UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL
(UCI)

THE DEVELOPMENT OF A PROJECT MANAGEMENT OFFICE (PMO)
PROPOSAL FOR THE TECHNICAL SERVICES DEPARTMENT WITHIN THE
DEPARTMENT OF INFRASTRUCTURE, PORTS AND ENERGY IN ST. LUCIA

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FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE
MASTER IN PROJECT MANAGEMENT (MPM) DEGREE

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(UCI)

This Final Graduation Project was approved by the University as
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DEDICATION

This research project is dedicated to my family, friends and colleagues who supported me through the development of this project, and to the Technical Department for allowing me to conduct my studies and interviews during regular operations.

ACKNOWLEDGMENTS

INDEX OF CONTENTS

INDEX OF FIGURES

INDEX OF CHARTS

ABBREVIATIONS AND ACRONYMS

- CE   Chief Engineer
- CMMI   Capability Maturity Model Integration
- DCE   Deputy Chief Engineer
- DIPE   Department of Infrastructure, Ports and Energy
- DOW   Director of Works
- EA   Engineering Assistant
- FGP   Final Graduation Project
- GIS   Government Information Systems
- MIPEL   Ministry of Infrastructure, Ports, Energy and Labor
- OPM3   Organizational Project Management Maturity Model
- PO   Project Officer
- PMMM   Project Management Maturity Model
- PM   Project Manager
- PMO   Project Management Office
- P3M3   Portfolio, Program & Project Management Model
- RMMS   Road Asset Management Unit
- SOW   Superintendent of Works
- SPU   Special Projects Unit
- TSD   Technical Services Department

EXECUTIVE SUMMARY (ABSTRACT)

The Ministry of Infrastructure, Ports, Energy and Labor (MIPEL), specifically the Department of Infrastructure, Ports and Energy (DIPE) is the leading government agency in St. Lucia for the maintenance of the island's infrastructure. The Technical Services Department (TSD) within the DIPE comprises of six sub-units that are responsible for the overall construction and maintenance of public roads, bridges and public administrative buildings on the island.

An organization's structure has to support the objectives of the organization and to ensure a smooth communication, decision-making processes and operations while at the same time clearly defining responsibilities. The main objectives of TSD are to ensure efficient and timely maintenance and repairs of public infrastructure and to ensure that effects of climate induced disasters are minimized, damages cleared and other infrastructure be prepared or reinstated with minimum delay.

Over the years, projects executed by TSD have experienced failures in meeting various project objectives resulting in cost overruns, low quality outputs and over extended time schedules. This is mainly due to the unavailability of trained and qualified personnel in the areas of project management to guide the management of projects implemented. With the deliverables of this project, the implementation of a Project Management Office within the structure of TSD will manage project activities effectively and will definitely increase the success rates of projects within set schedules, budget and quality parameters. In addition, the success gained from the implementation of the Project Management Office will provide valuable experience together with strategic training that will increase the organizations capacity and proficiency in project management skills.

The general objective for this Final Graduation Project (FGP) was to develop a Project Management Office (PMO) proposal for the Technical Services Department within the Department of Infrastructure, Ports and Energy (DIPE), to standardize Project Management best practices and to maximize the success rate of Infrastructural Projects undertaken by the Department. The specific objectives were: to conduct a maturity analysis and organizational needs of the Technical Services Department in order to determine its project management strengths, weaknesses and opportunities for improvement; to assess and determine the type of PMO that is best suited for the Technical Services Department, through the analysis of the various types of PMO's; to propose the characteristics and functions that a PMO should have; to determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority; to develop the implementation plan for the Technical Services Department within the Department of Infrastructure, Ports and Energy (DIPE) and to assess technical proficiencies and develop training policies.

The methodology undertaken for this project were a combination of research, interviews and data gathering of reports of similar nature using analytical, inductive-deductive and observations research methods. These methods allowed for an in-depth maturity analysis of all data collected on the Technical Services Department, their organizational structure and operations, along with the

willingness stakeholders in accepting the idea of a PMO within the organization. Utilizing the tools and sources, this project allowed for the analysis and recommendations on the best-suited PMO for the Technical Services Department along with its location and functions.

TSD has weaknesses in all project management areas, with its maturity rating being a level two for a project-based department. Efforts for improvement should be focused on strategies to improve the organizations maturity level by way of implementing the most suitable type PMO that can establish project management methodologies and processes into an organizational standard.

A Directive type PMO was most suitable for TSD due to its culture and history in project management. This type of PMO with its functions, as outlined by "Hobbs and Aubry, 2007" was best suited for the operations of TSD, hence it was adopted. The Directive type PMO will be most effective, located immediately below the head of TSD (CE), in the organizational structure where the full benefits of having a PMO can be realized. This allows for full control in performing its various roles and responsibilities in establishing methodologies and guidelines for the project management operations of TSD and lead it to a higher maturity rating.

It was concluded that the implementation of a PMO for TSD was of paramount importance for MIPEL to witness growth and strength in its project management maturity level. This will enable MIPEL to fulfill its mandate in being "A Flagship ministry, critical to achieving infrastructural and national development" efficiently and effectively.

Pursuant to the results and conclusions of this FGP, it was recommended that: upon the implementation of the PMO within TSD's structure, a maturity assessment should be conducted at least every two years to get an update of TSD's maturity level. Followed by an annual review program to analyze the functionality and relevance of the PMO within TSD along with its functions, roles and responsibilities as may be mandated by the ruling government.

A systematic approach should be undertaken when modifying the implementation plan of the PMO, due to changes that arises. This should be undertaken through a series of stakeholder consultation to ensure stakeholder buy-in and a smooth transition process. As the organization's maturity level increases, training policies established should be reviewed through training review boards to ensure the continued growth of staff.

1. INTRODUCTION

1.1   Background

St. Lucia is a small island economy in the Eastern Caribbean with a population of 181,889 (2018 estimate) and a land area of 620 square km with a 158 km coastline. An important issue confronting St. Lucia's infrastructural development is the vulnerability of its population and economy to natural disasters, which can seriously affect the productive sectors of the economy, such as tourism and agriculture, with particularly severe effects on the country's infrastructure. Over the years, disasters in St. Lucia have impacts on livelihood, destroyed infrastructure and disrupted provision of essential services and have absorbed a growing share of the national budget to cover recovery and reconstruction efforts.

The Ministry of Infrastructure, Ports, Energy and Labor (MIPEL), specifically the Department of Infrastructure, Ports and Energy (DIPE) is the leading government agency in St. Lucia for the island's infrastructure. The DIPE has the responsibility for the construction and maintenance of public roads, bridges and public administrative buildings. Under its new mandate in 2012, the department has taken over the responsibility of lending technical assistance to its sister ministries: The Ministry of Education, the Ministry of Health and the Ministry of Social Transformation.

New Construction and major upgrading and extension works are decided upon on political levels, which is dependent on the government in power. The tasks of the Technical Services Department (TSD) of the DIPE in this respect is to design and estimate the expected costs for these measures. For these works, consultants are frequently engaged. The TSD comprises of various subheads that are all engaged in the procurement of services from minor to major works.

1.2   Statement of the problem

The TSD shows some decisive structural deficits which are currently compensated by high individual motivation, the readiness to improvise and high engagement of individual employees (HPC/Sellhorn 2018).

This concerns:

- The distinctly centralized organizational structure.
- An outdated and unsuitable legal framework.
- Lack of proper IT and data management, by keeping decentralized, partly physical files and by the use of heterogeneous software of different varieties.
- The internal setup of operative units, outdated, not maintained or redundant equipment.

The success of the TSD in many instances is achieved through individual commitment and improvisation instead of being systematically ensured and facilitated by the organization in a structured way. Because of this, there is substantial risk for the performance and capacity of the TSD, for example:

- Unforeseen events demand increased management attention.
- Threats of legal disputes with third parties.
- Costs overruns.
- Fluctuation in quality outputs.
- Over extended time schedules.
- Unavailability or misplacement of information and data.

In line with this, is the unavailability of trained and qualified personnel in the areas of project management to guide the management of projects by TSD.

1.3   Purpose

The construction industry is one of the sectors with a high rate of possible project failures due to various factors. In view of the demand of new sustainable projects to be executed by the TSD, this project will analyze the current organizational structure, organizational needs and maturity to determine DIPE's capacity with relations to its expanded mandates and anticipated workload to be carried out. The results of the capacity building measures through the development of the PMO will benefit the TSD by:

- It delivering its anticipated services efficiently while ensuring resilience.
- Developing a strategy for the implementation of the recommendations based on the results provided, taking into consideration the current constraints of the DIPE.
- Guiding and managing project activities using project managment best practices which will increase project success within time, costs and quality parameters.
- Identifying the training/staffing needs of TSD to meet the technical challenges of an efficiently functioning infrastrutural development department in line with its mandate.

1.4   General objective

- To develop a Project Management Office (PMO) proposal for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE), to standardize Project Management best practices and to maximize the success rate of infrastructural projects undertaken by the Department.

1.5   Specific objectives

- To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.
- To assess and determine the types of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.
- To propose the characteristics and functions that a PMO should have.
- To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.
- To develop the implementation plan for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE).
- To assess technical proficiencies and develop training policies.

2. THEORETICAL FRAMEWORK

2.1   Company/Enterprise framework

2.1.1   Company/Enterprise background

The Department of Infrastructure, Ports and Energy (DIPE) forms part of the Ministry of Infrastructure, Ports, Energy and Labor (MIPEL) with over three hundred and fifty staff members, whose mandate is to focus on the country's public infrastructure, its development and maintenance.

The MIPEL was recently restructured and responsibilities redistributed due to the change in the local government. Presently, the DIPEL comprises of six main departments:

- IT and Communications Department.
- Public Utilities Department.
- Technical Services Department (TSD).
- Meteorological Department.
- Accounts Department.
- Energy.

The TSD comprises of six sub-units, which all report to the Chief Engineer (CE), who is the head of TSD. As per the Saint Lucia Works and Roads Act, Chapter 8.05; the CE has the overall responsibility and is charged with the construction, repair and supervision of all works, buildings, wharves, public highways and bridges, where the cost is to be defrayed from the general revenue of Saint Lucia (Amended by Act 20 of 1969). By law, the TSD heads and signs off on all works implemented to the national infrastructure.

2.1.2 Mission and vision statements

Based on the organization's mission and vision statement below, this research project will recommend a system where the department is able to fulfill its obligations whilst improving efficiency and increasing productivity.

Mission: Creating an environment that fosters sustainable, social and economic growth of Saint Lucia through the development of:

- A superior road and transportation network.
- Exceptional public utilities.
- Vigilant and well-equipped meteorological services; and
- A dynamic regulatory framework that fulfills the diverse needs of customers and stakeholders with a cadre of professional employees.

Vision: To be a flagship Ministry critical to the achievement of Infrastructural and national development.

2.1.3 Organizational structure

Figure 1. outlines the current structure of DIPE, which identifies the position of TSD within the department. TSD comprises of six sub-units, with each being responsible for various aspects of infrastructural works, as can be seen in Figure 2. Organizational Structure of the Technical Services Department. The six units include:

- **Road Construction and Maintenance** – there are two units within this unit: Signs Unit and Potholing Unit. The Signs Unit is responsible for the maintenance, installation and improvement of traffic signs as well as road markings, whilst the Potholing Unit is responsible for the repairs of cracks and potholes to the public road network plus the general cleaning of road gutters and drains.
- **Public Buildings and Grounds** – this unit is responsible for the general maintenance of public buildings and grounds. The unit also lends technical

assistance to its sister ministries with other building works; example police stations, fire stations, schools and hospitals which are not directly under DIPE portfolio.

- **Laboratory Services** – is responsible for quality assurance with relations to testing of soils, concrete and asphalt used for buildings and road construction on the island.

- **Mechanical Workshop** – is responsible for the maintenance and repairs of the Ministry's fleet of vehicles and equipment used for road works. It also produces culverts for the public and private sector on the island.

- **SPU/GIS/RMMS Unit** – comprises of three sub-units: (1) Special Project Unit (SPU) deals with the coordination and monitoring of major road projects implemented by TSD with funds from external funding agencies. (2) GIS/surveys Unit deals with the carrying out of surveys for small maintenance works that are not procured and (3) The Road Assessment Unit (RMMS) deals with road asset data collection and management.

- **Quantity Surveying Unit** – provides quantity-surveying support to all units within the TSD, including the verification of all payments processed.
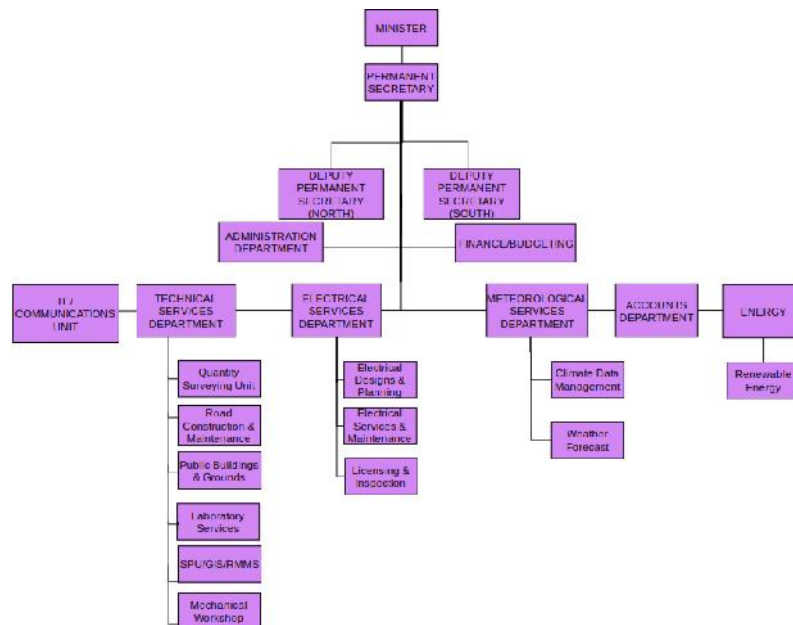
Figure 1. Organizational structure for the DIPE (Source: DIPE, 2018)
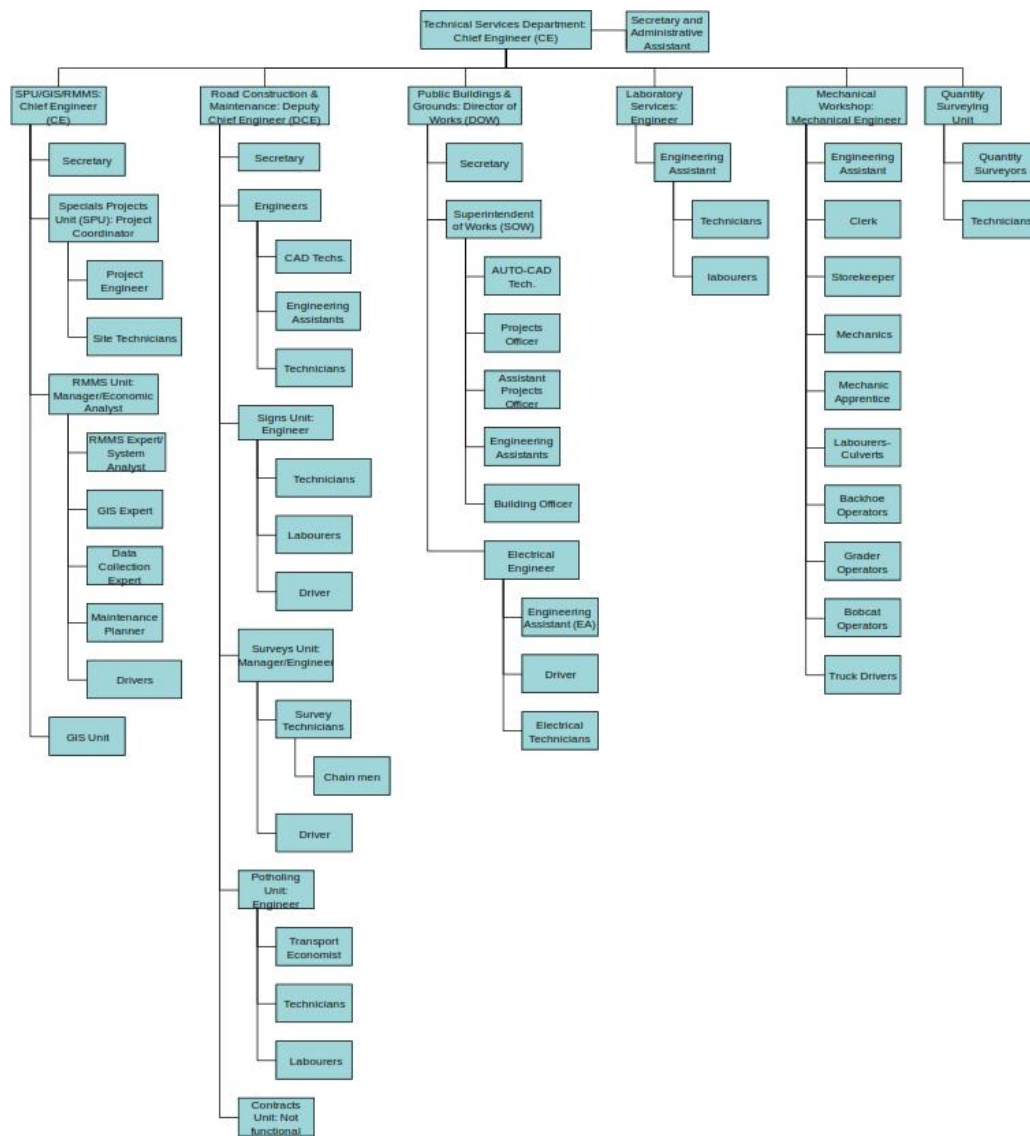
Figure 2. Organizational Structure of the Technical Services Department (Source: Sirway 2018, illustration HPC/Sellhorn)

2.1.4 Products offered

The Technical Services Department (TSD) is a department that offers technical services in line with the island's infrastructure: from roads, bridges, buildings, grounds etc. The key objective of this Final Graduation Project (FGP) is to analyze TSD and recommend the best Project Management Office (PMO) required to improve on the services rendered and the success rate of the Department.

