponsors and relevant functional management applicable for that certain project. This will assist in securing that the correct stakeholders are identified and involved from the start of the project. These organograms should be linked to the RACI charts to ensure the speed of decision making.

5.2. THE RESEARCH QUESTION

The research question stated in chapter one is:

What are the factors to be considered in the adoption of the matrix management organisation structure within a State-Owned enterprise?

Based on the conclusions drawn from the objectives discussed above it is clear that the research question has been answered.

5.3. RESEARCH PROPOSITION

The research proposition stated in chapter one is:

A clearer understanding of the factors that hinder or support the State-Owned Enterprise with the adoption of the matrix management organisation structure can improve the meeting of project objectives.

The research proposition has been met.

5.4. SUMMARY AND FUTURE RECOMMENDATIONS

The aim of the research was to investigate the factors that hinder or contribute to the adoption of the matrix management organization structure within State-Owned Enterprises. The study was aimed at determining the factors that contribute to the misunderstanding of the application of the matrix management organisation structure, in the management of projects in a State-Owned Enterprise. Even though most of the respondents have responded that the organisation is using a project matrix management organisation structure, there is a need for an awareness of the project matrix management organisation structure to the employees as some employees are not even aware what a project matrix is. The enablers to the implementation of the project matrix management organisation structure are managing complexity, resource efficiency, communication effectiveness and output quality. The barriers to the implementation of the project matrix management organisation structure are ambiguous authority and dual reporting, decision making delays, management of cross-functional teams, lack of a matrix guardian and level of conflicts. The roles of that the functional manager should be performing and not performing on this type of structure were also selected.

Most respondents indicated that the projects that they have worked on had cost implications with 39% of the respondents indicating that the projects that they have worked were completed on budget. 51% indicated that the projects that they have worked had an overspending of 0-20%. 10% indicated that the projects that they have worked had an underspending of 0-20%. 74% indicated that the projects that

they have worked on were completed behind schedule. 16% indicated that the projects that they have worked on were completed on time.

The understanding is that this type of structure, due to the number of the managers that are involved lacks decision making. This is due to lack to the lack of communication and stakeholder engagement (which is also an issue that was highlighted as lacking).

The results of this survey are very important to the organization as this is an indication of the outlook towards this type of structure that the organization has introduced. There are recommendations that are put forward aiming to improve the perception of employees towards this structure which could assist the organization in improving the performance of its projects

The outcome of this study was that the projects that are undertaken using project matrix management organisation structures are not performing well.

The recommendation for future research would be:

To investigate the factors that are affecting the performance of projects in project matrix management organisation structures.

REFERENCES

Amaratunga, D., Baldry, D., Sarshar, M. & Newton, R. J. W. S. 2002. Quantitative and qualitative research in the built environment: application of "mixed" research approach.

Archibald, R. D. 2003. Managing high-technology programs and projects, John Wiley & Sons.

Atkinson, P. 2003. Managing chaos in a matrix world. 47, 8-11.

Baber, W. 1990. Matrix organization theory and environmental impact assessment. 27, 235-252.

Baldwin, J. N., Farley, Q. 1991. Comparing the public and private sectors in the United States: A review of the empirical literature. 27-39.

Bartlett, C. A. & Ghoshal, S. 1990. Matrix management: Not a structure, a frame of mind. 68, 138-145.

Blumberg, C., Cooper, D. & Schindler, S. J. B. I. 2008. Research methods. 2, 130-139.

Bozeman, B. Mitchell, M., Leaf, P. 1979. Public management and policy analysis. New York: St. 12, 133148.

Braun, V. & Clarke, V. 2006. Using thematic analysis in psychology. 3, 77-101.

Brown, J. L. & Agnew, N. 1982. The balance of power in a matrix management organisation structure. 25, 51-54.

Burton, R., Obel, B. & Haakonsson, D. 2015. How to get the matrix organization to work. 4, 37-45.

Carter, S. M. & Little, M. 2007. Justifying knowledge, justifying method, taking action: Epistemologies, methodologies, and methods in qualitative research. 17, 1316-1328.

Chomeya, R. 2010. Quality of psychology test between Likert scale 5 and 6 points. 6, 399-403.

Cleland, D. 1972. 1. and William R. King, Management: A Systems Approach. New York: McGraw-Hill, Inc.

Cole, R. 1988. The public sector: The conflict between accountability and efficiency. 47, 223-232.

