



PMO implementation in trinidad and tobago engineering-service contractor firms: challenges and lessons learned

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ABSTRACT

This paper explores the challenges and lessons learned in integrating a project management office (PMO) into the existing organizational structure of engineering-service contractor (ESC) companies in Trinidad and Tobago (T&T). Although several T&T ESCs now boast of having a robust PMO, its implementation has been a difficult and expensive endeavor for most, persuading others to forego this. This disinclination is due to the lack of available insight and guidance on PMO implementation for ESCs operating in the Caribbean. Top management personnel and departmental managers from twenty-eight ESCs who played a direct role in the PMO incorporation at their organizations were polled in a self-report study which collected quantitative data via a questionnaire. Insights on their perceived PMO value, implementation weak and strong points, integration challenges and lessons learned were gathered and analyzed. The findings confirmed concurrence amongst all participating ESCs that PMO implementation bodes well for their strategic organizational goals. The biggest implementation challenges reported were creating a project management culture and realigning the power for resource management and allocation. Smoother integration was reported amongst companies that included suitable communication channels, pre-implementation planning, and project management training for PMO personnel into the process. For the findings varied across companies, this paper illustrates numerous areas of concern common to ESCs. There is no existing research on PMO implementation in T&T or Caribbean firms, and this paper provides foresight and direction for companies contemplating such endeavors.

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INTRODUCTION

With the government's steady decline in income from multi-national energy companies operating in Trinidad and Tobago (T&T), a Caribbean small island developing state (SIDS),

alternative revenue creation strategies are being explored to safeguard the economy. One strategy being touted is expanding T&T's services sector, especially developing competitive advantage in providing tradeable, skilled services for export to fledging energy sectors of selected Caribbean territories like Guyana and Suriname [1], [2]. The notion of migrating from a commodity-based (oil and gas) economy towards a knowledge-based one is also being proposed by King [3], where knowledge use, creation and transfer are strategic drivers of employment and revenue creation. T&T engineering service contractor (ESC) companies can facilitate these two strategies, who have gained technical expertise, experience, and capacity, having supported T&T's construction and energy sectors for decades.

Within the last five years, T&T ESCs have identified opportunities for market expansion to Guyana and the Eastern Caribbean, as revealed by Superville [4] and Stewart [5]. To successfully penetrate these markets, prequalify for provision of services with large multinational corporations operating as Engineering, Procurement and Construction (EPC) companies and efficiently manage and transfer knowledge, contractor companies must demonstrate a commitment to Project Management (PM) process governance as Tiwari and Dwarika [6] caution. It is best demonstrated by incorporating a Project Management Office (PMO) unit within their organizations. This is because the PMO has a specific mandate to standardize the project-related governance processes within organizations and facilitate sharing resources, methodologies, tools, and techniques as described by PMI [7]. Whilst many organizations recognize the benefits of a PMO, they are disinclined to pursue this because of the lack of predictability, specific lessons learned, unclear resource requirements and absence of a 'one size fit all' approach to implementation as discovered by Kondraju [8]. Very little published work exists that provides guidance to ESC organizations that are small and medium enterprises (SMEs) operating in the Caribbean region regarding implementing a PMO to address the vision and mission of its business – which is primarily providing services to industry via projects on a contractual basis. The research objectives then of this study are to gain firsthand insights from the management and practitioners at T&T ESC companies into the implementation aspects that worked well and those that were under-implemented to assist in developing a PMO implementation roadmap. It will assist in closing a knowledge gap that currently exists in the industry.

This paper presents findings coming out of a more extensive, ongoing study seeking to understand the altering role of T&T ESCs and how they can be re-engineered to become a more impactful economic contributor. It explores the challenges and lessons learned in integrating a PMO within T&T ESCs to subsequently develop an implementation framework specific to T&T ESC companies. This study solicited data from twenty-eight (28) engineering services contractor (ESC) companies who implemented PMOs at their organization via a self-report questionnaire. The gathered data was analyzed to establish the expected value of the PMO and understand the experienced challenges and lessons learned in the respective implementation campaigns of the participating ESCs. The merits of these analyzed insights and implications that can assist companies in developing their PMO implementation strategies were elaborated.