2.2 Project Management concepts

2.2.1 Project

PMBOK Guide defines a Project as "a temporary endeavor undertaken to create a unique product, service, or result" (Project Management Institute, 2017, p. 4). Projects are developed from a basic need, which can include the purchase of an equipment, the construction of a building, and the development of a software, to name a few. A project is deemed successful if the end product meets its objectives within time, cost and quality.

2.2.2 Project management

According to the PMBOK Guide, Project Management is defined as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. It is accomplished through the appropriate application and integration of the project management processes identified for the project (Project Management Institute, 2017, p.10).

2.2.3 Project life cycle

A project life cycle is defined, as the series of phases that a project passes through from its start to its completion. It provides the basic framework for managing the project (greycampus.com, 2020). This basic framework applies regardless of the specific project work involved (greycampus.com, 2020). The phases may be

sequential, iterative, or overlapping (Project Management Institute, 2017, p.19). The stages of a project's life cycle are:

- Initiating: Starting the Project – this phase defines and authorizes the project to be undertaken.
- Planning: Organizing and Preparing – this phase outlines the project and the strategy to be used.
- Executing: Carrying out the Work – this phase highlights the implementation of the project with activities.
- Closing: Ending the Project – this phase identifies the closure of the project.
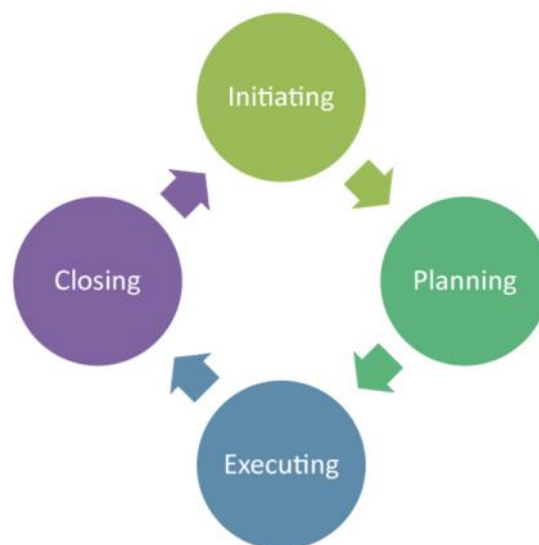
Figure 3. Phases of a Typical Project Life Cycle (Source: Invensis, 2018)
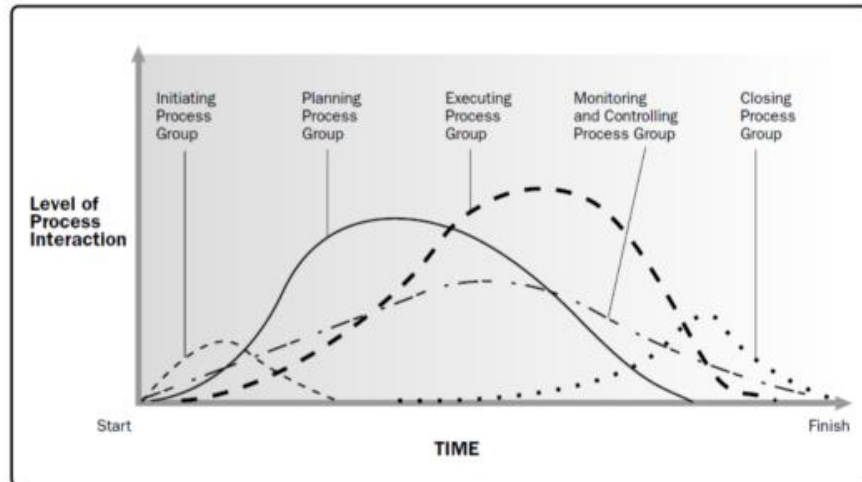
Figure 4. Process groups interact in a Phase or Project (Source: Project Management Institute, 2013)

Some of the projects undertaken by the TSD follows all four phases of the Project Cycle that are based on the funding agency and other projects which come from sister ministries commence from executing to the closing phases.

2.2.4 Project management processes

All projects require a set of processes that links project activities to develop an end product. PMBOK Guide 2017 makes mention that "the project life cycle is managed by executing a series of project management activities known as project management processes". It further mentions that every project management process produces one or more outputs from one or more inputs by using appropriate project management tools and techniques, as can be seen in Figure 5.
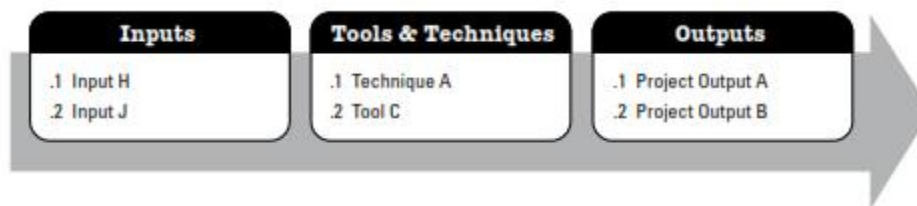
Figure 5 Example Process: Inputs, tools & Techniques, and Outputs (Source: PMBOK Guide PMI, 2017)

The PMBOK Guide group processes into five Process Groups as seen in Figure 6. PMBOK Guide 2017 defines a process group as a logical grouping of project management processes to achieve specific project objectives. The five process groups are:

- Initiating Process Group.
- Planning Process Group.
- Executing Process Group.
- Monitoring and Controlling Process Group.
- Closing Process Group.
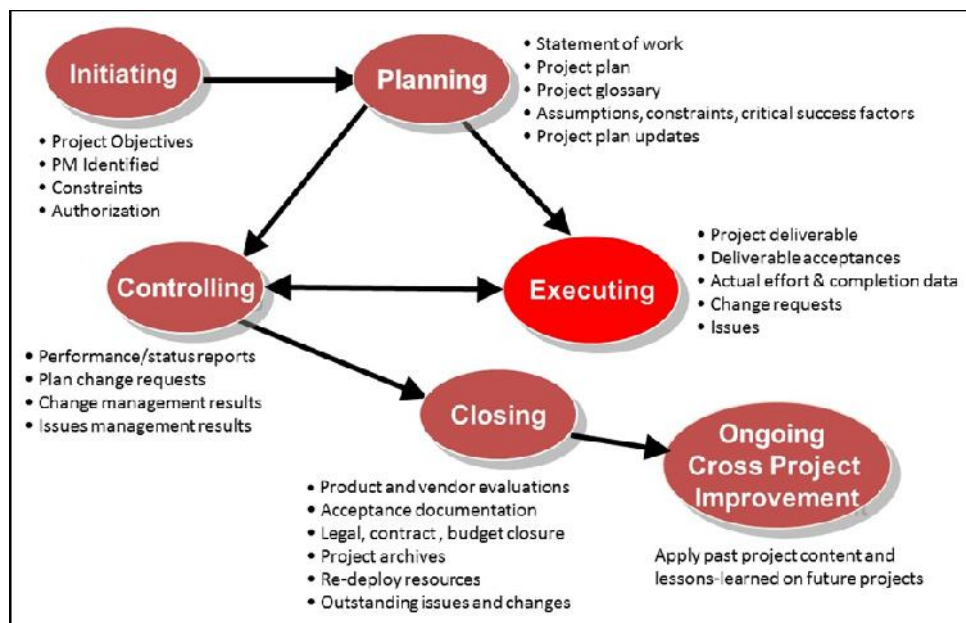
Figure 6. Project Management Process Groups (Source: Alaca.Westernscandinavia.org)

2.2.5 Project management knowledge areas

As formulated in the Project Charter, this Final Graduation Project "Development of a PMO" requires the application of the Project Management Knowledge Areas as outlined below. PMBOK Guide 2017 defines a Knowledge Area as an identified area of project management defined by its knowledge requirements and described

in terms of its component processes, practices, inputs, outputs, tools and techniques.

There are ten (10) Project management Knowledge Areas as described in PMBOK Guide 2017, which will be utilized in this project:

- **Project Integration Management** – involves the initial steps in developing a project and coordinates the activities within the Project Management Process Groups (Project Management Institute, 2017). It contains all the tasks that holds a project together: develop the project charter, develop the project management plan, direct and manage project work, manage the knowledge areas, monitor and control project work, perform integrated change control and closing the project (greycampus.com, 2020).

- **Project Scope Management** – is the knowledge area responsible for defining all work or scope required to complete the project. The Scope Management knowledge area comprises of the plan scope management, collect requirement, defining the scope, creating the WBS, validating the scope and controlling the scope.

- **Project Schedule Management** – deals with the processes required in managing the completion of the project within schedule. It includes the plan schedule management, defining activities, sequencing activities, estimating activity duration, develop and control schedules.

- **Project Cost Management** – deals with the processes in determining and controlling the cost aspects of the project. The project cost management includes the plan cost management, the estimated costs of the project, determining the budget and controlling the costs.

- **Project Quality Management** – deals with the processes that determines the quality aspect of the project. It includes the plan quality management, manage quality and control quality.

- **Project Resource Management** – deals with all the resources required for the completion of the project. It includes the plan resource

management, estimate activity resources, acquire resources, develop team, manage the team and control resources.

- **Plan Communications Management** –ensures timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring and ultimate disposition of project information (PMBOK Guide 2017). It includes the plan communication management, manage communication and monitor communication.

- **Project Risk Management** – PMBOK Guide 2017 describes Project Risk Management as the processes required to conduct risk management: planning, identification, analysis, response planning, response implementation and the monitoring risk on a project.

- **Project Procurement Management** – deals with the processes required to purchase or acquire products, services or results needed outside of the project team (Project Management Institute, 2017). It includes plan procurement management, conduct procurement and control procurement.

- **Project Stakeholder Management** – deals with the processes required to identify all persons who will be impacted by the project including the management of the stakeholders. This includes identifying the stakeholders, plan stakeholder engagement, manage and monitor stakeholder engagement.

2.3 Other applicable theory/concepts related to the project topic and context

2.3.1 Project Management Office

A Project Management Office (PMO) as an organizational structure that standardizes the project related governance processes and facilitates the sharing of resources, methodologies, tools and techniques (Project Management Institute 2017). The responsibilities of a PMO can range from providing Project

Management support functions to the direct management of one or more projects (Project Management Institute 2017). This project will analyze the various types of PMO's and make a recommendation on the most suitable type to be implemented within the DIPE.

There are three main types of PMO structures. They include the Supportive PMO, the Controlling PMO and the Directive PMO.

- **A Supportive PMO** – provides a consultative role to projects by supplying templates, best practices, training, access to information and lessons learnt from other projects (Project Management Institute 2017). With this PMO, the authority level is low.

- **A Controlling PMO** – provides support and require compliance through various means (Project Management Institute 2017). The authority level with this PMO is moderate.

- **A Directive PMO** – controls the project by taking direct responsibility, by the assignment of project managers. With this PMO, the authority level is at its highest.

2.3.2 Project Management Maturity

A Project Management Maturity is defined as a progressive development of an enterprise-wide project management approach, methodology, strategy, and decision-making process (Crawford, J.K, 2007). The best-suited level of maturity for an organization varies based on the organization's specific goals, strategies, resource capabilities, scope, and needs.

The level of maturity that an organization should strive for is determined during a detailed assessment conducted by a professional project management consulting team. The organization achieves full project management maturity when it has met the requirements and standards for project management effectiveness as defined by the Project Management Maturity Model (PMMM[SM]), and it is capable of demonstrating improvements such as on-time project delivery, cost reductions, organizational efficiency, and profitability (Crawford, J.K, 2007).

There are many project maturity models used in the various industries particularly in Information Technology and the Business Management sector. Following the examples utilized in the software industry, there have been a few improvements in the process frameworks used in the construction industry, to which this Final Graduation Project topic relates. The website PMI.org identify many different types of maturity models developed for the construction industry. They include the Project Management Maturity Model (PMMM), Structured Process Improvement Framework for Construction Environments – Facilities Management (SPICE FM), Organizational Project Management Maturity Model (OPM3), Project Management Process Maturity Model (PM2), Portfolio, Programme and Project Management Maturity Model (P3M3), Prince 2 Maturity Model (P2MM) and the Standardized Process Improvement for Construction Enterprises (SPICE).

The four Maturity Analysis Models that will be reviewed and analyzed for this Final Graduation Project include:

- Capability Maturity Model Integration (CMMI).
- Portfolio, Program and Project Management Model (P3M3).
- Organizational Project Management Maturity Model (OPM3).
- Project Management Maturity Model (PMMM).

Capability Maturity Model Integration (CMMI)

Capability Maturity Model Integration (CMMI) is defined by the website "dqindia.com" as a framework for process improvement and is developed by the Software Engineering Institute for Software Development, service providers and organizations involved with acquisitions. Three models address the following:

- The development of software, products and services (CMMI-DEV).
- The acquisition of products and services (CMMI-ACQ).
- The establishment, management and delivery of services (CMMI-SVC).
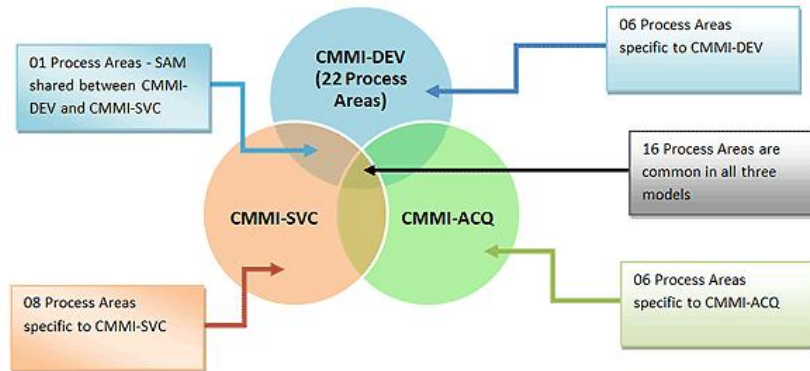
Figure 7. Common Elements of the three CMMI Models (Source: dqsindia.com/cmmi/getting started, 2020)

Software companies that undertook systems engineering and product development mainly use CMMI. There are five levels of maturity in CMMI process areas and they are:

- Level one – Initial: processes are not predictable and not planned.
- Level two – Managed: processes are characterized based on projects undertaken by organizations.
- Level three – Defined: processes are characterized based on the organization.
- Level four – Quantitatively managed: the processes are measured and controlled.
- Level five – Optimizing: focuses on improvements.

There are also four Category Process Areas for CMMI:

- Project Management.
- Engineering.
- Process Management.
- Support.

The website "dqindia.com" also makes mention of the 22 process areas in CMMI, where each process area representing an activity needed to follow to achieve a Maturity Level.

Portfolio, Program and Project Management Maturity Model (P3M3)

According to Sowden et al (2008), Portfolio, Program and Project Management Maturity Model (P3M3) is developed to assess government maturity standards and it acts as a roadmap for ongoing improvement and progression towards realistic and achievable goals that are suitable for business needs and aspirations.

González et al. (2007) indicates that P3M3 focuses on the addition of portfolio and program management domains to earlier versions of the model, helping to expand emerging processes of project complexity that contribute to overall success. P3M3 Maturity levels are identical to that of CMMI. P3M3 has three sub-models:

- Portfolio Management (PfM3)
- Programme Management (PgM3)
- Project Management (PjM3).

Each of these sub-models are broken down into seven perspectives:
- Organizational governance.
- Management control.
- Benefits management.
- Risk management.
- Stakeholder management.
- Finance management.
- Resource management.