Collis, J. & Hussey, R. 2014. Business Research. sl. Palgrave Macmillan.

Cooper, D. R. & Schindler, P. 2006. Marketing research, McGraw-Hill/Irwin New York.

Creswell, J. W. 2014. A concise introduction to mixed methods research, SAGE publications.

Danilovic, M. & Sandkull, B. 2005. The use of dependence structure matrix and domain mapping matrix in managing uncertainty in multiple project situations. 23, 193-203.

Davis, S. M. & Lawrence, P. 1978. Problems of matrix organizations. 56, 131-142.

Darke, P. et al. 1998. Successfully Completing Case Study Research: Combining Rigour, Relevance and

Day, P. & Klein, R. 1987. Accountabilities: five public services, Taylor & Francis.

De Vos, A. S., Delport, C., Fouche, C. B. & Strydom, H. 2011. Research at grass roots: A primer for the social science and human professions, Van Schaik Publishers.

Derven, M. J. T. D. 2010. Managing the matrix in the new normal. 64, 42-47.

Duniliec, E. J. W. P. 2009. Marketing międzynarodowy (International marketing).

Dunne JR, E. J., Stahl, M. J. & Melhart Jr, L. 1978. Influence sources of project and functional managers in matrix organizations. 21, 135-140.

Easterby-Smith, M. T. & Thorpe, R. 2002. R. and Lowe, A. (2002). 2, 342.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research. The Academy of Management Review. Volume 14, Number 4, pp 532 - 550

Ford, R. C. & Randolph, W. 1992. Cross-functional structures: A review and integration of matrix organization and project management. 18, 267-294.

Galbraith, J. R. 1973. Designing complex organizations, Addison-Wesley Longman Publishing Co., Inc.

Galbraith, J. R. 2000. Designing the global corporation, Jossey-Bass.

Galbraith, J. R. 2008. Designing matrix organizations that actually work: How IBM, Proctor & Gamble and others design for success, John Wiley & Sons.

Galbraith, J. R. 2014. Designing organizations: Strategy, structure, and process at the business unit and enterprise levels, John Wiley & Sons.

Galbraith, J. R. & Galbraith, J. R. 1977. Organization design, Prentice Hall.

Galbraith, J. R. 1971. Matrix organization designs How to combine functional and project forms. 14, 29-40.

Goddard, A. 1992. Perspectives on management control in a multiple agency, community service. 8, 115-128.

Goldkuhl, G. 2012. Pragmatism vs interpretivism in qualitative information systems research. 21, 135-146.

Goold, M. & Campbell, A. 2003. Structured networks: towards the well-designed matrix. 36, 427-439.

Gos, K. 2015. The Key Advantages and Disadvantages of Matrix Organizational Structures. 66-83.

Gotlieb, M. R. 2007. The Matrix organization reloaded, Praeger Publishers.

Gray, D. E. 2013. Doing research in the real world, Sage.

Greiner, L. 1998. Evolution and revolution as organizations grow. 76, 55-64.

Guterl, F. 1989. Goodbye, old matrix. 133, 32-38.

Hasson, D. & Arnetz, B. 2005. Validation and findings comparing VAS vs. Likert scales for psychosocial measurements. 8, 178-192.

Herzog, V. 2001. 2000 International Student Paper Award Winner: Trust Building on Corporate Collaborative Project Teams. 32, 28-37.

Huft, M. 1995. Cross-functional working relationships in marketing. 23, 351-357.

Jacques, P. H., Garger, J. & Thomas, M. J. M. R. N. 2008. Assessing leader behaviours in project managers.

Jensen, E. & Laurie, C. 2016. Doing real research: A practical guide to social research, Sage.

Jonczy, J., Wereda, W. 2014. Diagnosis of organizational efficiency as a condition of changes in public management. 7.

Joyce, W. 1986. Matrix organization: A social experiment. 29, 536-561.

Kerzner, H. 1984. Project Management—A system approach to planning, scheduling and controlling Van Nostrand Reinhold Company Inc New York.

Kilmann, R. J. S., Foresman & Company, G., IL 1985. Contemporary Organization Development.

Kishore, N., Pretorius, J. & Chattopadhyay, G. The Roles of Functional Managers and Project Managers in a Matrix Organization. 2019 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), 2019. IEEE, 784-788.

Knight, K. 1977. Matrix management, Gower Press.

Knight, K. 1976. Matrix organization: a review. 13, 111-130.