1. The Project Management Office Requisite

PMI [7] describes the PMO as the center that establishes a procedural framework that facilitates project planning and controlling through incorporation of the Project Management (PM) knowledge areas via development of procedures, standards, and indicators for the process of initiating, planning, executing, controlling and closing projects. PMOs have proven to reconcile projects with corporate vision, goals, and strategies and formalize a regime for consistent project management using a standardized method as discovered by Salameh [9]. Patel [10] describes the role of PMO units in assuring client companies that a contracting firm accepting a project has a roadmap for successful, proactive execution via optimal resource loading and process management. Many T&T ESCs favor the safer approach of pursuing bids based on the organization's seeming ability to execute the job. Christie [11] describes how a PMO can ease an organization's movement towards strategic project portfolio management, which involves selecting tenders for pursuit via risk-based tender evaluation, discerning the constraints of

customers' expectations, real-world industry factors and the futuristic goals of the organization. Notably, The PMO also facilitates the meeting of PM and knowledge management as Crowford [12] and Pemsel, and Wiewiora [13] posit, allowing a knowledge repository to be created from captured lessons learned and for policies to be developed from these, thereby improving project management quality. This is vital in developing a knowledge-based economy, fostering economies of repetition and enabling the competitiveness of T&T ESCs. Pounder and Devonish [14] highlight the need for proper management of institutional and policy issues to improve PM performance and accountability of tasks to advance the development of the Caribbean Region. In T&T, bureaucracy and imprudence in project implementation and execution leads to schedule slippage, cost overruns, lost opportunities and the consequent lessening of capacity building and confidence in the industry's future and needs to be addressed via formal organizational structures as cautioned by Lezama [15]. A PMO presence bodes well then for individual growth of ESCs and, consequently, national and regional development.

2. Role of Engineering-Services Contractor Companies and Industry Context

Sankat [1] surmised that T&T ESCs have historically played a vital role in driving the energy sector; in BPTT's operations alone, over half of the workforce hours are provided by contractors, and close to two-hundred ESC companies perform 65-75% of their work bpTT [16]. Because of extensive energy sector activity in T&T between the twentieth century and early twenty-first century, the onus of ESCs to evolve beyond being mere providers of craft labor or seek work beyond T&T's borders was not exigent. With reduced commodity prices and increased shale production in the U.S., upstream and downstream activity has become mired, as ECTT [17] reported. Competition for professional, skilled labor has increased, and the new norm of industrial operations involves the engagement of foreign ESCs to conduct works previously done by T&T content. T&T ESCs now have to improve market retention and penetrate new ones. Amongst the common diversification activities discussed by Sankat [1] that the T&T engineering profession, as a stakeholder in T&T's economy, can assist with is the extended provision of engineering services. Rowley [18] highlighted the role of service companies and contractors in driving innovation and cost control in periods of reduced economic activity and stifled commodity prices. Furthermore, the Energy Chamber of Trinidad and Tobago (ECTT) has long been promoting the need for export diversification from commodities and towards skill-intensive, tradable services by established companies who can compete on the international market as Marajh [2] recounts. These calls have been compelled because of the recognized potential of T&T ESC companies to diversify towards a business area that they can dominate Regionally.

3. Key PMO Implementation Considerations

Several authors have posited diverse PMO implementation guides, and many reiterate similar salient points to ponder. Salameh [9] recommends that PMO implementation must be managed like a project itself with roles, scope, value proposition, and outcomes of the endeavor established at the start. Soft issues like top-management commitment and buy-in to the business case for PMO implementation, employee willingness to participate, and creating a 'non-invasive sell' implementation framework is established as good starting points were posited by Patel [10] and Kondraju [8]. Salameh [9] and Kondraju [8] highlight that no PMO implementation exercise is spared the analysis of gaps that exist in skill levels, productivity, project quality and resources within the organization and the development of a plan to bridge these is vital. Besides, Christie [11] stresses the importance of setting up a PMO structure from the onset that facilitates flexibility and adaptability in applying PM processes and with adequate avenues for feedback and input from various stakeholders. Post-implementation planning is highlighted by Patel [10], who cautions that attention be paid to the metrics being proposed to evaluate the success of PM processes being integrated in the organization as these must be specific and appropriate to type, mission and strategic objectives of the PMO being implemented. The goal of continuous improvement must be built into the construct of the PMO at the beginning Christie [11] warns; the PMO must also incorporate policy that mandates a

clinical review of its effectiveness, process, mission, and strategy. Otherwise, collection and reporting on its performance metrics will be futile.

METHOD

Figure 1 below outlines the methodology utilized in this study. The deductions from the Literature Review and desk research were considered before developing the workflow. The subsequent Sub-Sections elaborate further on the particulars of each workflow stage.