The website "axelos.com" indicates that P3M3 allows an assessment of the process employed the competencies of people, the tools deployed and the management information used to manage and deliver improvements. This allows organizations to determine their strengths and weaknesses in delivering change.

Organizational Project Management Maturity Model (OPM3)

The OPM3 second edition defines the Organizational Project Management Maturity Model (OPM3®) as a framework that provides an organization-wide view of portfolio management, program management, and project management to support achieving Best Practices within each of these domains (Project Management Institute, 2008). It is aimed at measuring maturity level of projects and practices. According to Pinto and Williams (2013), the OPM3 maturity is classified into four levels:

- Standardize – where processes are structured.
- Measure – where data is used to evaluate performance.
- Control – where control plan is developed for measure.
- Continuity improve – where processes are optimized.

The benefits of using OPM3 as outlined by "Cbisco.com, 2016" are:

- It bridges the gap between strategy and individual projects by providing a way to advance an organization's strategic goals through the application of project management principles and practices.
- It provides a comprehensive body of knowledge regarding what constitutes Best Practices in organizational project management.
- It helps to decide whether to pursue improvements in specific critical areas, such as the domains of Portfolio, Program, or Project Management based on the maturity assessment.
- It provides guidance on prioritizing and planning if the organization decides to pursue improvements.

Project Management Maturity Model (PMMM)

The purpose of a Project Management Maturity Model is to provide a model of progressive improvement in project management systems and processes that can

be used to assess an organization's capabilities and to provide an improvement path (Pennypacker 2001, 6).

"Crawford, J.K, 2016" makes mention that the PM Solutions Project Management Maturity Model is based on two dimensional frames works, which reflects the level of maturity of an organization and the second reflects the key project management areas as per the structure of PMI's knowledge areas, as can be seen in Figure 8.
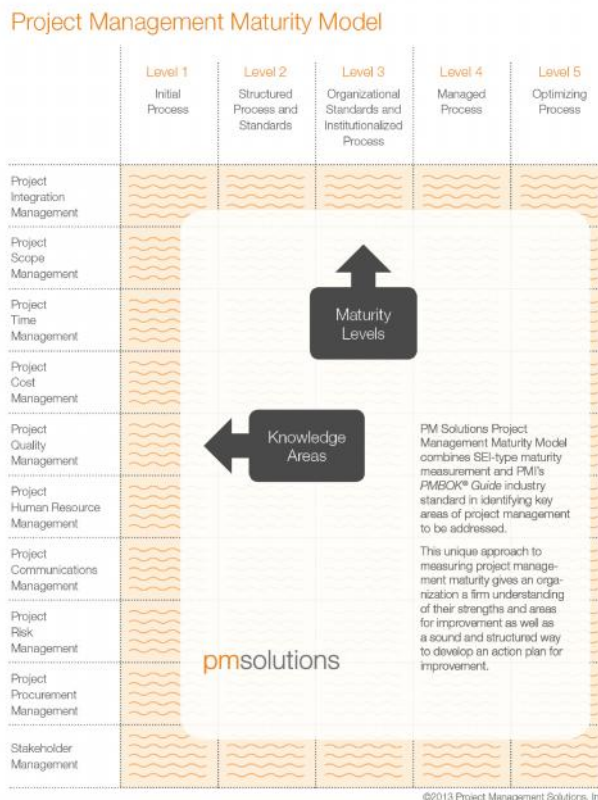
Figure 8. The PM Solution Project Management Maturity Model (Source: pmsolutions.com, 2020)

"The five maturity levels in the PMMM, that reflects organizational behaviors and the way they operate" (Crawford, J.K, 2016) are as follows:

Level one – Initial Process: reflects an organization that operates in a random manner. There are no established practices or standards used.

Level two – Structured Process and Standards: organizations operated in structured manner that adhere to some basic project management practices, but mostly at an individual project level.

Level three – Organizational Standards and Institutionalized Process: project management processes are in place and established as organizational standards. Procedures are well defined and documented.

Level four – Optimizing Process: Organizations measures project performance using well-defined metrics.

Level five – Processes are in place and actively used to improve project management activities.

3. METHODOLOGICAL FRAMEWORK

3.1 Information sources

Information sources can be defined as a person, thing, or location from which information is obtained. An individual can source information from many different places. They are obtained from peers, libraries, the internet, organizations or questionnaires, which is always dependent on the type of information that is required. No matter where the information originates from, there are only three types of information sources: primary sources, secondary sources and tertiary sources (Schmidt, 2013) and they will be utilized for this project.

For this Final Graduation Project information, sources will be from literature reviews, DIPE archives, PMBOK Guide (PMI, 2017), the internet, journals, academic reviews, personal experiences and questionnaires.

3.1.1 Primary sources

Healey Library at the University of Massachusetts Boston defines Primary Sources as immediate, first-hand accounts of a topic, from people who have direct connection to it (https://umb.libguides.com, "n.d"). Information from primary sources are original materials. Examples of primary sources includes interviews, surveys, academic journals, scholarly published documents, conference proceedings and articles to name a few.

For this Final Graduation Project the primary sources that will be used are interviews, web sites, reports undertaken by consultants for DIPE, survey data and journal articles.

3.1.2 Secondary sources

Healey Library at the University of Massachusetts Boston defines Secondary Sources "as sources that are often quoted from primary sources". They cover the same topic, but add a layer of interpretation and analysis (https://umb.libguides.com). Secondary sources includes review articles, books, practice guidelines, reference materials (dictionaries, encyclopedia, etc.), journal articles, web sites, magazines and newspaper articles.

For this Final Graduation Project the secondary sources that will be used are reference materials, journal articles, review articles, web sites, books and referenced materials.

Chart 1. Information sources (Source: Compiled by Author)

Objectives	Information sources	
	Primary	Secondary
To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.	Interviews and reports undertaken by consultants for DIPE, personal information, documentation on TSD Organizational Structure along with its operational processes and procedures.	PMBOK Guide (PMI, 2017), reference materials and web sites.
To assess and determine the types of PMO that are best suited for the Technical Services Department, through the	Interviews and reports undertaken by consultants for DIPE, personal information, documentation on TSD Organizational	PMBOK Guide (PMI, 2017), reference materials and web sites.

analysis of the various types of PMO's.	Structure along with its operational processes and procedures.	
To propose the characteristics and functions that a PMO should have.	Interviews and reports undertaken by consultants for DIPE, personal information, documentation on TSD Organizational Structure along with its operational processes and procedures.	PMBOK Guide (PMI, 2017), reference materials and web sites.
To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.	Interviews and reports undertaken by consultants for DIPE, personal information, documentation on TSD Organizational Structure along with its operational processes and procedures.	PMBOK Guide (PMI, 2017), reference materials and web sites.
To develop the implementation plan for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE).	Interviews and reports undertaken by consultants for DIPE, personal information, documentation on TSD Organizational Structure along with its operational processes and procedures.	PMBOK Guide (PMI, 2017), reference materials and web sites.
To assess technical proficiencies and develop training policies.	Interviews and reports undertaken by consultants for DIPE, personal information, documentation	PMBOK Guide (PMI, 2017), reference materials and web sites.

	on TSD Organizational Structure along with its operational processes and procedures.	

3.2   Research methods

The University of Newcastle Library guides defines Research Methods as the strategies, processes or techniques utilized in the collection of data or evidence for analysis in order to uncover new information or create better understanding of a topic(https://libguides.newcastle.edu.au "n.d"). It provides systematic details of how one intends to accomplish a research task or procedure. There are various types of research methods, which uses different tools for data collection.

The Analytical, Deductive-Inductive and Observational Methods are used for this Final Graduation Project.

3.2.1 Analytical method

Analytical research is a specific type of research that involves critical thinking skills and the evaluation of facts and information relative to the research being conducted (What is Analytical Research? (n.d). Retrieved March 19, 2020). With the Analytical research method data and facts, pertaining to a topic is compiled after which it is evaluated so that the sources are used to prove a hypothesis or prove an idea.

3.2.2 Deductive & Inductive method

Dr. Deborah Gabriel (2013) describes the differences between deductive and inductive approach research method as deductive is aimed and testing theory whilst inductive is concerned with the generation of new theories emerging from existing data. Deductive approach is associated with quantitative research whilst inductive is associated with qualitative research (Deborah, 2013).

Figure 9. Slide representation of the Deductive Research Approach (Source: Aqil and Hussain, 2008)
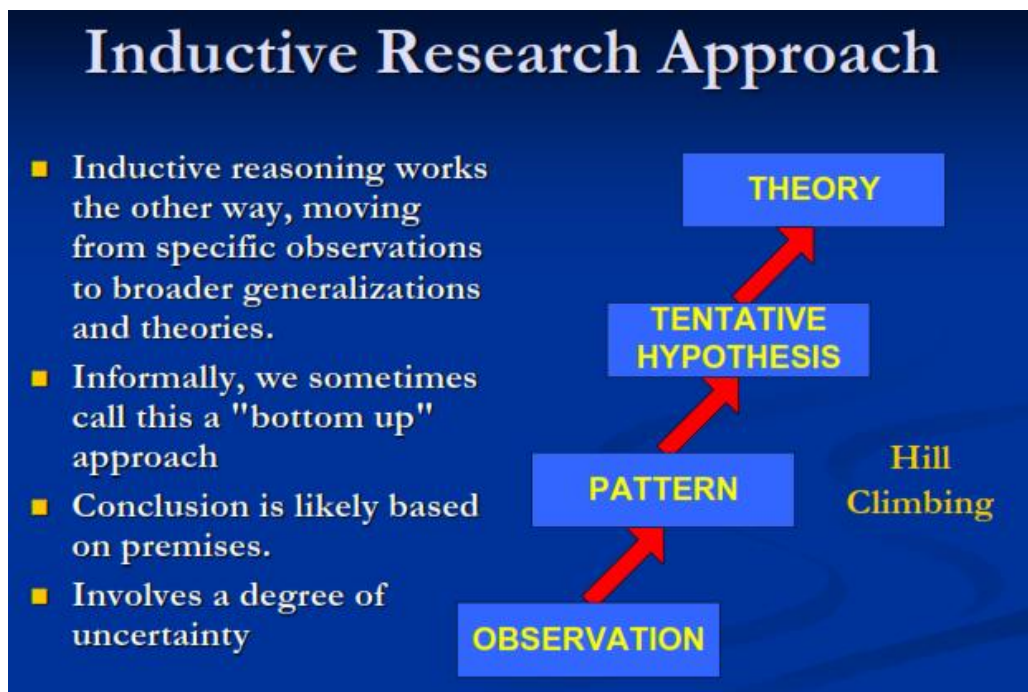
Figure 10. Slide representation of the Inductive Research Approach (Source: Aqil and Hussain, 2008)

3.2.3 Observation method

The observation method is defined as involving human or mechanical observation of what people actually do or what events take place (Prachi, https://www.managementstudyguide.com/observation_method.htm,n.d.).

Information is collected by observing process at work.

Chart 2. Research methods (Source: Compiled by Author)

Objectives	Research methods		
	Analytical Method	**Deductive & Inductive Method**	**Observation Method**
To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.	The Analytical method was used to assess the TSD current maturity status from the sources identified.	By testing the tools and techniques available to assess the maturity of TSD.	Using this method allowed the observation on how TSD currently operates with projects.
To assess and determine the types of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.	This Analytical method was used to study and understand the information gathered from the sources identified to determine what a PMO is and its benefits to an	This method will be utilized to make a comparison of PMO's in order to determine the best suitable type for the TSD.	

	organization.		
To propose the characteristics and functions that a PMO should have.	This method was used to make a comparison of the characteristics of a PMO to determine the functions of the PMO within the TSD.		
To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.	This method was used to understand the roles and responsibilities of a PMO and to determine the best location for the PMO within the TSD, along with its level of authority.		
To develop the implementation plan for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE).	This method allowed for data gathering to analyze and develop the implementation plan for the PMO with TSD.	With this method, the existing data is evaluated to determine a new outcome for implementation.	
To assess technical	This method		

proficiencies and develop training policies.	allowed for the review of existing data gathered to analyze them and make the necessary recommendations in training policies.		

3.3   Tools

Research tools are defined as anything that becomes a means of collecting information (civilengineeringterms.com). Tools are used to enhance the completion of tasks.

The tools that will be utilized for this Final Graduation Project include having meetings and interviews with senior management of TSD and DIPE, data gathering, expert judgment and consultations, scheduling tools, analytic techniques (document analysis), various maturity models, online review templates, information management, decision making, observations as recommended by PMBOK Guide (PMI, 2017).

Chart 3. Tools (Source: Compiled by Author)

Objectives	Tools
To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.	- Data gathering. - Expert judgment. - Information management. - Maturity models. - Analytic techniques (document analysis). - Meetings and interviews.
To assess and determine the types of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.	- Data gathering. - Expert judgment. - Information gathering. - Decision making. - Analytic techniques (document analysis). - Meetings.
To propose the characteristics and functions that a PMO should have.	- Data gathering. - Expert judgment. - Decision making. - Analytic techniques (document analysis).
To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.	- Expert judgment. - Meetings, interviews and consultations with key stakeholders. - Online review templates. - Data gathering. - Decision making.
To develop the implementation plan for the Technical Services Department	- Expert judgment. - Meetings, interviews and

(TSD) within the Department of Infrastructure, Ports and Energy (DIPE).	consultations with key stakeholders. - Online review templates. - Data gathering. - Decision making.
To assess technical proficiencies and develop training policies.	- Expert judgment. - Meetings, interviews and consultations with key stakeholders. - Online review templates. - Data gathering. - Decision making.

3.4   Assumptions and constraints

PMBOK Guide 6th Edition defines an Assumption as a factor in planning process that is considered true, real or certain without proof or demonstration (Project Management Institute, 2017). The assumptions considered in this Final Graduation Project are:

- Through the maturity analysis, all required information will be available.
- Based on the organizational structure of TSD a PMO is required so that the department is better able to manage projects effectively.
- It is assumed that most of the information required for the development of this Final Graduation Project will be readily accessible at DIPE.
- It is assumed that key stakeholders will willingly accept interviews, meetings and consultations for the data gathering process.
- .It is assumed that senior management will be open to accept the implementation plan proposed.
- Proper research will enable the recommendations of the relevant PMO required.
- Developing the proper implementation plan for the implementation of the PMO by the organization.

PMBOK Guide 6th Edition defines a Constraint as a limiting factor that affects the execution of a project, program, portfolio or a process (Project Management Institute, 2017). There are three main constraints and they are time, cost and quality; also known as triple constraints. The constraints considered in this Final Graduation Project are:

- The period to complete this Final Graduation Project by the University may limit the project deliverables.
- Collection of data may not be forthcoming, which may limit the content of this project.
- The key stakeholders (senior managers) may not accept the value of a PMO.
- The acceptance of the implementation plan and access to funding to implement it.

Chart 4. Assumptions and constraints (Source: Compiled by Author)

Objectives	Assumptions	Constraints
To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.	Through the maturity analysis, all required information will be available.	Collection of data may not be forthcoming, which may limit the content of this project.
To assess and determine the types of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.	Based on the organizational structure of TSD a PMO is required so that the department is better able to manage projects effectively.	The key stakeholders (senior managers) may not accept the value of a PMO.

Objectives	Assumptions	Constraints
To propose the characteristics and functions that a PMO should have.	Proper research will enable the recommendations of the relevant PMO required.	The period to complete this Final Graduation Project by the University may limit the project deliverables.
To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.	That the PMO should be effective in performing its roles in the recommended location.	The key stakeholders (senior managers) may not accept the value of a PMO.
To develop the implementation plan for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE).	Developing the proper implementation plan for the implementation of the PMO by the organization.	The acceptance of the implementation plan and access to funding to implement it.
To assess technical proficiencies and develop training policies.	With the implementation of the PMO, the opportunity arises to develop TSD's human resources.	Limitations with funding for training of staff by TSD due to management not accepting PMO proposal.

3.5 Deliverables

A deliverable is defined as "any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project" (Project Management Institute, 2017).

The deliverables developed on this Final Graduation Project are:

- A report analyzing the maturity level of the TSD within the DIPE, outlining the organizational needs and areas for improvement.
- A report analyzing the most suitable PMO for implementation within TSD.
- A report analyzing the functions and characteristics a PMO should possess.
- A plan to determine the location of the PMO within the TSD, along with its roles, responsibilities and level of authority within the department.
- A report outlining the implementation plan for the operations of the PMO, which includes methodology, tools and techniques.
- A report on the technical qualifications and training needs for TSD.

Chart 5. Deliverables (Source: Compiled by Author)

Objectives	Deliverables
To conduct a maturity analysis and organizational needs of the Technical Services Department (TSD) in order to determine its project management strengths, weaknesses and opportunities for improvement.	A report analysis of the maturity level of the TSD within the DIPE, outlining the organizational needs and areas for improvement.

