Lean Six Sigma Governance Modeling within the Project Management Office

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Abstract

The purpose of this study is to find efficiency and variation reduction within the project management office (PMO) process through the establishment and utilization of Lean Six Sigma (LSS) methodologies. Furthermore, the standardization of the LSS integration into the PMO process includes the conceptual framework supported by a literature review into the metrics of LSS and the PMO governance modeling. Moreover, the value in project governance is derived in the form of executed and timely deliverables to project outcomes. LSS methodology is utilized as a driver towards the establishment of continuous improvement initiatives within standardized processes. This study researches the significance of incorporating LSS into PMO governance modeling to extract efficiency through a continuous improvement process. The application of the LSS integrated PMO governance model captures the drive to ensure project portfolio frameworks are systematically analyzed, measured to extract efficiencies, and revised as a means to provide positive results in an ever-changing business environment.

Acknowledgments

The process of completing my master's program seemed at times to be a monumental task, however, with the support and patience of my wife, Niki the process fell into place piece by piece. I also want to acknowledge the time I sacrificed with my two children and hope they learned that dedication and sacrifice are needed for accomplishments in life. I am very grateful for my family's continued love and support.

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Chapter 1 - Introduction

The project management office (PMO) framework remains vigilant within organizations since being first utilized by the United States government a half-century ago (Hubbard & Bolles, 2015). Subsequently, organizations have adopted and amended the PMO process in an effort to perfect their framework. In addition, Kutsch, Ward, Hall, and Algar (2015) found evidence of organizational PMO burnout and moved to develop a strategy by enhancing the methodology. Conceivably a combination of mutually beneficial methodologies would reinvigorate organizational PMOs to function at a higher level.

Lean Six Sigma Methodology

Extensive research in the methodologies of Lean Six Sigma (LSS) governance modeling show process improvement when implemented into the organization's culture (De Koning, De Mast, Does, Vermaat, & Simons, 2008). Atkinson (2014) found organizational improvement was dependent on the learning and development of a practitioner's ability to implement the LSS initiative. The LSS methodology is well researched. Consequently, Grima, Marco-Almagro, Santiago, and Tort-Martorell (2014) found process improvements within project execution were only possible if the organizational culture was willing to accept the new methodology into their processes.

The point of LSS methodology research is to pursue fundamental solutions to reduce waste within processes and profitability inefficiency. To elaborate, Kalashnikov, Benita, López-Ramos, and Hernández-Luna (2017) propose that businesses often suffer from the continual need for adjustment within the changing business environments; LSS provides the component to sustain survival through consistent adherence to continuous improvement. Furthermore, the

integration of LSS methodology works to solve highly complex and time-consuming research analysis with the processes of projects (Kalashnikov et al., 2017).

The concept of profitability through process efficiency specifically reflects Kovach and Borikar's (2018) findings in studying LSS methodology integration into the organizational culture. As mentioned above, there are many examples of LSS integrations that increase the agility of an organization to perform in a competitive environment. For this purpose, Pisani, Hayes, Kumar, and Lepisto (2009) found that LSS has the purpose of increasing quality improvement through organizational process efficiency. Lastly, the embracement of change hinges on LSS success and a willingness of the organization's leadership to house a culture. In like manner, the PMO's success is determined by organizational culture, which adopts the methodologies to create and sustain a PMO governance framework (Cabanis-Brown, 2014).

Governance of a Project Management Office

The expansion beyond managing a set of projects through a PMO consequently undertook a change in complexity within the scope of interdependencies throughout multiple implementations (Too & Weaver, 2014). As a result, PMO governance modeling became a mission to align corporate strategy by managing out silos and aligning the benefits of the organization into a seamless project framework model. As recognized by Müller (2009), PMO governance has three distinctive framework elements: The education of stakeholders in the PMO process; the demand of management through steering committees and sponsors; and finally, the review and analysis of deliverables that are completed. Figure 1 represents the model for governance of project management, which considers the constraints, and enablers that dictate steps required to enact a framework model which organizations could utilize to manage complexity in strategic project delivery (Müller, 2009).