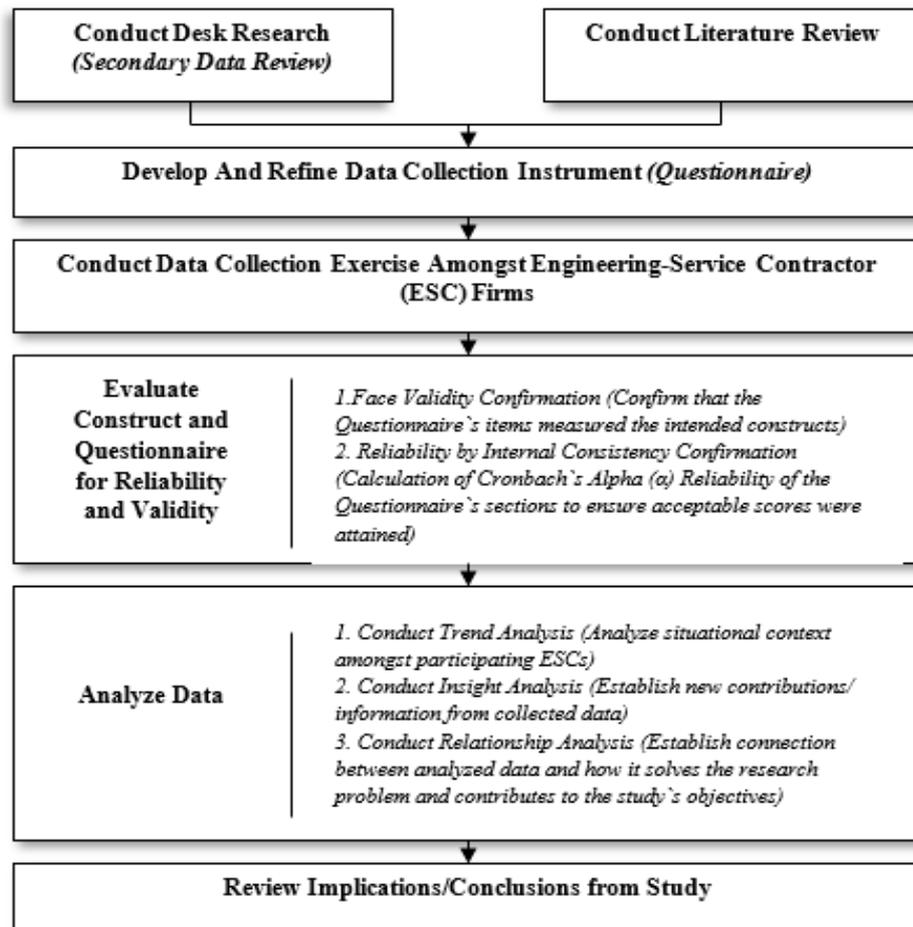


Figure 1. Outline of research methodology workflow

1. Desk Research

Secondary data developed by the participating ESCs during their PMO implementation exercises were reviewed. These included lessons learned documents, meeting minutes, invoices, engagement documents and correspondences with Subject Matter Experts to assist with the implementation exercise. This data review provided insight on key aspects like the prerequisites for proper PMO implementation and cost drivers of this exercise. Key perspectives from internal stakeholders (support department teams) and external stakeholders (clients, suppliers, sub-contractors) on the disruptions to their operations, new requirements for PMO operation compliance and their expected interactions with the new organizational unit were delivered as well. Additionally, specific information and skill sets that are not resident at the organizations to facilitate a seamless PMO integration exercise were revealed. The desk review created an appreciation of the complexity of the exercise and the knowledge and skills gaps that exists in companies wanting to implement a PMO.

2. Development and Structure of Data Collection Instrument

A questionnaire was developed based on deductions from the desk research and literature review to gather empirical data from the participating ESCs via a self-report study. The questionnaire was divided into five key sections, viz: 1) the demography of the participating ESC, 2) the perceived organizational PMO value proposition, 3) PMO implementation strong points, 4) PMO implementation weak points, and 5) PMO implementation/integration challenges and lessons learned. The questionnaire was refined using a methodology described by Rhea and Parker [19], which involved issuing the instrument to participants of two ESCs for completion and feedback. The data from this refining exercise was excluded from the final data set used for analysis. The respondents' mandate was to review questions provide options for responses and insight on question sequence and further inquiries. Since the close-ended questions varied in contexts and responses were contingent on the respondents' perspectives and beliefs, this study utilized the guide proposed by Vagias [20] to appropriately align response options for each question along the Likert Scale.

3. Selection of Respondents and Sample-Size Determination

ESCs targeted for the survey belonged to the Energy Chamber of Trinidad and Tobago (ECTT) membership pool. The ECTT was chosen since it is a longstanding, autonomous organization representing T&T's oil, gas, petrochemical, and heavy industrial sector client and contractor companies. To determine the minimum size of the contractor pool, a probabilistic sampling method developed by Hogg and Tanis [21] was used (see Equation 1 below).

$$n = \frac{m}{1 + \left(m - \frac{1}{N}\right)} \quad (1)$$

where:

N= Available population size

m= Unlimited population size

n= Limited population size

$$m = z^2 \frac{(p)(1 - p)}{E^2} \quad (2)$$

where:

z=Statistic value of confidence level used

p=Value of population proportion that is being estimated

E= Sampling error of the point estimate

Refers to Equation 1, the limited population size was calculated to be fifty-four (54) participants. From the ECTT pool, the estimated unlimited population size was 384. The available population size was sixty-three (63), and this study acquired responses from twenty-eight (28) contractors who represented 51.8% of the limited population size. A questionnaire with closed and open-ended queries was developed and validated to gather self-reports on PMO implementation from wholly T&T-owned ESCs. The implementation steps and challenges were derived from previous studies on PMO implementation. The questionnaire was administered face-to-face since the respondent pool was relatively small. Statistical review and interpretation for this paper were limited to the calculation of means and standard deviations.