To assess and determine the types of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.	A report analyzing the most suitable PMO for implementation within TSD.
To propose the characteristics and functions that a PMO should have.	A report analyzing the functions and characteristics a PMO should possess.
To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.	A plan to determine the location of the PMO within the TSD, along with its roles, responsibilities and level of authority within the department.
To develop the implementation plan for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy (DIPE).	A report outlining the implementation plan for the operations of the PMO, which includes methodology, tools and techniques.
To assess technical proficiencies and develop training policies.	A report on the technical qualifications and training needs for TSD.

4. RESULTS

A maturity model is defined as a descriptive model of the stages through which an organization progresses as they define, implement, evaluate, and improve on their processes.

Having the right people with the right skill set will improve the success rate of TSD, which will better equip the DIPE in meeting its objectives and carrying out its mandates towards the development of the country. Maturity levels and organizational needs assessments are effective ways in identifying the skill gaps in an organization and highlights the areas for improvement, which is beneficial to this research in developing a Project Management Office to help maximize the organization's project success. It also provides an overview of where the organization is presently and the desired results of an organization's performance.

4.1 Assessment of the Maturity Level and Organizational Needs of TSD

For this component, research was conducted to achieve two objectives. The first objective was to determine the level of project management maturity, whilst the second objective was to identify the organizational needs of the Technical Services Department based on its current maturity level.

4.1.1 Maturity Level of TSD

The Project Management Maturity Model (PMMM) was selected out of the four maturity models to conduct this phase of the analysis by gathering data through a survey and conducting interviews following the PMMM methodology guidelines, in identifying the maturity level of TSD and to determine whether the department is in keeping with project management best practices.

The model encompasses a two-dimensional framework. The first dimension depicts the ten Project Management Knowledge Areas with summarized processes that were measured against the second dimension, which reflects the five levels of maturity. Level one (1) being the least favorable and level five (5) being the optimum and most favorable option to attain the highest level of maturity.

Based on the current structure of TSD, a selection of ten (10) senior technical officers including two managers were participants to the survey in Appendix 4. The participants were also interviewed to gather information based on the intentions of the research topic. Based on the responses received from the survey and the review and analysis of the responses, the following maturity results were obtained as represented in Chart 6: Bar Chart and Chart 7:Pie Chart (also Refer to Appendix 5, which provides the collation of the results).

Chart 6.   Bar Chart Representation of the Maturity Level Analysis Results (Source: Compiled by Author)

Bar Chart Representation of the Maturity Analysis Results

- LEVEL 5 Optimized Process
- LEVEL 4 Managed Process
- LEVEL 3 Organizational Standards and Institutionalized Process
- LEVEL 2 Structured Process and Standards
- LEVEL 1 Initial Process
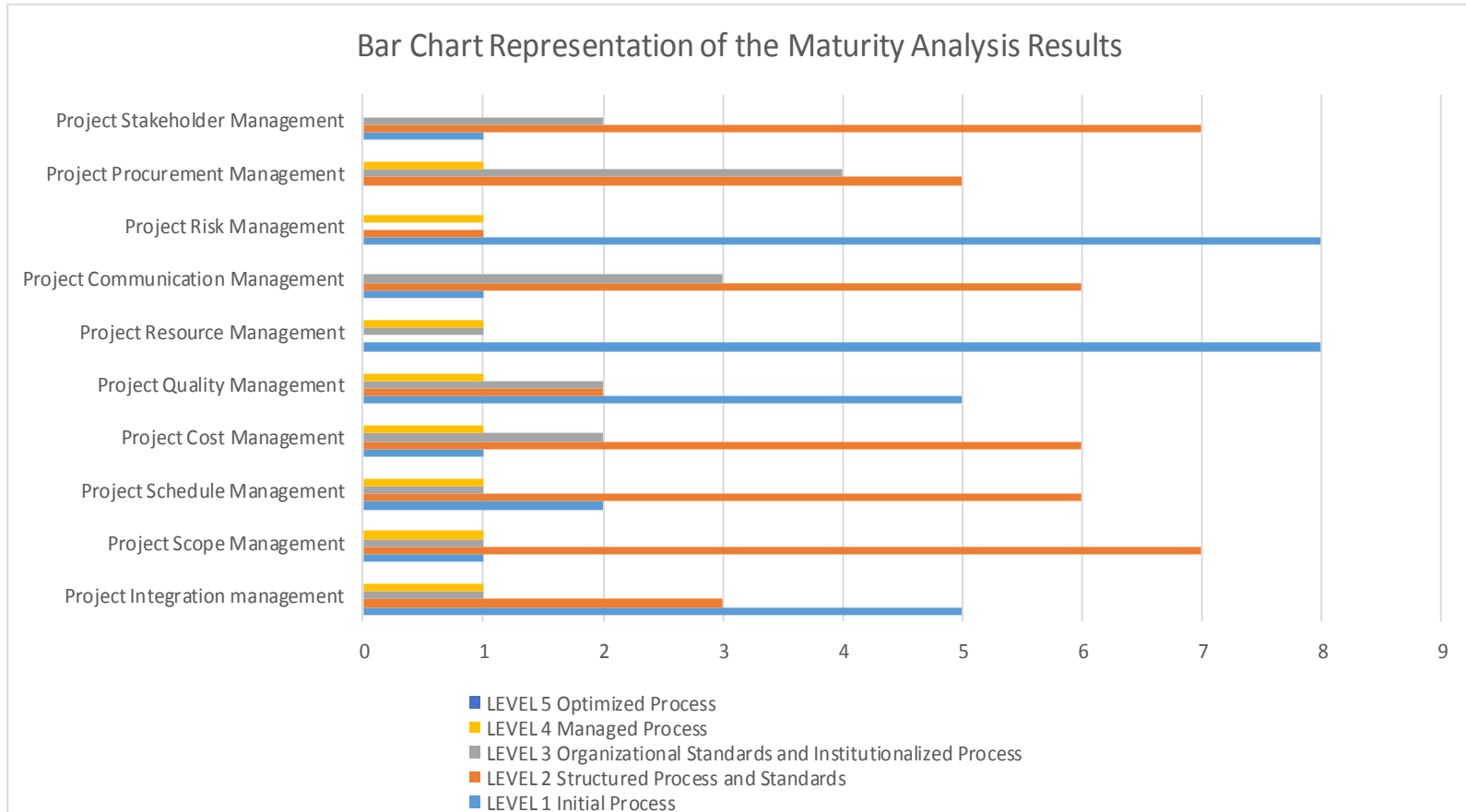
Chart 7.   Pie Chart Representation of the Maturity Level Analysis Results (Source: Compiled by Author)

Pie Chart Representation of the Results on the Maturity Level Analysis

- LEVEL 1 Initial Process
- LEVEL 2 Structured Process and Standards
- LEVEL 3 Organizational Standards and Institutionalized Process
- LEVEL 4 Managed Process

0%
8%
17%
32%
43%
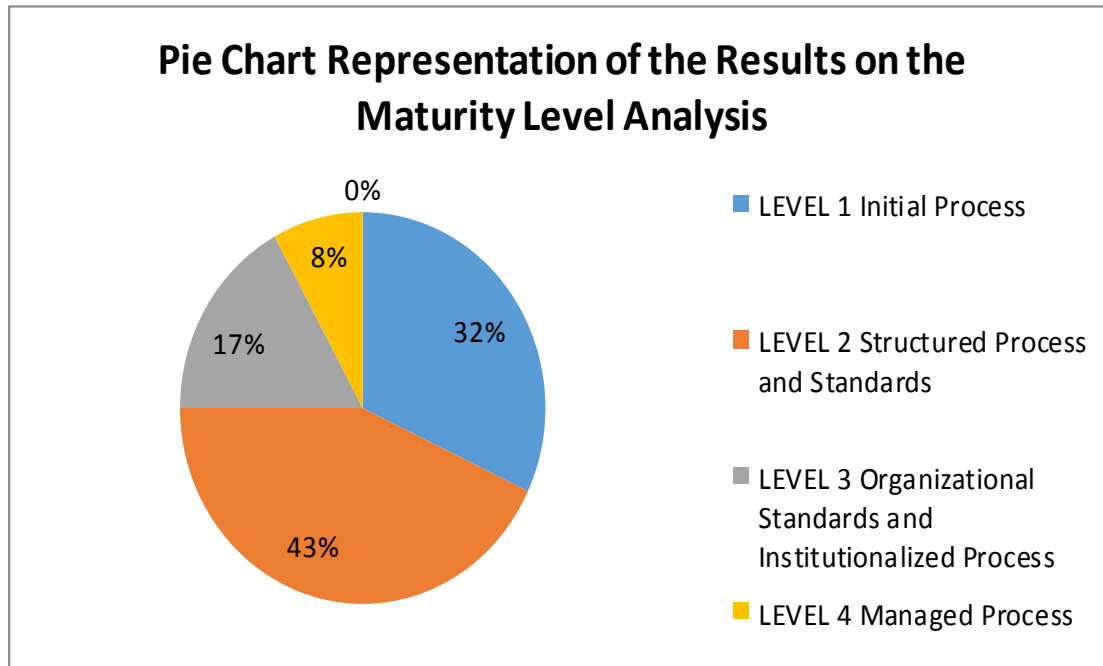
- Project Integration Management

The results indicated that 50% of the respondents agreed that TSD was at level one (1), whilst 30% said level two and 10% said levels three (3) and four (4). There is little to no established practices or structures in place for the implementation of projects by TSD. Project-related activities are performed in an ad hoc manner where individuals, teams, or units within TSD devise their way of operating without proper documentation of processes. Concentration is focused on the end product rather than on the processes utilized.

- Project Scope Management

The results showed that 70% of the respondents agreed that TSD was at level two (2), whilst levels one (1), three (3) and four (4) recorded a 10%

result each. Some basic scope management processes are in place and applied to larger projects (specifically those that are funded by external agencies like the World Bank and the Caribbean Development Bank that require approval on modifications that can affect the scope of a project). Smaller valued works or projects lack the required structures for scope management where the majority of the time there is no paper trail to justify change management, which has a direct effect on project claims or cost.

- Project Schedule Management

    The results collected showed that 60% of the respondents agreed that TSD was at level two (2), with 20% indicating that TSD was at a level one (1) and 10% said levels three (3) and four (4). Some basic processes exist for planning and scheduling but are mainly visible in large-scale projects based on the requirements of externally funding agencies. However, on smaller projects, managers do not stipulate such processes be followed.

- Project Cost Management

    60% of the respondents agreed that TSD was at a level two (2) when it comes to cost management, whilst 20% scored at level three (3) and 10% at levels one (1) and four (4). There are processes within TSD on small projects for cost estimating, reporting and performance measurements although not on a large scale. Cost management processes are more visible on large, visible projects where processes are well documented.

- Project Quality Management

    The results showed that 50% of the respondents placed TSD at level one (1) whilst 20% said TSD was at levels two (2) and three (3) and the remaining 10% said level four (4). Respondents admitted that although there were no established quality standards in place, the approval of the quality of works is left to the discretion of the supervising officers whilst large visible projects follow quality control metrics and standards, which falls within the

specification guidelines in the various contract documents. It provides the basis for the certification and payoff of projects.

- Project Resource Management

  The results showed that 80% of the respondents agreed that TSD was at a level one (1) when it comes to resource management, whilst the remaining 10% said levels three (3) and four (4). The assignment of staff to project teams is informal and ad hoc, which results in the overutilization of various team members on multiple projects. There is no set structure for planning and staffing projects.

- Project Communication Management

  Results showed that 60% of the respondents agreed that TSD was at a level two (2) when it relates to communication management, where some basic processes are established including project status reporting. More structured processes are seen in large visible projects, where proper documentation is available for the distribution of project information to all stakeholders. Whilst 30% indicated that TSD was at a level three (3), and 10% scored TSD at level one (1).

- Project Risk Management

  Results showed that 80% of the respondents scored TSD at a level one (1), whilst 10% scored TSD at a level two (2) and four (4). There are no established procedures or processes in place for managing risks. TSD responds to risk in a reactive manner instead of in a planned and proactive manner.

- Project Procurement Management

  The results showed that 50% of the respondents agreed that TSD was at a level two (2) with procurement management, whilst 40% scored TSD at a level three (3) and the remaining 10% said level four (4). TSD has

established some basic processes for the procurement of goods and services. Procurement processes are more visible with large projects, with a systematic procedure when procuring services or goods.

- Project Stakeholder Management

  Results show that 70% of the respondents score TSD at a level two (2), whilst 20% said level three (3) and 10% said level one (1). Basic stakeholder management processes are only established for large-scale projects as required by externally funded agencies like World Bank and Caribbean Development Bank, where their procedures are clearly defined in the various contract documents in managing stakeholders.

At the end of the maturity assessment, the results in "Appendix 5" indicated that TSD Project Management Maturity is at Level two (2). It identifies the areas of strengths and weaknesses including areas for improvement on the overall operations of TSD in managing projects. Having identified that TSD is at Maturity Level two (2), the next priority of TSD should be on creating procedures, standards, and training for utilization as the basis for operations, therefore a complete change in culture is required. The results enforce why there is an urgent need for the establishment of a Project Management Office. This office will guide the department through project management best practices and procedures to improve the success rates of projects executed in keeping with the triple constraints (time, cost, and scope) whilst upholding quality standards and ensuring that the DIPE fulfills its mandate.

4.1.2 Organizational Needs of TSD

Having identified the maturity level of TSD, the next phase was determining its organizational needs. The organizational needs assessment was carried out by gathering data through interviews with senior officers and management along with reviewing existing reports prepared by consultants for DIPE.

An organizational needs assessment measures or evaluates the level of an organization's performance against its objectives and goals. The type of assessment used was a Tactical Needs Assessment: which focused on the organization's overall performance and results. The overall performance was determined through the Maturity Analysis previously conducted.

As per TSD organizational structure, TSD comprises of engineers, technicians, building officers, engineering assistants, project officers, assistant project officers, quantity surveyors, a superintendent of works, a director of works, a deputy chief engineer, and a chief engineer. In the daily operations relating to projects, civil engineers are tasked with the overall management of projects executed by the department whilst the engineering assistants and technicians supervise the daily site operations. From the summation above, one can identify that there is a gap in project management procedures and standards (because civil engineers are not project managers). Currently, there are no qualified project managers within the department to manage and guide projects in best practices, except for the building unit. Operations within the unit follows some basic project management structures due to the qualifications of the head of the unit (DOW) and a senior officer; however, there is room for improvement.

Chart 8.   Training Needs Assessment (Source: Compiled by Author)

Post	Current Qualification	Experience in managing projects	Project Management training acquired	Training needs required
Chief Engineer (C.E)	- Master's Degree in Project Management (awaiting graduation). - Master's Degree in Civil Engineering.	Over 20 years' experience.	- Basic workshops done in-house.	PMP Certification.

	- BSc in Civil Engineering.			
Deputy Chief Engineer (D.C.E)	- Master Degree in Civil Engineering. - BSc in Civil Engineering.	At least 10 years' experience functioning as the Project Manager's representative on site.	- Basic workshops done in-house.	- CAPM certification. - PMP training and certification.
Director of Works (D.O.W)	- Master's Degree in Project Management. - College Diploma	At least 10 years' experience.	- Master's Degree in Project Management. - Basic workshops done.	- PMP Certification.
Superintendent of Works (S.O.W)	Bachelor of Architecture	At least 5 years' experience.	No training in project management.	- CAPM certification. - PMP training and certification.
3# Civil Engineers	- Master Degree in Civil Engineering. - BSc in Civil Engineering.	At least 3 years' experience functioning as the Project Manager's representative on site.	Basic workshops done in-house. No formal qualification.	- CAPM certification. - PMP training and certification.
10# Civil Engineers	BSc in Civil Engineering.	At least 3 years' experience functioning as the Project Manager's representative on site.	Basic workshops done in-house. No formal qualifications.	- CAPM certification. - PMP training and certification.
1# Project Officers	High school certification, college diplomas' and associate	Over 3 years' of supervising projects.	- Basic workshops done in-house.	- CAPM certification. - PMP training and

	degrees in building technician studies/ engineering /architecture.		- Master's Degree in Construction project management (ongoing).	certification.
1# Assistant Project Officer	High school certification, college diplomas' and associate degrees in building technician studies/ engineering /architecture.	Over 3 years' experience supervising small works' projects.	No training in project management.	- CAPM certification. - PMP training and certification.
1# Engineering Assistant	- Master of Project Management (ongoing). - BSc in Engineering Technology.	Over 15 years' experience functioning as a Project Manager and as an Interim Project Manager.	- Formal training in Project Management through workshops.	- PMP certification.
8# Engineering Assistants, 14# Technicians, and 2# Building Officers	High school certification, college diplomas' and associate degrees in building technician studies, engineering, and architecture.	Site supervision/ clerk of works experience.	No training in project management.	- CAPM certification.