Kolodny, H. 1979. Evolution to a matrix organization. 4, 543-553.

Kuhn, T. S. 1970. Criticism and the growth of knowledge: Volume 4: Proceedings of the International Colloquium in the Philosophy of Science, London, 1965, Cambridge University Press.

Kuprenas, J. 2003. Implementation and performance of a matrix organization structure. 21, 51-62.

Larson, E. W. & Gobeli, D. 1987. Matrix management: Contradictions and insights. 29, 126-138.

Lawrence, P. R., Kolodny, H. F. & Davis, S. 1977. The human side of the matrix. 6, 43-61.

Lee, S. 1992. Quantitative versus qualitative research methods—Two approaches to organisation studies. 9, 87-94.

Leedy, P. D. & Ormrod, J. E. 2005. Practical research, Pearson Custom.

Leedy, P. D. & Ormrod, J. E. 2016. Practical research: Planning and design. Hoboken. NJ: Pearson.

Leufkens, A. S. & Noordehaven, N. 2011. Learning to collaborate in multi-organizational projects. 29, 432-441.

Lincoln, N. 2005. The Sage handbook of qualitative research, Sage.

Ludwig, S. J. M. R. 1970. The move to matrix management. 59, 60-65.

Marshall, C. & Rossman, G. B. 2016. Designing qualitative research. Loss Angeles. CA: SAGE.

Minavand, H., Farahmandian, S. & Minaei, V. 2013. HR challenges of project managers.

Mogorosi, L. 2009. Steps in Research and Thesis writing process.

Moodley, D., Sutherland, M., Preterms, P. 2016. Comparing the power and influence of functional managers with that of project managers in matrix organisations: The challenge in duality of command. 19, 103-117.

Morrison, J. M., Smit, E. & Brown, C. 2006. A supportive organisational culture for project management in matrix organizations: a theoretical perspective. 37, 39-54.

Mouton, J. 2001. How to succeed in your master's and doctoral studies: A South African guide and resource book, Van Schaik.

Nesheim, T. J. K. & Management, P. 2011. Balancing process ownership and line management in a matrix‐like organization. 18, 109-119.

Numerof, R., Abrams, M. J. D. 2002. Matrix management: Recipe for chaos? 26, 42-45.

Pakarinen, M., Virtanen, P. 2016. Solving organisational conflicts in public matrix organisation.

Pandey, S. K., Wright, B. 2006. Connecting the dots in public management: Political environment, organizational goal ambiguity, and the public manager's role ambiguity. 16, 511-532.

Parker, G. M. 2003. Cross-functional teams: Working with allies, enemies, and other strangers, John Wiley & Sons.

Parker, R. & Bradley, L. 2000. Organisational culture in the public sector: evidence from six organisations.

Perry, J. L. & Rainey, H. 1988. The public-private distinction in organization theory: A critique and research strategy. 13, 182-201.

Ramos, M. & Health 1989. Some ethical implications of qualitative research. 12, 57-63.

Renner, M., Taylor-Powell, E. 2003. Analysing qualitative data. 1-10.

Rose, K. 2013. A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition. 44, e1-e1.

Rugg, G. & Petre, M. 2007. A Gentle Guide to Research Methods. 1st. Maidenhead, Berkshire: Open University Press.

Schenk, J. & Alcorn, S. J. N. M. 2012. Guardians of the matrix. 43, 53-55.

Schermerhorn, J. 2008. Zarządzanie, PWE. Warszawa.

Schermerhorn, J. R. 1991. Managing organizational behaviour, John Wiley & Sons.

Schwandt, T. 1994. Constructivist, interpretivist approaches to human inquiry. 1, 118-137.

Seale, C., Gobo, G., Gubrium, J. F. & Silverman, D. 2004. Qualitative research practice, Sage.

Seale, C. 1999. Quality in qualitative research. 5, 465-478.

Strauss, A. & Corbin, J. 1998. Basics of qualitative research techniques, Sage publications Thousand Oaks, CA.

Stuckenbruck, L. 1988. The matrix organization. 287.

Sy, T., Beach, L. & D'Annunzio, L. 2005. Challenges and strategies of matrix organizations. 28, 39-48.

Sy, T. & Cote, S. 2004. Emotional intelligence.