4. Reliability and Validity Assurances of Construct and Instrument

Face validity of the questionnaire was pursued in determining whether the questions developed could accurately measure the intended aspects for this study. The second researcher reviewed the final instrument to assure that redundant, invaluable and leading/biased questions were not posed to prospective participants. After the twenty-eight questionnaires were received and reviewed to confirm that all questions were answered, the Cronbach's alpha (α) reliability

for each of the questionnaire's five sections were calculated. All sections received a score above 0.70, which according to Hair et al. [22], it is acceptable to consider the instrument a reliable one since the questions share a common covariance and measure the same construct.

5. Data Analysis Approach

A pivot table was created to consolidate the collected questionnaires` data using Microsoft Excel. The study's objectives and research problem described in Section 1 were revisited to allow data examination and alignment. Three aspects of data analysis were conducted, viz: 1) Trend Analysis – to establish the situational context of the polled ESCs and determine similarities and differences with their experiences and data provided; 2) Insight Analysis – to ascertain new insights and contributions from the collected data that were not articulated in reviewed published research or reckoned by the researchers during desk research and 3) Relationship Analysis - to ascertain the connection between analyzed data and how it solves the research problem of identifying challenges and lessons learned with PMO implementation and how the data contributes to achieving the study's objectives of creating the basis for future implementation roadmaps for the studied organization type.

RESULTS AND DISCUSSION

1. Survey Respondents and Sub-Sector Distribution

Table 1 illustrates the five sub-sectors the polled ESCs were categorized into and the number of participating companies. The largest sub-sector was Mechanical, Turnaround / Shutdown and Manufacturing (39%) followed by Civil and Construction (25%), the two sectors that benefited mostly from oil and gas activity in T&T, according to Ramsaran and Hosein [23]. These two sub-sectors also contained the oldest implemented PMOs.

Table 1. Respondent sub-sector division by core business area

Esc category by core services offered	No. of participating escs	Age of implemented pmo (years)				Total
		1-3	4-6	7-10	Over 10	
Civil and construction	7 (25%)	1	3	2	1	7 (100%)
Mechanical, Turnaround/Shutdown and Manufacturing	11 (39%)	2	2	4	3	11 (100%)
Testing, Calibration and Inspection	4 (8%)	3	1	0	0	4 (100%)
Electrical, Software and Instrumentation	2 (7%)	1	1	0	0	2 (100%)
Industrial, Sales and Consulting	4 (8%)	2	1	1	0	4 (100%)
Total	28 (100%)	9 (32.1%)	8 (28.6%)	7 (25%)	4 (14.3%)	28 (100%)

The polled ESCs were asked to provide the numbers of team members in their PMOs as well as the formal PM qualifications they possessed. The criterion for respondent participation was solely top-management and department managers who were directly involved in implementing the PMO in their organization; incidentally, all respondents possessed PM qualifications, validating their skills and knowledge to understand and answer the survey instrument's questions adequately. Noteworthy is that 68% of all team members in the PMOs have Project Management Institute (PMI®) certification (Table 2), the leading body globally in PM standard development and training in the Western world.

Table 2. PM qualifications of PMO team members

ESC sub-sectors	PMO size	PM qualifications of PMO team members					Total
		CAPM®	PMP®	M.Sc. Project Management	Other	None	
Civil And Construction Mechanical,	56 (26.8%)	14	21	7	8	6	56 (100%)
Turnaround/Shutdown and Manufacturing	97 (46.6%)	33	46	11	4	3	97 (100%)
Testing, Calibration and Inspection	19 (9.1%)	4	7	2	3	3	4 (100%)
Electrical, Software and Instrumentation	14 (6.7%)	2	69	0	0	6	14 (100%)
Industrial, Sales and Consulting	23 (11.0%)	7	2	1	4	9	23 (100%)
TOTAL	209 (100%)	60 (29%)	82 (39%)	21 (10%)	19 (9%)	27 (13%)	209 (100%)

2. Age and Size of ESC Companies

The oldest ESCs came from the Mechanical, Turnaround/Shutdown, and Manufacturing sub-sector. The modal age of the ESCs in this study is 11-20 years old. It was noticed that the ESCs in the sub-sector Items 3-5 implemented PMOs soon after company formation as opposed to the first and second itemized sub-sectors. These latter sectors are younger and smaller in size (Table 3), which implores the question if younger, small-sized ESCs are working towards PMO implementation more assiduously than older, larger ESCs.