Chart 8 shows the training levels and gaps in the required skill set (project management training or qualifications) among officers responsible for projects. This leads to disorganized methods and procedures for managing projects. The current structure creates an environment where officers devise their tools and techniques to manage projects as opposed to organizational standards and guidelines. In some cases, this has led to conflicts, scope creeps, and consequently failed projects. Further to that, the lack of good project management methodologies does not allow for post-implementation reviews (lessons learned).

To get the organization to at least a Maturity Level three (3) or four (4). Training of staff at the various levels need to be undertaken as per the recommendations of Chart 8. Having these officers trained will better support the PMO and officers will be more accepting to the new procedures having been exposed to the requirements, methodologies and processes involved with managing projects.

4.2   Analysis of the different types of PMO

Figure 11. Which PMO Structure is right for your organization (Source: https://www.sesc.com/products/9a1auvzcpgseboaw6vdffn3keszinv, 2020)

Upon review of the information obtained from PMBOK Guide (PMI, 2017) and websites, Chart 9 outlines the three (3) types of PMO under review, that varies based on the degree of authority, control, and influences that they have on projects administered by the organization.

Chart 9.   Various types of PMO's (Source: Project Management Institute, 2017)

Various types of PMO	Procedures	Level of Control	Organizations best suitable for types of PMO
Supportive PMO	- Has a consultative role on the project. - Provides best practices, templates/forms, lessons learned and training of staff. - Cannot enforce compliance.	Has a low level of control and influence over the project.	- Small to medium size organizations.
Controlling PMO	- Requires governance and compliance to their frameworks and methodologies. - Provides project management training and assistance. - Enforces compliance to best practices.	Has a moderate level of control and influence over the project.	- Small to medium size organizations.
Directive PMO	- Directly manages the projects by assigning Project Managers to manage the projects and reports directly to the PMO.	Has a high level of control and influence over the project.	- Large organizations.

4.2.1 Supportive PMO

This PMO provides a consultative role to projects by supplying templates, best practices, training, access to information, and lessons learned from other projects

(Project Management Institute, 2017). Support is given as requested, without imposing control on project activities. With this PMO, the degree of control is low.

4.2.2 Controlling PMO

This PMO provides support and requires compliance through various means (Project Management Institute, 2017). This PMO has a moderate degree of control on projects, where they provide project management frameworks or methodologies that uses specific templates, forms, tools, or conformance to governance. A controlling PMO is established when organizations require having some level of control on their project activities, processes, and procedures.

4.2.3 Directive PMO

A Directive PMO controls the project by taking direct responsibility and assigning it to Project Managers. This PMO has the highest level of control and authority on project activities. Directive PMO goes beyond controlling the project and takes over the projects by providing the Project Management experience and resources needed to manage the project. Since the Project Managers are professionals in the field, they guarantee a high level of consistency of practice. This type of PMO is used and is more effective in organizations that run various projects simultaneously or concurrently.

The best type of PMO for any organization is dependent on the specific organization's culture and the history on projects implemented. The main objectives of the PMO within the organization are to:

1. Implement a standard in methodology.
2. Standardization of terminology.
3. Introduce effective repeatable project management processes.
4. Provide common supporting tools for uses (examples: templates and forms).
5. Ultimately to improve the levels of success of projects executed by an organization.

Upon the analysis of the three PMO's stated above, they each have their impact and functions based on the organization's structure and culture. In the case of TSD, and its current structure and work culture a PMO is highly recommended, as is the intent of this FGP. The PMO that was selected based upon the results and the analysis of the different types of PMO along with the culture of the TSD is that of **a Directive PMO**. The consensus of the interviewed officers was that TSD would greatly benefit from the characteristics and functions of a Directive PMO as opposed to that of a supportive or controlled PMO.

Results of the interviews conducted for this research showed the lack of qualified project management professionals to implement standards, processes and procedures along with tools and techniques to guide project management execution and supervision, which was a major setback for TSD. Interviewees also revealed that establishing a PMO in TSD would be met with resistance from some senior officers and management. This is due to having to relinquish the authority, control and power that comes with having the responsibility for the procurement process along with managing the projects as opposed to handing over to an independent body where they would not be able to manipulate various processes. This has always been an area of concern due to the power struggle as opposed to concentrating on the organization's growth and development.

The choice of the type of PMO selected was directly linked to the results identified through the maturity assessment conducted. The major weaknesses identified in the maturity analysis enforced the need for the PMO and the best suitable type for TSD.

Although the maturity analysis confirmed that TSD was still at an infancy level, due to the type of operations performed by TSD a drastic approach has to be taken hence the selection of a Directive type of PMO. Based on TSD's current operations, there needs to be a direct control of all projects above the petty contract margin. In addition, the characteristics of the Directive PMO is also

suitable when TSD is requested to lend assistance to sister government ministries where the PMO can provide the expertise and guidelines that is required.

Implementing this type of PMO will not reduce the productivity of existing staff; however, it will guide staff where all assigned project teams will be onboard with proper structures, procedures and processes, where their various roles and responsibilities will be clearly identified. Each role will be dependent on the other. By implementing this method, over time TSD will gradually shift from a maturity level two (2) to a three (3) then to a four (4).

Notwithstanding, the resistance that will be met with the implementation of the Directive PMO, for TSD to improve and meet the organization's objectives there needs to be a shift from reactive operations to proactive operations.

4.3   Characteristics and functions a PMO should possess

This section examines the functions and characteristics that the PMO for TSD should possess. Strengthening TSD's project management procedures and processes are critical and to a further extent, DIPE achieving its objectives and mandate whilst managing finances within the public sector. Project management in the public sector is challenging due to political interferance, environmental culture, sources of funds and influences by key stakeholders.

The Directive Type PMO plays a vital role in managing these complexities through various functions, which contributes to the organization's maturity and its development. The results of the maturity analysis conducted implied that critical functions and characteristics were not available nor provided, which presented the opportunity for improvement in TSD effectively managing projects.

4.3.1 Functions

Literature review shows that there are many authors that have described the most common functions that a PMO should possess. Examples of these literatures include Dai and Wells (2004) and Hobbs and Aubry (2007). With the well-known being the empirical research conducted by Hobbs and Aubry (2007), which was the focus of this section.

Chart 10 provides an overview of the functional groups of the two said authors Dia and Wells (2004) and Hobbs and Aubry (2007). Review of the chart shows that the PMO functional groups identified by the two authors are similar in nature.

Chart 10. Overview of PMO functions by Dia and Wells (2004) and Hobbs and Aubry (2007) (Source: trap.ncirl.ie/, 2020)

Dai and Wells (2004) identified six major categories of PMO functions:	Hobbs and Aubrey (2007) logically grouped the functions as part of the analysis. This resulted in 5 main groups of functions:
1. Developing and maintaining PM standards and methods	1. Monitoring and Controlling Project Performance
2. Developing and maintaining project historical archives	2. Development of Project Management Competencies and Methodologies
3. Providing project administrative support	3. Multi-Project Management
4. Providing human resources/staffing assistance	4. Strategic Management
5. Providing PM consulting and mentoring	5. Organizational Learning
6. Providing or arranging PM training	6. Execute specialized tasks for project managers.
	7. Manage customer interfaces.
	8. Recruit, select, evaluate and determine salaries for project managers.

The literature published by Hobbs and Aubry (2007) identified twenty seven (27) functions that a PMO should perform as shown in Chart 11, where the functions were rated by their level of importance (P1 – P27).

Hobbs and Aubrey (2007) identified that "monitoring and controlling of project performance" was the most important function of a PMO followed by "development of project management competencies and methodologies", "multi-project management", "strategic management", "organizational learning", "execute specialized tasks for project managers", "manage customer interfaces" and "recruit, select, evaluate and determine salaries for project managers".

For the purpose of this FGP, having selected "the Directive type of PMO" for TSD, the functions outlined by Hobbs & Aubry (2007) were adopted as was done by many PMO's worldwide. These functions will serve as the major services that the PMO should provide to the TSD.

Chart 11. PMO Functions & Functional Grouping by Order of Priority (Source: Hobbs & Aubry (2007))

Functional Groups	Functions	Importance of Functions by Priority
Group 1: Monitoring and Controlling project performances.	1. Report project status to management.	P1
	2. Monitor and control project performance.	P3
	3. Implement and operate a project information system.	P5
	4. Develop and maintain a project scoreboard.	P8
Group 2: Development of	1. Develop and implement a standard methodology.	P2

project management competencies and methodologies	2. Promote project management within the organization.	P9
	3. Develop competency of personnel, including training.	P4
	4. Provide mentoring for project managers.	P12
	5. Provide a set of tools without an effort to standardize.	P19
Group 3: Multi-project management	1. Coordinate between projects.	P7
	2. Identify, select and prioritize new projects.	P14
	3. Manage one or more portfolios.	P13
	4. Manage one or more programs.	P16
	5. Allocate resources between projects.	P21
Group 4: Strategic management	1. Provide advice to upper management.	P6
	2. Participate in strategic planning.	P11
	3. Manage benefits.	P25
	4. Networking and environmental scanning.	P26
Group 5: Organizational learning	1. Monitor and control the performance of the PMO.	P10
	2. Manage archives of project documents.	P15
	3. Conduct post-project reviews.	P22
	4. Conduct project audits.	P17
	5. Implement and manage a database of lessons learned.	P23
	6. Implement and manage a risk database.	P24
	Manage customer interfaces	P18
	Execute specialized tasks for project managers	P20
	Recruit, select, evaluate and determine salaries for Project Managers	P27
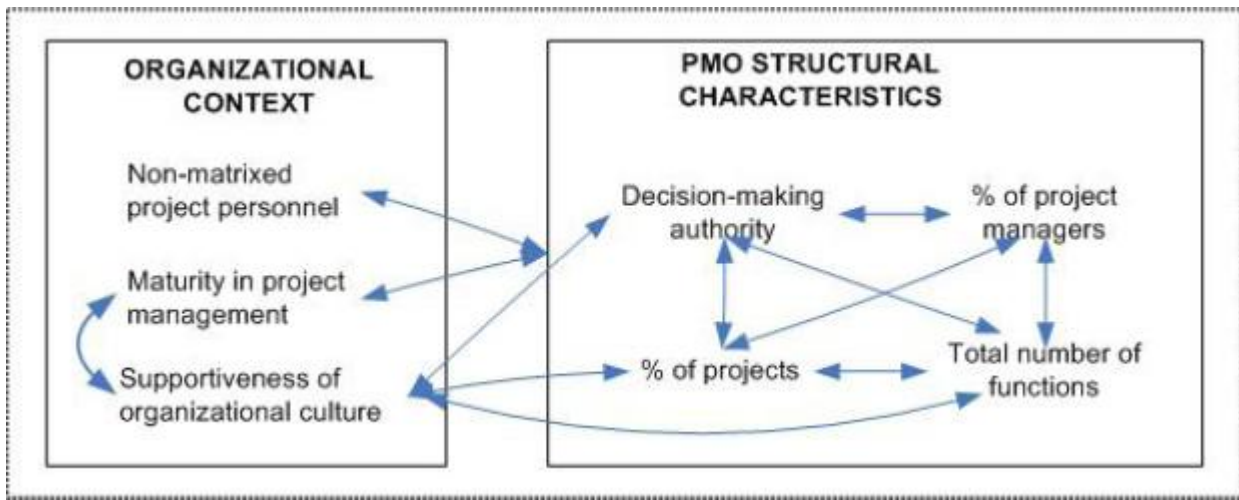
Figure 12. Cluster of characteristics of a PMO that vary together (Source: PMI, July 2020)

Literature review has also identified certain characteristics that the PMO should possess in determining whether it integrates within the organization successfully or whether it becomes non-existent over time. These characteristics include:

1. The PMO should have strong and dedicated leadership in the form of the right project coordinator, who has the overall responsibility of leading the project management team in the direction aligned with the organization's mandate.

2. The PMO should have skilled, certified and experienced personnel that make up the project team.

3. The PMO should have the backing and buy-in of the organization's management. The PMO needs to understand the expectations of the various stakeholders towards the PMO (Cunha, 2015). It has to be supportive of the organization's operation strategy.

4. The PMO should portray transparency and high-visibility that would encourage the support of other functional units and departments. This is where the organizational benefits are realized (business value).

5. The PMO should have processess, policies and templates well-defined, which will be beneficial to its continued success within the organization.

6. The PMO should have the authority to make key decisions and take action.

7. The PMO should have good communication and relationship management with stakeholders.

4.4 Location of the proposed PMO within TSD's Organizational Structure, along with its roles, responsibilities and level of authority.

4.4.1 Location

Based on the maturity assessment results as well as the selection the Directive type PMO for TSD, the department can begin to strategically plan to improve on its project management maturity deficencies by the strategic placement of the PMO within the organization's structure. The integration of the PMO within TSD will allow for the swift implementation of the project management processes and procedures that will deal with the most urgent project related matters.

Based on interviews conducted during the PMO selection process, it was apparent that the input from senior managers were required to identify the best suitable location of the PMO.

It has been established that the low rating of TSD's maturity level reinforces the need for the placement of the PMO at a high level within TSD's organizational structure. For best results and for the PMO to achieve its objective, the PMO should be placed directly below the mandate of the CE (who has the overall responsibility for TSD) as shown in Figure 13.
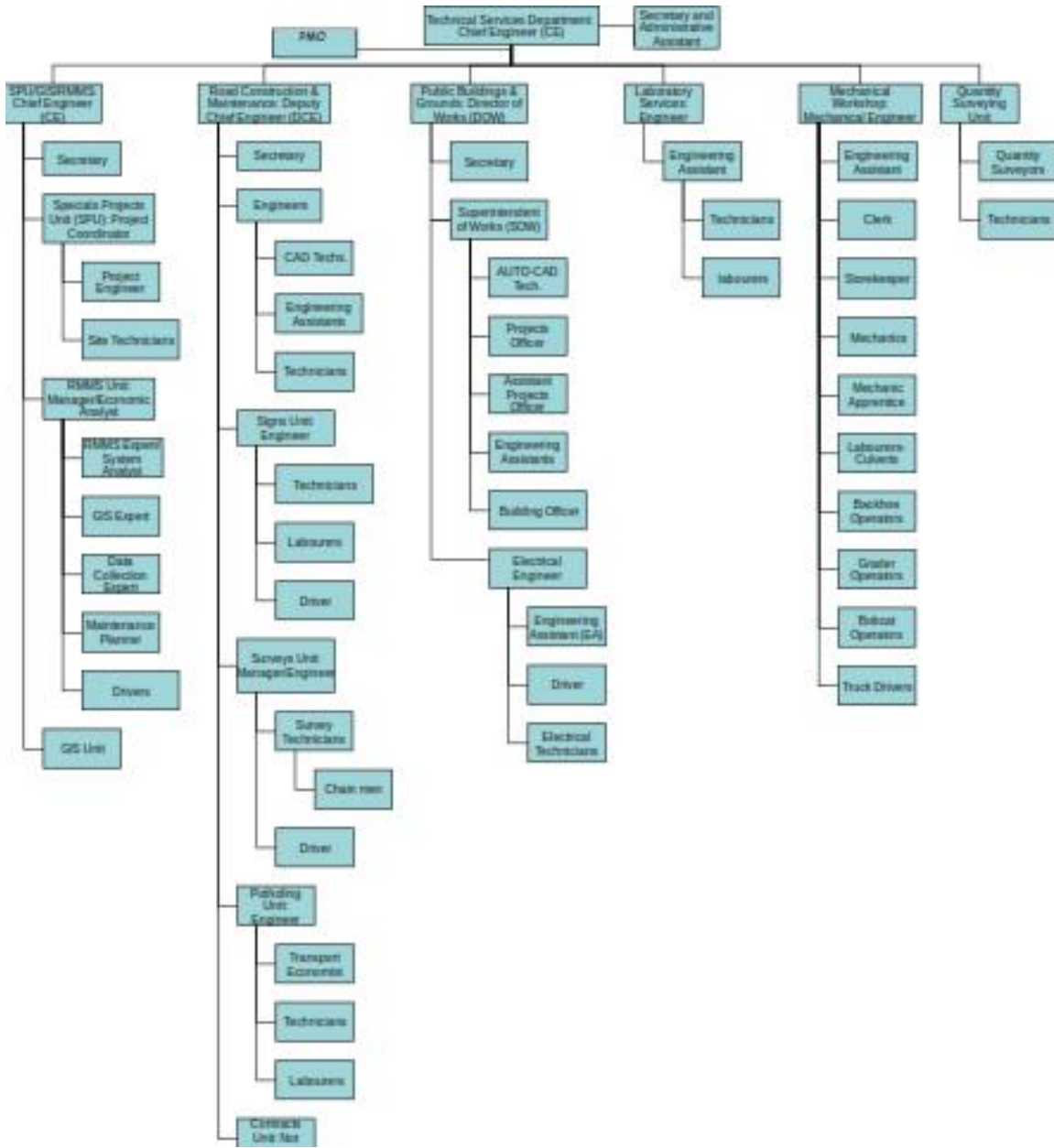
Figure 13. Proposed Location for the PMO within the Organizational Structure of the Technical Services Department (Source: Compiled by Author)

4.4.2 Roles and Responsibilities and the Level of Authority assigned to TSD's PMO

Based on the maturity assessment and the recommended PMO type for TSD, a series of roles and responsibilities are proposed for the Directive type PMO within TSD.