Tellis, W. 1997a. Introduction to Case Study. The Qualitative Report. Volume 3, Number 2, pp 1 - 10

Tellis, W. 1997b. Application of Case Study Methodology. The Qualitative Report. Volume 3, Number 3, pp 1 - 18

Turner, S. G., Utley, D. R. & Westbrook, 1998. Project managers and functional managers: A case study of job satisfaction in a matrix organization. 29, 11-19.

Usmani, F. 2012. Types of Organization Structure.

Verschuren, P., Doorewaard, H. & Mellion, M. 2010. Designing a research project, Eleven International Publishing the Hague.

Whitford, A. & Governance 2006. Unitary, divisional, and matrix forms as political governance systems. 10, 435-454.

Yin, R. K. 1994. Case Study Research: Design and Methods. 2nd Edition. Sage Publications, Thousand Oaks

COVER LETTER

THE PERCEPTION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE ON PROJECT PERFORMANCE - IN A STATE-OWNED ENTERPRISE

Dear Sir/Madam,

The purpose of this study is to investigate the perception of the project matrix management organisation structure on project performance in a State-Owned Enterprise.

Your participation in this research project is greatly appreciated. Your input will allow me to identify and understand the perception of the matrix management organisation structures on project performance. The questionnaire should take approximately 5-10 minutes of your time.

Data collected will be stored electronically and will be kept strictly confidential. Participation will be anonymised to protect your identity. If you wish to receive a copy of the final results of the research, you are welcome to contact me, and a summary of the final results will be sent to you.

The interview instrument that will be administered has been approved by the University of Cape Town Ethics Committee and thus, meets all ethical requirements imposed by the University.

If you have any further queries prior to filling in the questionnaire, please feel free to contact me using the contact details provided below.

Thank you again for agreeing to participate,

Athayanda Brukwe
Masters Student (Researcher)
Email: brkath001@myuct.ac.za
Cell no: +27 71 850 7269

INFORMATION SHEET AND PARTICIPANT CONSENT FORM

Department of Construction Economics and Management

Fifth Level

Snape Building, Engineering Mall Upper

Upper Campus

Telephone: +27 21 650 3443

Email: Con-cem@uct.ac.za

THE PERCEPTION OF THE MATRIX MANAGEMENT ORGANISATION STRUCTURE ON PROJECT PERFORMANCE - IN A STATE-OWNED ENTERPRISE

Dear Participant,

My name is Athayanda Brukwe, and I am conducting research towards a Master of Science in Project Management degree at the University of Cape Town. I am researching the perception of the matrix management organisation structure in project management and would like to invite you to participate in the study. My supervisor is Mr Mark Massyn, and he can be contacted on this email address mark.massyn@uct.ac.za for queries.

The purpose of this study is to investigate the perception of the project matrix management organisation structure on project performance in a State-Owned Enterprise. As you are involved in project management, you have been purposely selected to participate in this study. The target group of this research are the employees that are working on projects and working on the project matrix management organisation structure or which have worked on the matrix management organisation structure in the past.

Please understand that you do not have to participate, i.e., your participation is voluntary. The choice to participate is yours alone. If you choose not to participate, there will be no negative consequences. If you choose to participate, but wish to withdraw at any time, you will be free to do so without negative consequences. However, I would be grateful if you would assist me by allowing me to interview you through this questionnaire.

Anonymising techniques will be used to ensure the confidentiality of participants; however, anonymity cannot be guaranteed. Participants where applicable, will be referred to as Respondent 1, 2, 3, etcetera. The data collected in this study and information pertaining to the study is solely for academic purposes. The data collected will be used in the study and the findings/feedback after the study has been completed will be shared with the participants on request and the organisation. There will be no direct benefits to the participant, however, this information might assist the organisation in improving their project management practices, should the organisation decide to follow up on the findings of this study. Data will be stored electronically.

Could you please fill in the attached questionnaire to the best of your ability. Your participation will contribute extremely to the findings of the study, which will add knowledge in the use of project matrix management organisation structure in projects. The questionnaire will take 20-30 minutes to complete.

Please feel free to contact me should you require further clarification.

Do you understand the objective of the interview and the contents of this letter?

Yes [   ]   No [   ]

Any information that I provide in this study shall not be used for any other purpose other than the ones stated.

Name of participant ……………………………   Date ………………

Signature of participant ……………………………………

Researcher: Athayanda Brukwe

Masters Student - MSc Project Management

Email: brkath001@myuct.ac.za

Cell no: +27 71 850 7269

APPENDIX C – SURVEY QUESTIONNAIRE

SURVEY QUESTIONNAIRE

Please answer all questions and all sections.