Size of the ESCs was gauged by its number of permanent employees and those with contract tenures of two years and over and is summarized in Table 4; all polled companies were found to be SMEs. Lewis et al. [24] reiterate that any expressive growth, development, and reformation of SMEs are greatly influenced by their founder, employees, and innate characteristics of the organization. These factors were considered in exploring PMO implementation in the ESCs.

Table 3. Age of contractor companies

ESC Sub-Sector	Age of ESC (Years)				Total
	1-5	6-10	11-20	Over 20	
Civil And Construction Mechanical,	1	3	2	1	7(100%)
Turnaround/Shutdown and Manufacturing	2	2	4	3	11(100%)
Testing, Calibration and Inspection	0	1	2	1	4 (100%)
Electrical, Software and Instrumentation	1	1	0	0	2 (100%)
Industrial, Sales and Consulting	2	1	1	0	4 (100%)
TOTAL	6(21.4%)	8 (28.6%)	9 (32.1%)	5(17.9%)	28 (100%)

Table 4. Size of participating ESC companies

ESC Sub-Sector	Size of participating ESC companies (number of employees)				Total
	1-10	11-25	26-100	Over 100 But less than 500	
Civil And Construction Mechanical,	1	1	3	2	7(100%)
Turnaround/Shutdown and Manufacturing	1	2	1	7	11(100%)
Testing, Calibration and Inspection	0	1	3	0	4 (100%)

ESC Sub-Sector	Size of participating ESC companies (number of employees)				Total
	1-10	11-25	26-100	Over 100 But less than 500	
Electrical, Software and Instrumentation	0	2	0	0	2 (100%)
Industrial, Sales and Consulting	0	1	3	0	4 (100%)
TOTAL	2 (7.1%)	6 (21.4%)	10 (35.7%)	9 (32.1%)	28 (100%)

3. PMO Value Proposition Statistics

Survey Section 1 sought to assess the level of concurrence from respondents that an implemented PMO added value to their organization and ascertain how much of the recognized benefits they are experiencing. Although a 5-Point Likert Scale was used to range responses from strongly agree to disagree strongly, the results were interpreted using just a 3-point scale (Table 5).

Table 5. Respondents' ratings of PMO value addition to their organization

Value addition of implemented PMO	Strongly agree/agree	Neutral	Strongly disagree/disagree	Total
Development and use of predictable and reusable PM tools, techniques and processes (<i>Standardization</i>)	22 (78.6%)	3 (10.7%)	3(10.7%)	28 (100%)
Improved market penetration with higher prequalification rate and/or partnerships with MNC's and other ESCs to undertake projects.	12 (42.9%)	7(25%)	9(32.1%)	28 (100%)
Better management of project scope deviations (<i>change orders, scope creep, gold plating etc.</i>)	18 (64.3%)	9(32.1%)	1(3.6%)	28 (100%)
Reduced number of projects terminated before completion.	20 (71.4%)	2(7.1%)	6(21.4%)	28 (100%)
Projects completed within PM triple constraints (<i>i.e., time, quality and budget</i>)	21(75%)	3(10.7%)	4(14.3%)	28 (100%)
Created data via project risk-based assessments to guide `Go /Do Not Go` decisions.	17 (60.7%)	6(21.4%)	5(17.9%)	28 (100%)
Improved resource visibility and management (<i>reduced overlap</i>).	22(78.6%)	3(10.7%)	3(10.7%)	28 (100%)
Improved project performance metric scores (<i>E.g., CPI and SPI</i>) compared to pre-PMO implementation scores.	19 (67.9%)	3(10.7%)	6(21.4%)	28 (100%)
Assisted with attaining key certification to improve marketability and process governance (<i>E.g., STOW, ISO 9001 QMS etc.</i>)	16 (57.1%)	4(14.3%)	8(28.6%)	28 (100%)
Enabled organization to better understand and comply with regulatory requirements for project execution (<i>E.g., FIDIC, PMI</i>)	17 (60.7%)	4(14.3%)	7(25%)	28 (100%)
Improved categorizing of client companies based on what they value in a project (<i>market discipline</i>).	18(64.3%)	7(25%)	3(10.7%)	28 (100%)

It was seen that the greatest benefits reported by the respondents were standardization of the PM process (78.6%), improved resource visibility and management (78.6%) and having projects completed with the PM triple-constraint (75%). Remarkable is also the benefit of assessing project risks before acceptance to guide execution, determining whether the project should be accepted and eliminating incidents of project termination before completion (Items 4 & 6). Tiwari and Dwarika [6] identified these as major stumbling blocks in PM practice of contractor companies. Not much benefit with market penetration, partnership formation and

assistance with key certification attainment was reported. Nevertheless, the findings presented in Table 5 validated the case for PMO implementation research to be pursued to assist companies in maximizing their project performance and fostering organizational growth.