The PMO has the power and authority to fully manage all projects assigned to the TSD, where the PMO will laise with each of the respective department units who will be on ground to oversee the daily site operations under the guidance of the PMO.

The PMO is responsible for establishing Project Methodologies and guidelines for the project team and other departmental units to adhere by. The PMO will perform the various functions as outlined in Chart 11 and ensure that all project management systems are in place for all project related activities in TSD. Doing so ensures that multiple projects are run simultaneously in a repeatable and systematic manner.

Figure 14. Proposed Project Team for the PMO of the Technical Services Department (Source: Compiled by Author)

The most important roles of a PMO includes that of the PMO Manager (better known as a Project Coordinator), the Project Manager and the project team. The size of the PMO is highly dependent on the scope of responsibilities that the PMO has to perform along with the magnitude of projects executed by the organization. In the case of TSD, Figure 14 outlines the proposed structure for the PMO bearing in mind its functions, roles and responsibilities. Whilst Chart 12 identifies the staff requirements for the PMO.

Chart 12. Development of PMO Project Team (Source: Inloox.com (2020) and the Author)

No.	Role	Description	Skills
1	PMO Manager/ Coordinator	The success of the PMO is dependent on the PMO Manager, hence the most suitable, qualified and experienced person must be chosen for the position. This individual must be appointed before the implementation of the PMO, which will allow for being part of the planning of the PMO and selection of project team. This ensures that the right persons are chosen which will facilitate effective teamwork.	- Multiple years of experience successfully managing projects in the lead position. - Must possess good social and leadership competencies. - Must possess good communication and conflict management skills. - Must be assertive and cooperative. - Must be in knowledgeable in project management standards, methods and processes. - Good to have a project management certification.

		Should be assigned exclusively to lead the PMO and shall be responsible for coordinating all aspects of the projects undertaken by TSD and ensuring that it is running smoothly.	
2	Project Managers	Should be assigned exclusively to the PMO and shall be responsible for overseeing all aspects of the projects undertaken by the PMO along with the assistance of the other Project Team Members; including all procurement activities with the Procurement Officer, project charter, project management plan, project monitoring and tracking, cost control and scheduling, change management, risk identification and management, stakeholder	• Multiple years of experience successfully managing projects in the Project Manager position. • Must possess good social and leadership competencies. • Must possess good communication and conflict management skills. • Must be assertive and cooperative. • Must be in knowledgeable in project management standards, methods and processes. • Good to have a project management certification.

		management, etc. The Project Manager devises strategies to ensure that projects attain its benefits.	
3.	Other Project Team Members: Procurement Officer and Project Officers.	Like the Project Manager, the project team should be able to withstand a high degree of pressure due to the challenges of coordinating projects across a large department and its workload. In order to define their roles, it is necessary to identify the characteristics of each project, starting by having a clear definition of the scope of work and type of construction or maintenance & repair contract, duration of the construction, among other things. These items will help in	• Should have a certain degree of assertiveness. • Should possess strong communication skills. • Should have organizational talent and project management knowledge and training.

| | | defining the personnel needs for monitoring both in numbers and in type of education and experience required for each person.

Scope definition will allow for the elaboration of the monitoring team setup by dividing the project into main areas and allow the determination of the roles and responsibilities for each team member. | |
|---|---|---|---|

Chart 13 provides an overview of the assignment of roles to PMO functions. As can be seen the Project Manager is the right hand man to the PMO Coordinator, where most of the functions require a joint effort by both individuals.

Chart 13. Role Assignment to PMO functions Chart (Source: Hobbs & Aubry (2007) and Author)

Functional Groups	Functions	Role
Group 1: Monitoring and Controlling project performances.	1. Report project status to management.	PMO Manager
	2. Monitor and control project performance.	Project Manager
	3. Implement and operate a	Project Manager

	project information system.	
	4. Develop and maintain a project scoreboard.	PMO Manager & Project Manager
Group 2: Development of project management competencies and methodologies	1. Develop and implement a standard methodology.	PMO Manager & Project Manager
	2. Promote project management within the organization.	PMO Manager
	3. Develop competency of personnel, including training.	PMO Manager
	4. Provide mentoring for project managers.	PMO Manager
	5. Provide a set of tools without an effort to standardize.	PMO Manager & Project Manager
Group 3: Multi-project management	1. Coordinate between projects.	PMO Manager & Project Manager
	2. Identify, select and prioritize new projects.	PMO Manager & Project Manager
	3. Manage one or more portfolios.	PMO Manager & Project Manager
	4. Manage one or more programs.	PMO Manager & Project Manager
	5. Allocate resources between projects.	PMO Manager & Project Manager
Group 4: Strategic management	1. Provide advice to upper management.	PMO Manager
	2. Participate in strategic planning.	PMO Manager & Project Manager
	3. Manage benefits.	PMO Manager & Project Manager
	4. Networking and environmental scanning.	PMO Manager
Group 5: Organizational learning	1. Monitor and control the performance of the PMO.	PMO Manager
	2. Manage archives of project documents.	PMO Manager
	3. Conduct post-project reviews.	PMO Manager & Project Manager
	4. Conduct project audits.	PMO Manager & Project Manager
	5. Implement and manage a database of lessons learned.	PMO Manager & Project Manager
	6. Implement and manage a risk database.	PMO Manager & Project Manager
	Manage customer interfaces	PMO Manager
	Execute specialized tasks for	PMO Manager

	project managers	
	Recruit, select, evaluate and determine salaries for Project Managers	PMO Manager

4.5 Implementation Plan for the operations of the PMO

Having identified the type of PMO required, its proposed location within TSD and its various roles and responsibilities, the next phase would be to implement the PMO in the new organizational structure.

The implementation plan is directly linked to the results of the maturity assessment, which identified the project management weaknesses within the organization, along with other results analysis, which helped determine the structure for the implementation plan.

The first line of action is to consult all stakeholders for the introduction of the PMO into the organization's structure. This process can be undertaken through a series of workshops with all team members as well as management. Also included in this phase is the development of the Business Case along with the project charter, which involves strategic plans, finances, vision and mission statements, project objectives, etc.

The next line of action is to review the skill set available to carry the new structure forward. The organization's performance history is reviewed to determine the priorities of the PMO for immediate or long-term action and improvement.

Once the skills are identified and need assessment approved, the procedures and processes developed for the PMO are implemented using the templates and guidelines developed.

Lastly, a review of the PMO's performance is conducted to determine the effectiveness of the methodologies set out for the operations of the PMO (included is lessons learnt). This will also determine whether the organization's maturity level have improved from that of a level two (2) to a level three (3) or four (4).

Chart 14. PMO Implementation Plan (Source: Adapted from PMI.org (2020), PMMajik.com, (2020) and Author)

Phases	Steps	Task	Timelines
Phase One – Define			
		Project management	
	1.1	Project Planning and intiation.	
	1.2	Assess the current organization and its environment.	
	1.3	Establish the PMO's Charter (e.g: vision and mission statements, scope, and objectives).	Week 1- 2
	1.4	Develop the PMO's Business Case.	
	1.5	Review and finalize project plan	
Phase Two – Plan, implement and manage			
		Governance	
	2.1	Facilitate Governance process/support	
	2.2	Prioritization Processes	
	2.3	Identify the organizational structure and staffing requirements.	
	2.4	Identify change management processes	Week 2 - 4
	2.5	Project dashboard reporting and other reports	
	2.6	Project review process	
	2.7	Establish a Governance Committee	
		Methods and Standards: methodologies and frameworks, processes and performance metrics	
	2.8	Project status reporting	
	2.9	Project deliverables	
	2.10	Estimating processes	
	2.11	Project plan templates and forms	Week 4 - 7
	2.12	Project milestone standards	
	2.13	Scope management processes	
	2.14	Change management processes	

	2.15	Project acceptance processes	
	2.16	Establish project tracking/reviews to determine improvements in Project Management	
		Resource Management	
	2.17	Schedule/time recording systems	
	2.18	Resource forecasting systems	
	2.19	Resource management processes	
	2.20	Conduct reviews on resources management (conflicts, etc) for improvements.	
		Training and Mentoring	
	2.21	Enterprise tools and practices	
	2.22	Project tools, templates and processes	
	2.23	Resource forecasting	
	2.24	Develop training requirements	
	2.25	Establish training review boards	
Phase Three – Project Deployment / roll-out			
	3.1	Develop PMO deployment plan and deploy PMO (enterprise tools and processes, project leveling tools, templates and processes).	Week 7 - 8
	3.2	Overall project reviews for return on investment (e.g lessons learnt, project completion rates, customer/stakeholder satisfaction)	
Key performance indicators include: ratios on improvement in project completion and success, increase in customer satisfaction rates (reduction in complaints due to product quality), improvement in resource management (reduction in conflicts related to staffing and training), improvement in project management (risk identification and management, lessons learnt registers), meeting project timelines and returns on investments.			

4.6 Technical Proficiencies and training needs for TSD

Training are based on the requirements of the organization upon the results of the project management maturity assessment conducted. Training measures are part of personnel development, where personnel development is in turn a part of the overall organizational development and the strategic direction of the organization.

The objectives of training are to achieve:

1. An improvement in knowledge.
2. An improvement in skills.
3. An improvement in performance.

The Technical Services Department has to react flexibly and provide efficient services of high quality in the maintenance and repair of the infrastructure in St. Lucia through successful project management. In order to achieve this goal, the staff within the TSD must be skilled and qualified in project management to complement the PMO.

Consequently, a training plan is developed.

4.6.1 Recommendations on Provisions of Training

1. Basic knowledge and skills

In order to improve performance and to allow for a better allocation of tasks, it is recommended to increase function-independent qualifications. Therefore, training should include programmes that strengthen interdisciplinary abilities, beliefs and behaviour. This means that there should be task related training for staff members in general topics like leadership, personnel management planning and decision-making techniques, information and communication should be offered. For lower level personnel it means that the development should lead to "multi-tasking", example the ability of an employee to perform more than one job competently and efficiently.

The training topics and training courses in the Charts 15 – 20, define minimum skills and competencies required. It is recommended to employ external trainers to provide in-house training specifically tailor-made for TSD. In this case, the Charts 15 - 20 provide guidelines for specifying the requested training. The target audiences for the specific training events are also specified.

2. Management training

Management training should take place regularly in order to steadily improve "soft" skills like leadership and communication. These skills have to be trained permanently if a lasting effect is to be reached. As stated below, the main target group are the DCE, SOW and Engineers. However, anyone in TSD who is leading a team should receive some sort of "management" training, example technicians leading a group of labourers.

In addition to the below indicated topics, training will be necessary in topics of IT applications and document management. The necessary IT systems with a server and clear data storage requirements are needs to be in place to complement the training.

3. Leadership and general management

Especially for the engineers and the engineering assistants, it is of utmost important to have some basic management competencies. A competency can be defined as a particular quality that an organization has decided to be desirable for employees to possess. During performance appraisals and assessment processes competencies are usually used as benchmarks to rate and evaluate employees.

Key competencies are:
- Communication
- Leadership
- Teamwork ability
- Responsibility
- Commercial awareness / cost awareness
- Decision making
- Trustworthiness and ethics
- Result orientation
- Problem solving
- Work organization

Chart 15. A sample course in Management and Leadership (Source: HPC/ Sellhorn, 2019)

Course Title: Leadership and General Management Training

Target Audience: SOW, Engineers, Project Officers and
                          Engineering Assistants.

Overall Objective: The target audience is familiar with General
                          Management Tools.

Module / Sub Topic	Learning Objective (per sub-topic)
Basics of Leadership	• The participants have general knowledge about leadership theory and practice. • They understand the important components of different leading styles related to job and people. • The participants know the theoretical and practical background of different delegation models.
Motivation Praise and reprimand Appraisal schemes	• The participants get an overview about motivation theories. • They can use incentives and disciplining measures. • They can handle the "motivational gap". • The participants are acquainted with and can make use of appraisal systems.
Conflict Handling and Change Management	• The participants are familiar with "natural" conflicts. They can avoid conflicts and know instruments to handle conflicts. • The participants are acquainted with typical resistance against change. They know the

	important instruments to avoid and overcome change barriers.
Typical Leadership Mistakes	• The participants know the typical leadership mistakes. • They know how to avoid these mistakes.
Successful negotiations	• The participants are able to negotiate and get win-win-results.
Planning, Project Management and Contract Supervision Presentation skills	• The participants are acquainted with planning and budgeting tools. • They can supervise contractors. • The participants know the principles of good presentation for internal and external purposes.
Decision making	• The participants know important tools for better decision making. • They know about prioritizing tasks.
Basics of Controlling	• The participants understand key figures (Key performance indicators KPI's) for their units.

As can be seen in Chart 15, many topics relate to the area of management and leadership. A course duration of five days would be extremely short to understand and practice the different tools and concepts. Therefore, it is recommended to split the course into several sub-courses and to ensure that training in these subject areas are repeated on a regular basis. The course should be set up as an interactive training event with group work and participants' presentations.

Chart 16.   A sample course in Presentation and Communication (Source: HPC/ Sellhorn, 2019)

Course Title: Presentation and Communication

Target Audience: SOW, Engineers, Project Officers, Engineering
                           Assistants, Building Officers and Technicians.

Overall Objective: The target audience

Module / Sub Topic	Learning Objective (per sub-topic)
Presentation	• The participants can design appropriate and effective presentations. • They understand the do's and don'ts of successful presentations. • They can give presentations in a confident and competent manner.
Communication and interaction	• The participants understand the basics of communication. • They know how to communicate clearly and effectively. • They know how to encourage participation of the audience and create an atmosphere designed to achieve interaction.

4. Procurement and contract management

It is recommended to provide training in these subjects to staff involved in the procurement process and in contract management and monitoring. Contract monitoring and performance control will remain the responsibility of the engineers; therefore, they should be equipped with some tools to carry out this task (see Chart 17).

Chart 17. A sample course in Contracting (Source: HPC/ Sellhorn, 2019)

Course Title: Contracting

Target Audience: CE, DCE, DOW, SOW, Engineers, Project

                               Officers and Procurement staff.

Overall Objective: The participants have the necessary knowledge to

                               draft contracts according to international standards

                               by taking into account all necessary legal and

                               commercial obligations

Module / Sub Topic	Learning Objective (per sub-topic)
International Standards of Contracts	• The participants are familiar with all the relevant paragraphs and International Standards of Contracts.
Legal Formalities	• The participants are aware of legal requirements and are able to check contract compliance to legal requirements and commercial terms and conditions (including warranty, the transfer of risk, assignment, auditing rights, confidentiality, remedies, etc.).
Post-award Administration	• The participants know about typical post-award administration procedures like contract auditing and monitoring minor changes, change requests etc.

Chart 18. A sample course in Contract Management (Source: HPC/ Sellhorn, 2019)

Course Title: Contracting Management

Target Audience: CE, DCE, DOW, SOW, Engineers, Project

Officers and Procurement staff.

Overall Objective: The participants have the necessary knowledge to

carry out contract management.

Module / Sub Topic	Learning Objective (per sub-topic)
Introduction to contract management	• The participants are familiar with all aspects of contract management.
Specification writing	• The participants are aware of the importance of clear, detailed and unambiguous specifications. They are able to write specifications in their area of expertise.
Contracts and Service Level Agreements	• The participants know about different types of contracts and service level agreements and their implications.
Negotiation skills	• The participants understand the principles of negotiation and are able to negotiate and get win-win-results.
Dealing with change requests	• The participants understand the implications of change requests. They can give recommendations on approving or declining change requests.
Managing contracts	• The participants can apply the different tools of contract management. They understand the different aspects to be

	considered in contract management.

5. Project Management

Much of the work of TSD is project related. Therefore, all technical staff should receive some form of training in project management. The training gives some basic knowledge about the nature of projects and essential factors of project management to the participants. On the other hand, the training ensures that everybody at TSD is aware of standards in project management, since they will be applied by the PMO.

Chart 19. A sample course in Project Management (Source: HPC/ Sellhorn, 2019)

Course Title: Project Management

Target Audience: DCE, DOW, SOW, Engineers, Project
                                      Officers and Engineering Assistants.