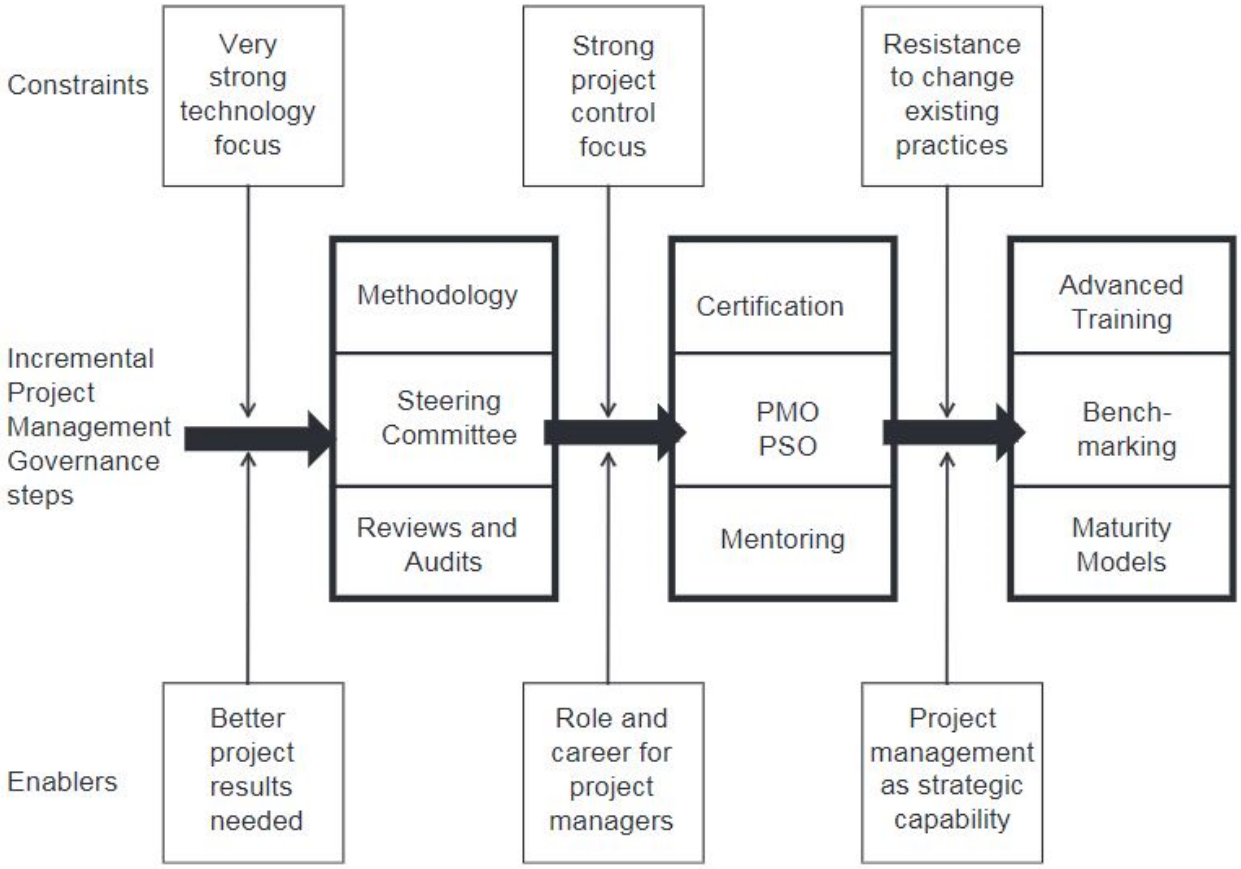

Figure 1. The constraint and enabler elements of a PMO governance models. Adapted from "Model for governance of project management," by R. Müller, 2009, *Project governance*. Farnham, Surrey, England: Routledge.

Badewi (2016), in his belief, aimed to validate the positive outcomes for the use of project management governance as a methodology across organizations of different makeup. Although project management governance builds a foundational element of structured benefit, the methodology is built on the premise of human investment. Badewi (2016) recognized beneficial analysis in the project management governance system, which has tangible successes in project management investment. The field of project management could utilize the analysis findings of Badewi (2016) and grow to understand the palpable investment of governance methodology.

The application of governance in project management adheres to both structural integrity and accountability. To clarify, Garland (2009) found that the lack of proper governance models executed across a project portfolio was the cause of continual failure in project completion times. Furthermore, governance modeling across the organization's framework constituted a boost in structural efficiency (Garland, 2009). Therefore, the value in project governance is derived in the form of executed and timely deliverables to project outcomes.

The project stakeholders are often the centerpiece or foundational element within the project management process. Accordingly, Khan, Skibniewski, and Cable (2014) summarize that stakeholders are a key component surrounding how governance frameworks engage with the benefits of project deliverables. Furthermore, Miller and Hobbs (2005) found stakeholders are a quintessential facet of project delivery mechanisms in governance modeling. The hurdles in governance model development within project management exist in stakeholder engagement practices (Khan et al., 2014).