4. PMO Implementation Statistics

Before reporting on abstract challenges faced with PMO implementation, the respondents were asked to report on how well or inadequate they perceived specific PMO implementation steps were executed. Elements with a mean of 4 or more were considered well-implemented.

4.1 Reported Implementation Strong Points

It was found that the steps reported as well implemented were those of an academic nature or theoretical prerequisites associated with the organizations establishing their business needs and the PMO's place in their strategic plan (Table 6 – Items 2, 4, and 5) as opposed to practical aspects related to actual implementation and maintenance of a fully functional PMO unit. This can lead to the inference that the ESCs' management are in better stead to manage the assessment and planning phases of PMO implementation more robustly than the tenets of the execution phase. Besides, this may indicate that there are challenges with getting the entire organization on board after they are made aware of the requirements to support PMO implementation and some insularity may exist on the requirements to facilitate a fully functional PMO to deliver its expected nominal value. Also, it raises the query of whether organizational staff are unclear of the new roles and responsibilities with the integration of this unit (Table 6 - Item 3). Notably, the ESCs reported a firm understanding of the nominal value and need for a PMO in their organization and demonstrated that they are capable of determining whether its implementation fits into their strategic and business plans. The ESCs also reported that their better implemented points (with Mean scores ≥ 4.5) were ascertaining the need for expert advice and determining the weaknesses within their organizations as it pertains to resources required for proper PMO implementation. Although reported as strong points, the general areas that improvement were reckoned for were developing systems for project control (Table 6 – Item 8), reporting (Table 6 – Items 6 and 8) and knowledge/information management (Table 6 – Items 7 and 10). These items scored a Mean value of less than 4.5.

Table 6. Implementation steps reported as well implemented

Implementation strong points	Mean	Standard deviation
Clear definition of PMO value proposition to the organization and stakeholders.	4.3282	0.89791
Ascertaining whether a PMO is appropriate for the ESC or if an alternative (e.g., project steering committee) is more suited for the management of projects.	4.5623	0.9334
Establishment of role, authority, scope and size of the PMO.	4.0723	0.70831
Execution of gap analysis ('as-is' analysis) for areas of project governance, human resources and technical capabilities within the ESC.	4.7492	1.0028
Soliciting expert advice for all stages of implementation process.	4.6351	0.9276
Preparation of tools, templates and processes to encourage standardization of the PM process.	4.2892	1.04616
Development of a Technology Plan for PMO (Excel, MS Projects, Primavera)	4.3611	0.93934
Establishment of Earned Value Management (EVM) calculation and improved transparency in project financial reporting.	4.0026	0.86527
Determining organizational PM maturity and type of PMO (supportive, controlling, directive) needed by the company	4.0626	0.9327
Integrating existing institutional norms and PM knowledge into the PMO operations	4.2091	1.0239

4.2 Reported Implementation Weak Points

This study confirmed that successful PMO implementation depends on historical project performance data collection, personnel attitudes, existing accountability culture of the organization, pace of roll-out, and other difficult factors to manage, as described by Singh et al. [25]. Table 7 outlines the implementation steps reported as inadequately or difficult implemented. Further interrogation of this data involved observing items that scored a Mean of below 3.5 and identifying these as critical weak points that participants commonly reported. The salient reported weak points were discovered in the areas of stakeholder management (Table 7 – Items 1 and 11), document control/quality assurance (Table 7 – Item 3), human resource management (Table 7 – Item 5) and project control or responsiveness to challenges with implementation and keeping the campaign on track (Table 7 – Items 5 and 11) which identifies the need for a dedicated person to manage this exercise and establish pause-points to revisit the success and challenges of the implementation exercise. Having been identified, these weak points can be counteracted with improved planning and action items in the development of the PMO implementation roadmap.

Table 7. Implementation steps reported as weakly implemented

Implementation Weak Points	Mean	Standard Deviation
Active management of stakeholder concerns, expectations, desires and information during implementation.	3.1783	1.0595
Accurately determining resource requirements and durations for specific implementation stages prior to campaign initiation.	3.9714	0.7853
Collection and analysis of historical project performance data to develop continuous improvement plan	3.4167	0.8725
Project Management training for internal employees and management.	3.9714	0.9273
Staffing of PMO with most suitable personnel	3.0207	1.0038
Development of implementation plan and tracking its progress.	3.8889	0.9824
Quick recognition of deviations in planned activities and development of a plan to get campaign back on track.	3.4850	1.0027
Development of system for measuring success of implemented stages via formal, established metrics and recognition of `quick wins` .	3.6543	1.0037
Roll out of a comprehensive Change Management Strategy	3.6000	0.8763
Clear accountability by persons managing specific implementation actions during the process.	3.9026	0.9351
Established `tollgates` for team to pause and review next step of implementation to gauge readiness and ensure resources are available to proceed.	3.4587	1.0037