Overall Objective: The participants have the necessary knowledge to
                                      follow the guidelines implemented by the Project
                                      Managers. They become acquainted to the tools to
                                      control and steer costs/resources, time schedule and
                                      quality. They can identify risks and undesired
                                      developments in an early stage and can recommend
                                      appropriate counter- measures to the PMO since
                                      they would be part of the line staff on site.

Module / Sub Topic	Learning Objective (per sub-topic)

Basics of project management	• The participants are familiar with the different aspects of project management
Project cycle	• The participants understand the different project phases and can structure projects.
Project planning	• The participants can develop a work breakdown structure, a milestone plan, elaborate a project schedule, do cost and resource planning and can carry out a project related risk analysis.
Project controlling and implementation	• The participants understand the importance of project documentation and reporting for controlling and monitoring. • They know instruments for quality assurance and can cope with project deviations.
Completion of a project	• The participants are aware of the implications of preliminary and final acceptance and can develop acceptance procedures. They are able to derive lessons learnt from their project and communicate them.
Leadership and communication: • The role of the project Manager. • Leadership and Communication in a project. • Solution of conflicts.	• The participants understand the implication of different leadership styles in a project, the role and responsibilities of the PMO Manager and Project Manager as a leader. They understand the potential for conflicts in a project and can apply tools to solve problems and conflicts.

The actual scope and duration of the Project Management training should depend on the prior knowledge of the various participants. As a limited number of individuals already received training in project management, the focus may vary, depending on the actual participants.

One specific focus in project management can be how to work with consultants and contractors in order to ensure that the benefits gained from the consultants can be maximized. This includes deliverables control as well as building of a good and fruitful relationship to prevent conflicts.

Chart 20. A sample course in Risk Management (Source: HPC/ Sellhorn, 2019)

Course Title: Risk Management

Target Audience: CE, DCE, DOW, SOW, Engineers and Project
                          Officers.

Overall Objective: The Participants know the principles and techniques
                          of risk management.

Module / Sub Topic	Learning Objective (per sub-topic)
Principles of Risk Management	• The participants understand the principles of risk management as defined in ISO 31000.
Risk Identification and Assessment	• The participants can identify risks and assess risks for the probability of occurrence and potential severity of impact.
Risk Mitigation	• The participants know how to create new processes to avoid risks or find ways to transfer risks to external parties.

| Risk Management in Projects | • The participants can develop plans to manage risk in specific projects, including risk management tasks, responsibilities, activities and budget. |

5. CONCLUSIONS

The development and establishment of a PMO within TSD plays a vital role in the success of operations for the DIPE. To commence this research project, a maturity analysis was conducted by use of a PMMM methodology. The aim for conducting the maturity analysis was to determine the status of TSD whilst also realizing the opportunity for improvement in its project management operations.

The maturity results guided the development of the six objectives that constitutes the PMO. Which included the selection of the most suitable type of PMO to be established within TSD along with identifying its functions and characteristics, location and implementation plan.

1. In my view, TSD's maturity level two rating is very low for a project-based department. Its level of efficiency and output on projects is at a bare minimum. This is because of insufficient utilization of expertise in project management best practices. Current efforts for improvement should be focused on strategies to shift the maturity level of the organization to a level three (3) or a four (4), which can be realized by implementing drastic measures for establishing project management methodologies and processes into an organizational standard.

2. A Directive type PMO is most suitable for TSD due to two main factors. Firstly, the organization's culture and history in project management will facilitate the acceptance of the PMO. Secondly, surveys and interviews conducted clearly reflected the need for the Directive type PMO.

   The PMO chosen fits within the current organizational structure of TSD and with its functions, lead the organization to a higher maturity level because TSD's current structure lacks trained and skilled personnel versed in

providing guidance in project management, as shown in the maturity assessment conducted.

3. Having identified the best suitable PMO for TSD, the functions and characteristics of the proposed PMO was established.

   The literature on PMO functions published by Hobbs and Aubry, (2007) was adopted for the proposed PMO, because the twenty- seven (27) functions identified in Chart 11 is aligned to the services that the PMO should provide to TSD, to aid the department in realizing its project management goals, which in turn would benefit the MIPEL.

4. Having identified the functions and characteristics of the proposed PMO, the location of the PMO within the organization's structure was considered.

   Due to the structure, operations and the results of the organization's maturity level, the new PMO will be most effective, located immediately below the head of TSD (CE) within the organization where the full benefits of having a PMO can be realized.

   The roles and responsibilities assigned to the PMO will encompass establishing project methodologies and guidelines for the project team and other departmental units. Roles and responsibilities are critical to improving the success of projects implemented by TSD. This is critical for its operational growth and the organization's maturity development.

5. The proposal for the development of a PMO for TSD, would not be complete without an implementation plan. Therefore, proper planning is required on the methodology of introducing the PMO within TSD to allow for stakeholder buy-in. All stakeholders within the department need to appreciate the need for establishing the PMO along with the direction in which TSD is heading.

Being that TSD's maturity is in an infancy stage, the implementation plan proposed is structured in a way that the PMO can be merged into the daily operations of TSD with minimum interruption. Therefore, as outlined in Chart 14, the three-phase approach was adopted where the priority in services was broken into stages for ease of implementation.

6. Lastly, is the need for providing training of staff to complement the newly installed PMO. To enable this, the skill set of the organization was determined, to identify the areas of training required for TSD's staff as was previously identified in "Chart 8: Training Needs Assessment" upon conducting the Organization's Needs Assessment in the early stages of this research paper.

   Previous report submissions by the consultants HPC/Hellhorn contracted by DIPE were used as the main source in identifying the recommended areas for training within TSD and was adopted as part of this research. Charts 15 to 20 acknowledges and identifies the training needs in leadership skills, communication skills, procurement skills and most importantly project management skills.

   Institutionalizing training policies will complement the operations of the proposed PMO, where all units within TSD would operate as one entitiy in realizing the organization's goals. Only then, will MIPEL witness the project management growth of TSD and fulfill its mandate efficiently and effectively. Project management maturity level growth will be inevitable.

6. RECOMMENDATIONS

The intentions of this research topic were to examine TSD's project management practices with the intent to develop a PMO that is most suitable for the organization's operations. Having concluded the results of the series of objectives establish in this research paper, the following are recommended:

1. Upon the implementation and full operations of the PMO within TSD, a maturity assessment should be conducted at least every two (2) years to update the maturity level status of TSD and to determine opportunities for improvement.

2. Due to the changes in work cultures, specifically changes in government every five years and their priorities, the type of PMO established for TSD may require re-evaluation. Therefore, with the establishment of the new PMO within TSD's organizational structure, an annual review program is required to analyze the functionality and relevance of the PMO to meet the needs of the presiding government of St. Lucia.

3. As the operations of DIPE changes with the changes in government, so will some functions and characteristics of the PMO within TSD. The functions of the PMO needs to be re-evaluated as the need arises to ensure that the PMO is providing the required services of TSD.

4. As the work culture changes every five years due to the presiding government and their mandates, the location of the PMO may be restructured and in turn, the roles and responsibilities of the PMO be modified. It is recommended that a review panel be established to review the existing roles and responsibilities of the PMO along with their level of authority and their relevance to particular projects as may be mandated by the presiding government.

5. Change is inevitable. When changes are required to the PMO, a systematic approach should be undertaken in modifying the implementation plan through a series of stakeholder consultations to ensure stakeholder buy-in for a smooth transition process.

6. It is recommended that the training policies be modified and updated as the organization's maturity level increases and the possible change in staffing occurs. With technological and industrial advances, training policies which may have suited the organization prior will become outdated, hence the recommendation for systematic updates to training policies through review boards.

7. An FGP of this type could be used as a guide for other ministries in the public sector that desire to establish a PMO within their structure. It provides a structured approach of processes required to implement a PMO within an organization based on its goals and type of operations.

8. Similar organization's that wish to implement a PMO should first brainstorm and decide on what the company wishes to attain, along with an evaluation to derive a clear picture of the organization's objectives, goals and strategies and current trends in operations. A maturity assessment should then be undertaken to establish the organization's current status in determining its strength, weaknesses and opportunities for improvement. It will highlight the challenges of the organization and provide guidance on the processes required for implementing a PMO.

7. BIBLIOGRAPHY

(n.d.). Retrieved from http://www.free-management-ebooks.com/faqpm/principles-
  08.htm

(n.d.). Retrieved from https://study.com/academy/lesson/project-management-
  maturity-model-definition-levels.html

(n.d.). Retrieved from https://study.com/academy/lesson/project-management-
  maturity-model-definition-levels.html#:~:text=The Project Management Maturity
  Model, an action plan for improvement.

(n.d.). Retrieved from https://www.csus.edu/indiv/y/yangy/145ch1.htm
  /pmp/what-is -project-life-cycle-and-its-main-characteristics

Abbas, Dilawar. "PMO (Project Management Office)." *LinkedIn SlideShare*, 24 Oct.
  2014, www.slideshare.net/dilawarabbas/pmo-project-management-office-
  40668047.

Aubry, M., Hobbs, B. & Thuillier, D., 2007. Organizational project management: An
  historical approach to the study of PMO's. International Journal of Project
  Management 26 (2008) 38–43.

Burney, S.M.A; Saleem, H., (2008), "Inductive & Deductive Research Approach",
  Lecture delivered on 06-03-2008 at Auditorium of
  Faculty of Arts and Science, University of Karachi, Karachi, Pakistan.

Cunha, A. (2015, February 23). Project Management Office (PMO):
  Characteristics, Roles, Functions, T... Retrieved July 12, 2020, from

https://www.slideshare.net/adsoncunha/project-management-office-pmo-
45047000

Dai, C. X., 2002. The role of the project management office in achieving project
success. Paper presented at Project Management Institute Annual Seminars
& Symposium, San Antonio, Newtown Square, PA: Project Management
Institute.. 74

Dai, C. X. & Wells, W. G., 2004. An exploration of project management office
features and their relationship to project performance. International Journal of
Project Management 22 (2004) 523– 532.

Dietrich, P., Artto, K. A., & Kujala, J. (2010). Strategic priorities and PMO functions
in project-based firms. Paper presented at PMI® Research Conference:
Defining the Future of Project Management, Washington, DC. Newtown
Square, PA: Project Management Institute.

Ferreira, Reon. What Are Functions of the Project Management Office (PMO) in
the Irish Public Sector, Their Level of Maturity, and How Do They Contribute
to Organizational Value? 2019, trap.ncirl.ie/3962/1/reonferreira.pdf.

Five Basics of a PMO Implementation Plan. (n.d.). Retrieved July 29, 2020, from
https://www.projectmanagement.com/blog-post/7932/Five-Basics-of-a-PMO-
Implementation-Plan

Gabriel, D. (2020, February 3). Inductive and deductive approaches to research.
Retrieved from https://deborahgabriel.com/2013/03/17/inductive-and-deductive-
approaches-to-research/

Getting Started with CMMI. (n.d.). Retrieved from
https://dqsindia.com/cmmi/getting-started/

Hartney, J., Izzatullo, Fidele, & Ancheta, F. (2020, February 20). The 10 PMBOK Knowledge Areas. Retrieved from https://www.projectengineer.net/the-10-pmbok-knowledge-areas/

Hobbs, B., & Aubry, M. (2007). A multi-phase research program investigating Project Management Offices (PMO's): The results of phase 1. Project Management Journal, 38(1), 74-86.

How to set up a PMO. (2017, January 16). Retrieved July 25, 2020, from https://www.pmmajik.com/set-pmo/

HPC, & Sellhorn. (2018). *Report of Capacity Needs Assessment of Tsd* (Vol. D2 - D6).

Huff, H. (n.d.). MSG Management Study Guide. Retrieved from https://www.managementstudyguide.com/observation_method.htm

Learning. (n.d.). Retrieved from https://www.pmi.org/learning/library/pm-maturity-industry-wide-assessment-9000

Learning. (n.d.). Retrieved July 25, 2020, from https://www.pmi.org/learning/library/pmo-implementation-thirty-day-plan-7511

LibGuides: Research Help: Types of Sources. (n.d.). Retrieved from https://libguides.merrimack.edu/research_help/Sources

LibGuides: Research Methods: What are research methods? (n.d.). Retrieved from https://libguides.newcastle.edu.au/researchmethods

Muriuki, N., & Muriuki, N. (n.d.). Definition of Research tool: Different forms of research tool. Retrieved from https://www.civilengineeringterms.com/research-methodology/definition-research-tool-forms/

Organizational Project Management Maturity Model (OPM3). (2016, May 11). Retrieved from https://www.cbisco.com.au/2015/01/31/organisational-project-management-maturity-model-opm3/

Pennypacker, J. S. & Grant, K. P. (2002). Project management maturity: an industry-wide assessment. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications, Seattle, Washington. Newtown Square, PA: Project Management Institute.

Project Management Institute. (2008). *Organizational project management maturity model (OPM3) knowledge foundation*. Newtown Square, PA.

Project Management Institute. (2017). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (6th Edition). Project Management Institute.

Research Guides: Primary Sources: A Research Guide: Primary vs. Secondary. (n.d.). Retrieved from https://umb.libguides.com/PrimarySources/secondary

Software, S. (2020, June 19). What are PMO roles and responsibilities in an organization? Retrieved July 21, 2020, from https://www.saviom.com/blog/pmo-roles-responsibilities-organization/

The PMO Series (2): The Most Important Project Management Office Roles. (n.d.). Retrieved July 21, 2020, from https://www.inloox.com/company/blog/articles/the-pmo-series-2-the-most-important-project-management-office-roles/

Wale, S. (n.d.). PMO Implementation PPT Template. Retrieved July 24, 2020, from https://www.techno-pm.com/2017/05/pmo-implementation-plan-ppt-template.html

What Is Analytical Research? (n.d.). Retrieved from
    https://www.reference.com/business-finance/analytical-research-
    94534a536bf46028

What is P3M3®? (n.d.). Retrieved from https://www.axelos.com/best-practice-
    solutions/p3m3/what-is-p3m3

What is Project Life Cycle and its Main Characteristics?: Invensis Learning. (2018,
    February 27). Retrieved from https://www.invensislearning.com/resources

What is project management maturity? (n.d.). Retrieved from
    https://www.pmsolutions.com/resources/view/what-is-project-management-
    maturity/

What is the role of a project management office (PMO)? (2019, September 26).
    Retrieved July 21, 2020, from https://www.workzone.com/blog/role-project-
    management-office-pmo/

What Research Is Telling Us about PMOs, www.pmi.org/learning/library/what-
    research-telling-pmos-6870.

White, S. K. (2018, March 16). What is CMMI? A model for optimizing development
    processes. Retrieved from https://www.cio.com/article/2437864/process-
    improvement-capability-maturity-model-integration-cmmi-definition-and-
    solutions.html

Www.facebook.com/ashiklis. (2016, June 28). Types of Information Sources.
    Retrieved from http://www.lisbdnet.com/types-information-sources/

8. APPENDICES

Appendix 1: FGP Charter

PROJECT CHARTER	
(Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries)	
Date:	**Project Name:**
24-Feb-20	The Development of a Project Management Office (PMO) Proposal for the Technical Services Department (TSD) within the Department of Infrastructure, Ports and Energy(DIPE) in St. Lucia
Knowledge Areas / PM Processes:	**Application Area (Sector / Activity):**
Knowledge Areas: Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communication Management, Project Risk Management, Project Procurement Management and Project Stakeholder Management. **PM Processes Groups:** Initiating, Planning, Executing, Monitoring and Controlling and Closing.	Construction Sector
Project Start Date:	**Project Finish date:**
24-Feb-20	21-Aug-20
Project Objectives (General and Specific):	

General Objective:
To develop a Project Management Office (PMO) proposal for the Technical Services Department within the Department of Infrastructure, Ports and Energy (DIPE) to standardize Project Management best practices and to maximize the success rate of

Infrastructural Projects undertaken by the Department.

Specific Objectives:

1. To conduct a maturity analysis and organizational needs of the Technical Services Department in order to determine its project management strengths, weaknesses and opportunities for improvement.

2. To assess and determine the type of PMO that are best suited for the Technical Services Department, through the analysis of the various types of PMO's.

3. To propose the characteristics and functions that a PMO should have.

4. To determine the position of the PMO within the organization along with its structure, roles and responsibilities and its level of authority.

5. To develop the implementation plan for the Technical Services Department within the Department of Infrastructure, Ports and Energy (DIPE).