Conceptual Framework

The project management office (PMO) can become a level of organizational bureaucracy, which lessens utilization and causes project failure. Furthermore, creating a governance model that encompasses both attributes of LEAN Six Sigma (LSS) and PMO efficiencies work to produce a stakeholder need for an organized governance framework. In addition, PMOs are a process to structure the conveyance of project management deliverables. As Joong-Hoon, Sung-Hun, and Dae-Cheol (2015) have represented, PMOs revealed that compliance in traditional PMO structuring suffered greatly for stakeholder adherence and was the root cause of PMO failure. LSS exemplifies a purpose to determine the effectiveness of process improvement among business services to eliminate the negative variation and process inefficiencies (Fu-Kwun

& Kao-Shan, 2010). Consequently, LSS integration through a PMO governance model could influence process efficiency within the PMO process. Specifically, Burch, Strawderman, and Bullington (2016) found through their research that the implementation of Lean Six Sigma (LSS) ideology further strengthens the logistical nature of business processes.

The model presented in Figure 2 encompasses PMO structuring and LSS quality value system melded into a governance model, which represents the attributed combination of PMO and LSS frameworks.

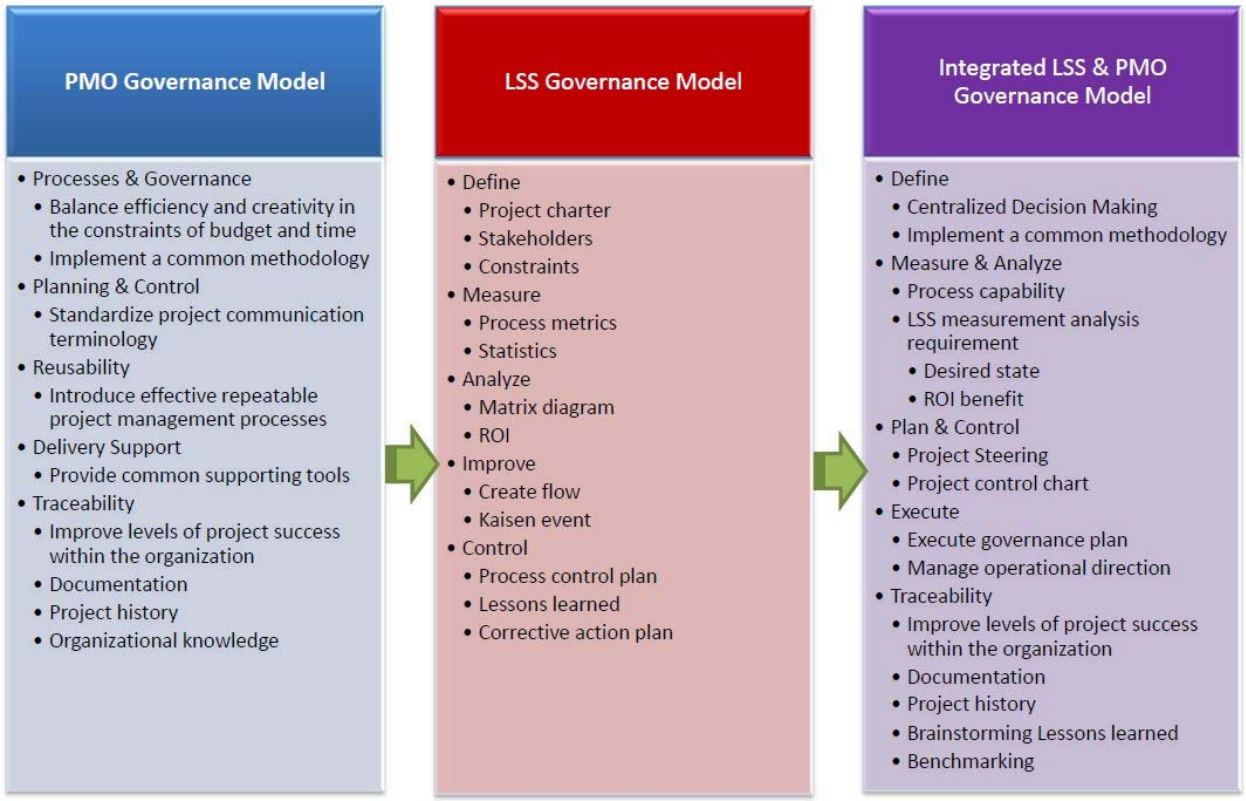

Figure 2. The graphical representation of an integrated PMO & LSS Model where PMOs are stringently built to follow a detailed rule module for proper execution of project delivery. In addition, Tang (2006) incorporates a breakthrough strategy represented by the methodology to Define-Measure-Analyze-Improve-Control (DMAIC) and target defect reduction in the regarded LSS-PMO integrated governance model.