5. Reported Challenges of PMO Implementation

Table 8 shares some implementation challenges reported by the surveyed ESCs. Poor PM culture and discipline were cited as a major impediment (82.14%) followed by realignment of power for managing key resources and creating PMO policies that will not make project execution a bureaucratic process (78.6%). There is the perception that the PMO unintentionally gives *de facto* power to the project manager over key resources disrupting the laid structure for organizational resource management according to Singh et al. [25]. Despite the PMO business case being reported as properly defined in many ESCs, there was a reported challenge in getting firm sponsorship commitment from senior management (64.3%). It indicates that they have reduced confidence in the ability of the organization to realize these PMO benefits quickly enough and acknowledge that it is a hit or miss endeavor as many studies have established. The custom of staffing T&T ESCs with temporary hires was reported as the common underpinning of several challenges reported, and this is almost unavoidable since projects are temporary endeavors. It reduces the opportunity to run a pilot PMO whilst maintaining a constant complement of staff and reduces input of institutional knowledge and experience in the development of policies.

Table 8. Reported challenges with pmo implementation

Implementation challenge	Frequency	Percent
Lack of complete, long-term support for implementation campaign by senior management, organizational service departments and various stakeholders.	18	64.3%
Dedicating resources to the implementation endeavour and development of a `implementation expense recovery` model due to unpredictability of value addition in terms of financial figures.	16	57.1%
Access to expert advice in development of implementation and transition planning.	11	39.3%
Realignment of power for management of key resources.	22	78.6%
Finding full complement of PMO staff from existing employee pool.	16	57.1%
Establishing clear lines of communication between PMO internal and external stakeholders during implementation.	19	67.9%
Poor PM discipline and culture in organization.	23	82.14%
Lack of stability and continuity of PMO resources and stakeholders due to key project and support staff being temporary hires.	20	71.4%
Failure to recognize the soft skills needed during PMO implementation	13	46.4%
Preference by T&T ESC top management for subjective indicators for measuring success of implemented stages as opposed to formal, established metrics.	15	53.5%
Getting T&T vendors and sub-contractors to the organization to modify their processes and documentation to facilitate the PMOs drive towards process governance and standardization.	16	57.1%
Creation of policies that will not render project execution a bureaucratic process.	22	78.6%

6. Lessons Learned in PMO Implementation

Seven (7) participating ESCs maintained a Lessons Learned Log during their implementation campaigns which were made available to the researcher. Table 9 summarizes those and posits further lessons derived via the execution of this study. This input provides potential solutions to counteracting the weak points identified in Sub-Section 4.4.2 and the areas identified for further improvement in Sub-Section 4.4.1. A perusal of Table 9 indicates that prefatory work is required before the implementation exercise begins, and the reported lessons corroborate the notion that the implementation exercise must be treated as a project itself and be managed and tracked for progress. As identified in Sub-Sections 4.4.1 and 4.4.2, proper stakeholder management (internal and external) is vital in allowing efficient PMO integration as the unit cannot be successful operating as an island. Besides, the need for engaging the right people at the right time in the implementation and integration campaign has been identified in this study.

Table 9. Key lessons learned with PMO implementation

Lesson learned from implementation campaign	Merit(s) of the lesson learned
Engage an external entity to ascertain PM capability maturity of the organization and to determine the type (<i>supporting, controlling directive</i>) of PMO needed.	Provides an objective assessment of any gap within the ESC that cannot be amply assessed internally.
Prior to developing a PMO implementation plan, gather historical project data and performance statistics by project type.	1.Allows creation of a PMO specific to the needs and nature of the organization. 2.Enables easier and objective measurement of effectiveness of PMO implementation and highlights any `quick wins` that may be achieved during implementation.
Develop a schedule (<i>Tracking Gantt</i>) and use a phased approach to PMO implementation.	1.Too many concurrent activities may lead to overlap of limited resources which can frustrate the campaign.

Lesson learned from implementation campaign	Merit(s) of the lesson learned
The implementation campaign must have a dedicated driver or steering committee.	2. Keeps track of implementation timeline and activity completion slippage. This ensures that implementation steps are thoroughly executed, and a person/committee acts as a lynchpin between the support departments, stakeholders, and top management.
Determine how PMO integration impacts the activity of support departments within the organization and develop a plan for smooth interoperability. Don't `force fit` existing staff into roles or use <i>Peter's Principle</i> to staff PMO.	Processes of other departments may be impacted and changed and must be done in an organized, controlled way. Avoids error of misaligning key PMO personnel and their responsibilities and turning graduate engineers into project managers without sufficient training and experience.
Involve all of the organization's supporting/service departments in the planning and execution of PMO.	The involvement of new stakeholders during the implementation campaign could change the direction of the implementation plan, sowing seeds of failure.