6. To assess technical proficiencies and develop training policies.

Project purpose or justification (merit and expected results):
The aim of the FGP is to create a Project Management Office proposal that will standardize project management practices to improve the success rate of projects being executed within the department. The Department of Infrastructure, Ports and Energy (DIPE) receives financial allocations from the Ministry of Finance and various external funding agencies annually, to plan and execute public infrastructural projects. Over the years, there has been failures to meet project objectives resulting in cost overruns, low quality outputs and over extended time schedules. The creation and implementation of a Project Management Office will manage project activities and increase project success within time, cost and quality parameters. In addition, the success gained from the implementation of the PMO will provide valuable experience together with strategic training, which will increase organizational capacity and proficiency in project management skills.
Description of Product or Service to be generated by the Project – Project final deliverables:
The Final Graduation Project will provide a comprehensive Project Management Office Proposal with its new structure, its inclusion into the Department's existing organizational structure and the resources required for implementation. The proposal will address project management best practices as recommended by the Project Management Body of Knowledge (PMBOK 6th Edition).
Assumptions:
1. It is assumed that access to all information required to execute the Final Graduation Project will be readily available.
2. It is assumed that the Department will grant access to specific project information.
3. It is assumed that participants in the information gathering exercises will be open to participation.
Constraints:

Time constraints established by the University for the Final Graduation Project will impact the deliverables of the project scope.

Preliminary Risks:

If there is an unwillingness of participants in the information gathering process, there will be a delay in the analysis of data, which will impact the delivery time and subsequent quality of the project.

Budget:

Total Budget is US $3,800.00.
(130 days x 2 hrs per day = 260 x $12.50 per hr = $3,250.00 plus $400.00 for review of document by expert and $150.00 for printing).

Milestones and dates:

Milestone	Start date	End date
Graduation Seminar	24-Feb-20	29-Mar-20
Tutoring Process	30-Mar-20	26-Jun-20
Review by reviewers	29-Jun-20	17-Jul-20
Adjustments	20-Jul-20	14-Aug-20
Defence to Board of Examiners	17-Aug-20	21-Aug-20

Relevant historical information:

The Department of Infrastructure, Ports and Energy (DIPE) is the leading government agency in St. Lucia for the island's infrastructure. It is responsible for the construction and maintenance of public roads, bridges and public administrative buildings. Since 2012 under its renewed mandate, the Department has taken over the responsibility of lending technical assistance to its sister government ministries: the Ministries of Health, Education and Social Transformation. The technical staff of the Technical Services Department comprises of a director of works, superintendent of works, civil engineers, structural engineers, mechanical engineers, projects officers, engineering assistants, quantity surveyors, building officers, CAD Techs and technicians. The Chief Engineer has the overall responsibility for the Technical Services Department. With the exception of two officers currently completing their master's degree in Project Management, the department does not have qualified project managers guiding the management of the projects executed by the department. With the development of a Project Management Office, the Technical Services Department will be better able to manage their projects successfully utilizing project management best practices.

Stakeholders:

Direct stakeholders:
1.   Permanent Secretary.
1.1 Chief Engineer.
2.1 Technical Officers within the department.

Indirect stakeholders:
1. Public.
2. Other government ministries.
3. Suppliers.

Approval:	
Project Manager:	Signature:
Authorized by: Lotty Prospere	Signature: _L. Prospere_

Appendix 2: FGP WBS

Appendix 3: FGP Schedule

FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		**Final Graduation Project**	130 days	Mon 2/24/20	Fri 8/21/20		
2		FGP Start	0 days	Mon 2/24/20	Mon 2/24/20		
3		1,Graduation Seminar	25 days	Mon 2/24/20	Fri 3/27/20	2	
4		1.1,FGP Deliverables	20 days	Mon 2/24/20	Fri 3/20/20		
5		1.1.1,Charter	5 days	Mon 2/24/20	Fri 2/28/20		
6		1.1.2,WBS	5 days	Mon 2/24/20	Fri 2/28/20		
7		1.1.3,Chapter I. Introduction	5 days	Mon 3/2/20	Fri 3/6/20	5,6	
8		1.1.4,Chapter II. Theoretical framework	5 days	Mon 3/9/20	Fri 3/13/20	7,12	
9		1.1.5,Chapter III. Methodological framework	5 days	Mon 3/16/20	Fri 3/20/20	8	
10		1.1.6,Annexes	15 days	Mon 3/2/20	Fri 3/20/20		
11		1.1.6.1,Bibliography	5 days	Mon 3/16/20	Fri 3/20/20	8	
12		1.1.6.2,Schedule	5 days	Mon 3/2/20	Fri 3/6/20	6,5	
13		1.2,Graduation Seminar approval,	5 days	Mon 3/23/20	Fri 3/27/20	9,11	
14		2,Tutoring process	65 days	Mon 3/30/20	Fri 6/26/20		
15		2.1,Tutor	3 days	Mon 3/30/20	Wed 4/1/20		
16		2.1.1,Tutor assigment	1 day	Mon 3/30/20	Mon 3/30/20	13	
17		2.1.2,Communication	2 days	Tue 3/31/20	Wed 4/1/20	16	
18		2.2,Adjustments of previous chapters (if needed)	5 days	Thu 4/2/20	Wed 4/8/20	16,17	
19		2.3,Charter IV. Development (Results)	47 days	Thu 4/9/20	Fri 6/12/20	18	
20		2.4,Chapter V. Conclusions	5 days	Mon 6/15/20	Fri 6/19/20	19	
21		2.5,Chapter VI. Recommendations	5 days	Mon 6/22/20	Fri 6/26/20	20	
22		Tutor approval	0 days	Fri 6/26/20	Fri 6/26/20	21	
23		3,Reading by reviewers	15 days	Mon 6/29/20	Fri 7/17/20		
24		3.1,Reviewers assigment request	5 days	Mon 6/29/20	Fri 7/3/20		
25		3.1.1,Assigment of two reviewers	2 days	Mon 6/29/20	Tue 6/30/20	22	
26		3.1.2,Communication	2 days	Wed 7/1/20	Thu 7/2/20	25	

Project: PROSPERE_LOTTY_Sched
Date: Fri 3/6/20

Task		Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split		External Tasks	Inactive Summary	Manual Summary	Critical
Milestone		External Milestone	Manual Task	Start-only	Critical Split
Summary		Inactive Task	Duration-only	Finish-only	Progress

Page 1

FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
27		3.1.3,FGP submission to reviewers	1 day	Fri 7/3/20	Fri 7/3/20	26	
28		**3.2,Reviewers work**	**10 days**	**Mon 7/6/20**	**Fri 7/17/20**		
29		**3.2.1,Reviewer**	**10 days**	**Mon 7/6/20**	**Fri 7/17/20**		
30		3.2.1.1,FGP reading	9 days	Mon 7/6/20	Thu 7/16/20	27	
31		3.2.1.2,Reader 1 report	1 day	Fri 7/17/20	Fri 7/17/20	30	
32		**3.2.2,Reviewer**	**10 days**	**Mon 7/6/20**	**Fri 7/17/20**		
33		3.2.2.1,FGP reading	9 days	Mon 7/6/20	Thu 7/16/20	27	
34		3.2.2.2,Reader 2 report	1 day	Fri 7/17/20	Fri 7/17/20	33	
35		**4,Adjustments**	**20 days**	**Mon 7/20/20**	**Fri 8/14/20**		
36		4.1,Report for reviewers	9 days	Mon 7/20/20	Thu 7/30/20	34	
37		4.2,FGP update	1 day	Fri 7/31/20	Fri 7/31/20	36	
38		4.3,Second review by reviewers	10 days	Mon 8/3/20	Fri 8/14/20	36,37	
39		**5,Presentation to Board of Examiners**	**5 days**	**Mon 8/17/20**	**Fri 8/21/20**		
40		5.1,Final review by board	2 days	Mon 8/17/20	Tue 8/18/20	38	
41		5.2,FGP grade report	3 days	Wed 8/19/20	Fri 8/21/20	40	
42		FGP End	0 days	Fri 8/21/20	Fri 8/21/20	41	

Project: PROSPERE_LOTTY_Sched
Date: Fri 3/6/20

Task		Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split		External Tasks	Inactive Summary	Manual Summary	Critical	
Milestone		External Milestone	Manual Task	Start-only	Critical Split	
Summary		Inactive Task	Duration-only	Finish-only	Progress	

Appendix 4: Project Management Maturity Model (PMMM) Survey Template

INSTRUCTIONS: PLEASE SELECT THE APPROPRIATE PROJECT MANAGEMENT MATURITY LEVEL THAT BEST SUITS THE OPERATIONS OF THE TECHNICAL SERVICES DEPARTMENT AGAINST THE OUTLINED PROJECT MANAGEMENT KNOWLEDGE AREAS.

LEVEL OF PROJECT MANAGEMENT MATURITY	LEVEL 1 Initial Process	LEVEL 2 Structured Process and Standards	LEVEL 3 Organizational Standards and Institutionalized Process	LEVEL 4 Managed Process	LEVEL 5 Optimized Process	SCORE LEVEL 1-5
Project Integration management	No established practices, standards or Project Office. Work is performed in ad hoc fashion.	Basic documented processes for project planning and reporting are available. Management only involved on high-visibility projects.	Project integration efforts institutionalized with procedures and standards. Project Office is beginning to integrate project data.	Processes/standards utilized by all projects and integrated with other corporate processes/systems. Decisions are based on performance metrics.	Project integration improvement procedures are utilized. Lessons learned are regularly examined and used to improve documented processes.	
Project Scope Management	General statement of business requirements. Little to no scope management or documentation available.	Basic scope management process is in place. Scope management techniques regularly applied on larger, more visible projects.	Full project management processes are documented and utilized by most projects. Stakeholders actively participate in scope decisions.	Project management processes are used on all projects. Projects are managed and evaluated in light of other projects.	Effectiveness and efficiency metrics drive project scope decisions by appropriate levels of management. Focus is on high utilization of value.	

Project Schedule Management	No established planning or scheduling standards available. Lack of documentation makes it difficult to achieve repeatable project success.	Basic processes exist but not rquired for planning and scheduling. Standard scheduling approaches are utilized for large, visible projects.	Schedule management processes are documented and utilized by most projects. Organization wide integration includes inter-project dependencies.	Schedule management utilizes historical data to forecast future performance. Management decisions are based on efficiency and effectiveness metrics.	Improvement procedures utilized for time management processes. Lessons learned are examined and used to improve documented processes.	
Project Cost Management	No established practices or standards. Cost process documentation is ad hoc and individual or project teams follow informal practices.	Processes exist for cost estimating, reporting and performance measurement. Cost management processes are used for large, visible projects and management supports efforts to apply them.	All cost processes are in place and documented. Cost processes are considered organizational standards and are utilized by most projects. A cost change control system is in place and implemented.	Cost planning and tracking integrated with Project Office, financial and human resources systems. The organization mandates compliance with project management processes and procedure. Management takes an "organizational view" of projects.	Lessons learned improve documented processes. Management actively uses efficiency and effectiveness metrics for decision-making. Metrics are used to understand the performance of a project during execution and for making management decisions for the future.	

Project Quality Management	Management is aware of the need for quality management, but no established project quality practices or standards are in place.	Basic organizational project quality policy has been adopted. Management encourages quality policy application on large, visible projects and is supportive of the time required to enhance project quality by defining and implementing quality control metrics.	Quality processes are well documented as organizational standards. Management participates in quality oversight for most projects.	All projects are required to use quality planning standard processes. The Project Office coordinates quality standards and assurance.	The quality process includes guidelines for feeding improvements back into the process. Metrics are key influences on product quality decisions, including cost-and-benefit comparisons, effectiveness and efficiency decision.	
Project Resource Management	No repeatable process applied to planning and staffing of projects. Project teams are informal and ad hoc. Human resource time and cost is not measured.	Repeatable processes are in place that defines how to plan and manage the human resources. Resource tracking are on highly visible projects only.	Most projects follow established resource management processes. Professional development program establishes project management career path.	Resource forecasts used for project planning and prioritization. Project team performance is measured and integrated with career development plans.	All projects are expected to follow the established human resource's planning process. Teams consistently document projects lessons learned. Improvements are incorporated into human resources management process.	
Project Communcatio n Management	Management utilizes an ad hoc communication s process whereby project status is	Basic communications management processes are established. Project status and progress reports	The communication management process has been institutionalized and formal communications	Communications management plans are mandated for all projects. Communications plan are	An improvement process is in place to continuously improve project communications management. Lessons learned are	

	reported informally.	are distributed regularly. Large, highly visible projects follow the process and provide progress reporting based on triple constraints.	management plans are expected for most projects. Active involvement by management for project performance reviews.	integrated into corporate communications structure.	captured and incorporated into improvement initiatives and documented into repeatable processes.	
Project Risk Management	No established practices or standards are in place. Documentation is minimal and results are not shared. Risk response is reactive rather than planned and proactive.	Risk management processes are documented and utilized for large projects. Management consistently involved with risks on large, visible projects.	Risk management processes are considered organizational standards and are utilized for most projects. Metrics are used to support risk decisions at the project and the program levels.	All documented processes are utilized for most projects. Management is actively engaged in organization wide risk management. Risk systems are fully integrated with time, cost and resource systems.	Improvement processes are utilized to ensure projects are continually measured and managed against value-based performance metrics. Lessons learned are regularly examined and used to improve documented processes.	
Project Procurement Management	No project procurement process in place. Methods are ad hoc. Contracts managed at final delivery level.	Basic process documented for procurement of goods and services. Procurement process mostly utilized by large or highly visible projects.	The procurement process acts as an organizational standard and is used by most projects. Project team and purchasing department integrated in the procurement process.	Organizational management mandates compliance with procurement procedures by all projects. Make/buy decisions are made from an organizational perspective. Vendors are	Procurement process is reviewed periodically and enhancements are incorporated. On-going process improvements focus on procurement efficiency and effective metrics.	

| Project Stakeholder Management | An ad hoc stakeholder management process is in place, whereby projects manage stakeholders informally. | A basic project stakeholder management process is established. Large, highly visible projects follow the process and provide a structured approach for project stakeholder management. | There is a standard approach and process for project stakeholder management across the organization. Formal project stakeholder management plans are developed and executed for most projects. | Stakeholder management plans are required for all projects. The plans are integrated into all corporate planning systems, processes and structures. | A process is in place to ensure continuous improvement of project stakeholder management. Lessons learned are captured and incorporated into existing processes. | |

The cell above "Stakeholder management plans..." column (top partial row) reads: "integrated into the organization's project management mechanisms."

Appendix 5: Results of the Project Management Maturity Model (PMMM) Survey (Source: Compiled by Author)

LEVEL OF PROJECT MANAGEMENT MATURITY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	
	Initial Process	Structured Process and Standards	Organizational Standards and Institutionalized Process	Managed Process	Optimized Process	MEDIAN LEVEL
Project Integration management	5	3	1	1	0	2
Project Scope Management	1	7	1	1	0	2
Project Schedule Management	2	6	1	1	0	2
Project Cost Management	1	6	2	1	0	2
Project Quality Management	5	2	2	1	0	2
Project Resource Management	8	0	1	1	0	2

Project Communication Management	1	6	3	0	0	2
Project Risk Management	8	1	0	1	0	2
Project Procurement Management	0	5	4	1	0	2
Project Stakeholder Management	1	7	2	0	0	2
	32	**43**	**17**	**8**	**0**	

Appendix 6: Credentials of Linguistic Review Professional (Source: Angela Jean Baptiste, 2020 and compiled by Author)

Angela Marie Paul Jean Baptiste
P.O. Box CHOC 8238, Union Hill Top
Castries, St. Lucia
ajnbaptiste@sjc.edu.lc; (758)584-6047/450-2789

Thursday 30th July, 2020

Academic Advisor

Master's Degree in Project Management (MPM)

Universidad para la Cooperacion Internacional (UCI)

Dear Academic Advisor,

Re: Philological Review of Final Graduation Project submitted by Ms. Lotty Nicole Prospere in partial fulfilment of the requirements for the Masters in Project Management (MPM) Degree.

I hereby confirm that **Ms. Lotty Prospere** has made all the corrections to the Final Graduation Project document as have advised. In my opinion the document meets the literary and linguistic standards expected of a student reading for a degree at the Masters Level.

I am a trained English Language teacher who have been instructing students at the high school level since 2011. I have a Bachelor's Degree in Education from the *University of the West Indies, Cave Hill Campus*, Barbados. A copy of the same is attached.

Sincerely,

ABaptiste

Angela Jean Baptiste, B.Ed.

THE UNIVERSITY OF THE WEST INDIES

Angela Marie P. Jean-Baptiste

having completed the Course of Study approved by the University and having satisfied the Examiners, has this day been admitted by the Senate to the Degree of

BACHELOR OF EDUCATION
EDUCATION

(TEACHING OF LANGUAGE ARTS)
with
Second Class Honours (Upper Division)

July 1, 2011

DATE

VICE-CHANCELLOR

UNIVERSITY REGISTRAR

This Document is not valid unless it bears the University's seal