SECTION A: DEMOGRAPHIC DATA

A1: State years working in projects, period within the organisation and which department are you working for in the company …………………………………………………………………………

SECTION B: BACKGROUND QUESTIONS (Please select the relevant options)

B2. According to your understanding, which type of project structure does the organization use, please see brief description of each of the project structure.

Project Structure	Description	Please select one
Functional Organizational Structure	Functional organizations are structured around the organization's primary functions. In a functional organization, every employee is positioned within only one function and has one manager they report to, the Functional Manager/Departmental Manager. The Functional Manager assigns and manages the employees work and handles administrative tasks such as employee compensation.	
Project-Based Organizational Structure	Project-based organizations are structured around projects and not functions. This type of structure is also called a projectized organizational structure. In a project-based organization most of the organization's resources are involved in project work. Project Managers have high levels of independence and authority for the project and control the project resources.	
Matrix Organizational	Matrix organizations blend features of project-based and functional organizational structures. The employee has two (or	

Structure   more) managers they report to, their Functional Manager/Departmental Manager and the Project Manager. If they are working on multiple projects, they may have even more managers to report to. The matrix organizational structure is a combination of two or more types of organizational structures.

SECTION C: PERCEPTION QUESTIONS (Please select the relevant options)

The following questions are based on the literature review conducted for the study. Please indicate whether you agree or disagree with the items as per your experience of working in project matrix management organisation structures.

C3. The following are the advantages of using project matrix management organisation structures as per the literature review conducted for the study, which advantages do you agree/disagree with? Please list any other advantages that you are aware of that are not mentioned here.

No	Criteria	Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1	Managing complexity					
2	Communication effectiveness					
3	Output quality					
4	Resource efficiency					
5	Motivation and job satisfaction					
6	Balance of power					

C4. The following are the disadvantages of using project matrix management organisation structures as per the literature review conducted for the study, which advantages do you agree/disagree with? Please list any other disadvantages that you are aware of that are not mentioned here.

No	Criteria	Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1	Misaligned goals					
2	Unclear roles and responsibilities					
3	Ambiguous authority and dual reporting					
4	Lack of a matrix guardian					
5	Silo focused employees					
6	Management of cross-functional teams					
7	Complexity					
8	Allocation of resources and priorities					
9	Level of conflicts					
10	Decision making delays					

C5. In your opinion what are the roles or should be the roles of the functional/ departmental managers in the matrix management organisation structure, which roles do you agree/disagree with? Please list any other roles that you are aware of that are not mentioned here.

No	Criteria	Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
1	Assign specific individuals to the team, and negotiate with the project manager regarding resources					
2	Provide subject matter expertise					
3	Recommend changes to the project, including corrective actions					
4	Manage activities within their functional areas					
5	Assist with problems related to team member performance					
6	Improve staff utilization					

C6. On the projects that you have worked on that are utilizing the project matrix management organisation structures, were there any project cost implications that have been as a result of the project matrix management organisation structure used?

Yes ☐   No ☐

C7. For the projects that you have worked on within the last 3 years under the matrix management organisation structure, please indicate the project performances regarding the cost. Did the projects mostly came in on budget/overspent/under spend.

0 -20% Underspent ☐   0 -20% Overspent ☐   On budget ☐

C8. On the projects that you have worked on that are utilizing the project matrix management organisation structures, were there any project schedule implications that have been as a result of the project matrix management organisation structure used?

Yes ☐   No ☐

C9. For the projects that you have worked on within the last 3 years under the matrix management organisation structure, please indicated the project performances regarding the schedule. Did the projects mostly complete on time/behind schedule/ahead of schedule?

Projects completed on time ☐

Projects completed ahead of schedule ☐

Projects completed behind schedule ☐

C10. For the projects that you have worked on within the last 3 years under the matrix management organisation structure, please indicate if the project experienced any of the challenges or issues listed below as a result of the project matrix management organisation structure used? Please select all applicable. Please list any issues or challenges that you are aware of that not mentioned here.

Project scope creep ☐

Lack of decision making ☐

Audit findings ☐

Poor project change management ☐

Disengaged and non-responsive sponsor ☐

Non-compliance to construction regulations ☐

Lack of stakeholder engagement ☐

Thank you so much for taking your precious time to fill in this survey, your participation is highly appreciated.