CONCLUSION

1. Implications and Contributions of Study

As established in Section 1, several studies exist on PMO implementation, but insufficient data and guidance on the prefatory work needed to ensure the posited steps work well for the T&T industry context. As with any project, which a PMO implementation campaign must be treated as, the seeds of failure or success are sown at the beginning (PMO implementation stage). The contribution of this study to the wider body of PM knowledge is the provision of new statistics via examination of the experiences of T&T PM practitioners with PMO implementation which serves as a good starting point in reducing this research gap. It explored implementation steps that were perceived as adequately or under implemented and investigated the underpinning challenges and lessons learned coming out of the experience. The findings discussed in this study provides insight for the development of an implementation plan which may involve several components such as a RACI (Responsible, Accountable, Consulted, Informed) chart, outlining exactly what role each organizational team member or department plays in the implementation campaign and schedule, which must have a comprehensive and realistic breakdown of requisite activities and reasonable durations for completion of these. This gap was identified in Section 4.4.1 above. Besides, this study collated the most common mistakes, oversights and under-appreciated aspects of PMO implementation which provides cautionary insight to companies.

Ellis and Ramdath [26] polled engineering professionals in the T&T industry who expressed the need for engineering graduates to enter the workforce with aptitude in the key areas of project management like planning, scheduling and cost estimating. The role of the T&T Universities in sufficiently extending the focus of university- industry collaboration and research to include the operations of service contractors and foreign EPC companies operating in T&T must be prioritized; Lezama [15] discussed the knowledge transfer and resolution of contracting issues that T&T firms can benefit from with this high-level liaison. Much emphasis is being placed on the development of SME's, which most ESCs polled in this study are, as a poverty mitigation and wealth creation measure. SME development research must also be sufficiently extended from mostly manufacturing companies, as is the case in T&T, to include ESC companies since the SME demographic share similar characteristics and both can be developed in parallel.

Once proper traction is achieved with PMO implementation by T&T companies, PMOs will transform into `disruptive` structures and greater value addition and expanded roles will be expected from them. The PMO will be expected to focus more on strategy, leadership and training, innovation, stakeholder management, portfolio management and agility. Supporting research to enable these imminent roles includes but would not be limited to 1) Improved organizational structure and resourcing mechanisms to facilitate PMO effectiveness, 2)

Objective method of calculating financial value of benefits endowed by PMO integration in the organization and 3) Development of metrics, codes of practice, standards and other tangible documents to bolster stakeholder and top-management buy-in of PMO.

2. Research Limitations

Several limitations were encountered in the execution of this study, which having been identified can then be eliminated in future research. Firstly, limited access to secondary data published by participating ESCs pertaining to their implementation exercises was a challenge as most ESCs kept minimal records. Greater availability of this data would have provided improved insight and context for more probing questions to be included in the questionnaire. Due to time constraints, a wider base of ESCs were not approached to participate and provide data; although the respondent size was considered appropriate for this study, a larger respondent pool would have facilitated more convincing generalizations of the collected data and its subsequent implications. In similar vein, the study was not extended to include participation of Caribbean ESCs; this would have confirmed widespread applicability of the findings and investigated their experiences in a more regional context. Also, respondents were primarily only those who were directly involved in implementing the PMO at the participating organizations and PM practitioners who are assigned to the PMO, but not extended to departments that support PMO operations (for instance, Business Development/Estimating, Quality Control/Assurance, Procurement/Supply Chain and Engineering/Technical teams). Responses from these departmental staff members would have provided more appreciation into the integration aspects, implementation challenges, prerequisites for greater implementation efficacy and may have served to provide adequate data and foundation for a comprehensive, organization wide PMO implementation plan to be developed from this study.

3. Future Perspectives and Research Scope

The implications of this study shed light on new perspectives for future studies and has set the basis for emergent research scopes. One potential area surmised is the investigation of the PMO's performance in facilitating effective PM practice for traditional (waterfall) PM as well as Agile Project Management (APM) methodology which is rapidly gaining significance in practice due to its benefits. A key performance indicator (KPI) based performance management system for PMOs can be developed as this study highlighted the nominal need for a PMO and its expected value, from PM practitioners' perspectives. Additionally, a broader survey can be conducted amongst Caribbean entities involved in service provision (extractive industries, manufacturing etc.) who have implemented PMOs to gauge whether the implementation recommendations and findings amongst ESCs are analogous and hold for a wider group. The findings of such a study will lay the basis for a more holistic PMO implementation roadmap for Caribbean service-sector companies to be contributed to the body of knowledge – a gap that currently exists.

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