APPENDIX D – ETHICS APPROVAL FORM

ETHICS APPLICATION FORM

Please Note:
Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: http://www.ebe.uct.ac.za/ebe/research/ethics1

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant		ATHAYANDA BRUKWE
Department		FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT
Preferred email address of applicant:		ATHAYANDA.BRUKWE@TRANSNET.NET
If Student	Your Degree: e.g., MSc, PhD, etc.	MSc PROJECT MANAGEMENT
	Credit Value of Research: e.g., 60/120/180/360 etc.	60
	Name of Supervisor (if supervised):	MR MARK MASSYN
If this is a research contract, indicate the source of funding/sponsorship		
Project Title		THE PERCEPTION OF THE MATRIX STRUCTURE ON PROJECT PERFORMANCE IN A STATE OWNED ENTERPRISE

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

APPLICATION BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	ATHAYANDA BRUKWE	Signed by candidate	11.07.2020

SUPPORTED BY	Full name	Signature	Date
Supervisor (where applicable)	*marke massyn*		01/8/2020

APPROVED BY	Full name	Signature	Date
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section 1; and for all Undergraduate research (including Honours).	Louie van Schalkwyk		17 August 2020
Chair: Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the questions in Section 1.	Louie van Schalkwyk		17 August 2020

Page 1 of 1

INTERVIEW QUESTIONNAIRE

Background – A survey questionnaire was completed regarding the perception of the matrix management organisation structure on project performance in a State-Owned Enterprise. This is a follow up interview to unpack, discuss and validate the results of the study.

1.   Most respondents <u>agreed</u> with the following <u>advantages</u> of using project matrix management organization structures; could you please advise whether you agree?

1.1 Managing complexity...

....

....

1.2 Resource efficiency..

....

....

1.3 Communication effectiveness...

....

....

2.   Most respondents disagreed with the following advantages of using project matrix management organization structures; could you please advise whether you agree?

2.1 Balance of power..

....

....

2.2 Motivation and job satisfaction..

....

....

2.3 Output quality..

....

....

3.   Most respondents agreed with the following disadvantages of using project matrix management organization structures; could you please advise whether you agree?

3.1 Ambiguous authority and dual reporting...

....

....

3.2 Decision making delays...

....

....

3.3 Level of conflicts..

....

....

4.   Most respondents disagreed with the following disadvantages of using project matrix management organization structures; could you please advise whether you agree?

4.1 Unclear roles and responsibilities..

....

....

4.2 Misaligned goals...

....

....

4.3 Silo focused employees...

....

....

5.   An additional disadvantage that was provided by the respondents was that "the matrix management organization structure was associated with increase in overhead management costs", could you advise if you agree or disagree with this statement and why?

....

....

....

6.   Most respondents agreed with the following roles of the functional/ departmental managers in the matrix management organization structure; could you please advise whether you agree?

- **Provide subject matter expertise**
- **Manage activities within their functional areas**

....

....

....

7.   Most respondents disagreed with the following roles of the functional/ departmental managers in the matrix management organization structure; could you please advise whether you agree?

- **Recommend changes to the project, including corrective actions**
- **Assist with problems related to team member performance**

....

....

....

8. The respondents both agreed and disagreed with the following task "Assign specific individuals to the team, and negotiate with the project manager regarding resources", kindly advise whether you agree or disagree as a role of a functional manager and why?

....

....

....

9. The respondents were asked if the projects that they have been working on under the project matrix management organization structure have had any cost implications. The response was that: 58% of the respondents indicated that the projects had cost implications and 42% responded that the did not have cost implications
   - According to your experience on working with projects using the matrix management organization structure, does the use of the structure has an impact on the cost performance of the project?

....

....

....

10. The respondents were asked if the projects that they have been working on under the project matrix management organization structure have had any schedule implications. The response was that: 74% of the respondents indicated that the projects had schedule implications and 24% did not have schedule implications
    - According to your experience on working with projects using the matrix management organization structure, does the use of the structure has an impact on the schedule performance of the project?

....

....

....

11. The respondents were asked to choose the project issues or challenges that they experienced on the projects that are using project matrix management organization structure. The highest rated issues or challenges were as follows, please advise whether you agree?

11.1 Lack of decision making...……………………….......

....

11.2   Lack of stakeholder engagement...

....

11.4   Project scope creep..

....

11.5 Poor project change management..

....

Thank you so much for taking your precious time to participate in this interview, your participation is highly appreciated.