The LSS-PMO integrated governance model features a quality management methodology within the PMO processes. Each of the six quality management values surrounding LSS is attributed to process improvement through efficiency and the reduction of variation. For the same reason, the LSS to PMO integrated governance model represents a streamlined process that condenses both LSS and PMO frameworks into one efficient structure to exemplify the positive characteristics of both methodologies. The stakeholders now have a unified process, which could realize an increased usage rate that reduces the bureaucracy within a stand-alone PMO framework.

Statement of the Problem

The project management office (PMO) falls into organizational bureaucracy by not defining stakeholder value through the structuring of procedural rules and governance (Dinsmore, 2000). Specifically, stakeholders biases developed through power brokers within the PMO process are a driving force among the majority of organizations, which impedes motivation to recognize current procedures. Dinsmore (2000) reveals the evaluation in the speed of delivery within the PMO framework faces internal repercussion as a detriment to project processes from top-level management questioning the organization's production levels and impeding the current procedures. Bureaucracy hinders the integration of PMO development that is relevant to the organization's goals because the project team or department does not support the tool (Hill, 2014).

The LSS-PMO governance model developed through research will answer the following questions:

- How would the methodology of an LSS governance model effectively promote a reduction of variation and increase in efficiency within the scope of a PMO?

- How would the LSS governance model influence PMO processes in organizations?
- What level of an efficiency rating is considered favorable to project success in the PMO?
- What level of significance is LSS in providing organizations with efficiency increases and variation reductions?
- How do the perceptions of organization staff factor in the success of LSS initiatives?

The Significance of the Study

LSS governance model integration into the project management framework utilizes the process improvement of LSS to exemplify the efficiencies within PMOs. Inman and Houston (2015) moreover organize the PMO build as a representative of governance modeling, which could assist in the creation of an LSS governance framework structure. Meanwhile, PMOs by themselves serve as a foundational element to structure the project management process. Joong-Hoon et al. (2015) recognized through data analysis that cost and time compliance within the PMO revealed inaccuracies. Failures caused by the bureaucracy of PMOs could be alleviated through the integration of LSS methodology.

The negative variation and process inefficiency illustrate the purpose to determine the effectiveness of process improvement among business services (Fu-Kwun & Kao-Shan, 2010). As an illustration, PMOs are a process to structure the delivery of project management deliverables. Atkinson (2014) likewise, found conclusive remarks on the strategy of organizational improvement was dependent on the learning and development practitioner implementing the LSS initiative with the purpose of behavioral and culture change. Consequently, LSS integration through a governance model could influence process efficiency within the PMO process. Specifically, Burch et al. (2016) found through their research that the

implementation of Lean Six Sigma (LSS) ideology further strengthens the logistical nature of business processes.

Purpose of the Study

The purpose of this study is to formulate a LEAN Six Sigma governance model to structure efficiencies within the project management office. The integration of LSS into the operations of the project management office may streamline resource allocations, thus building on the efficiencies of eliminating waste within the project processes (Hill, 2014). Through an exploration of LSS, organizations that have no continuous improvement modules are losing traction to their competition (Burton, 2011). The incorporation of LSS and PMO methodologies is quintessential to building a foundation of efficiency. The critical review will show PMO inefficiency can be an element of stakeholder neglect and project failure. In summary, LSS governance modeling has not been extensively researched as a tool to enhance the PMO framework.

Organization of the Study

The organization of this study will include a literature review of supporting research surrounding project management office standardized framework within the integration of Lean Six Sigma governance modeling. Secondly, the conceptualization of LSS governance modeling will be evaluated as a means to determine enhancements within the PMO governance contained in project management deliverables. Lastly, the integrated LSS-PMO governance model will become a framework for project managers to enrich the PMO system to facilitate usage to an increased degree.

Chapter 2 – Literature Review

The main objective of this research review is to capture the specific understanding of how Lean Six Sigma (LSS) could influence the framework of the project management office (PMO) through governance modeling. PMO success rates fluctuate in the undefined and underutilized control and conformity that are impeded by bureaucracy in stakeholder bias (Hill, 2014). The concept of a Lean Six Sigma project management office (LSS-PMO) governance model will be described through literary research in a theoretical model of LSS-PMO governance methodologies. Allowing the LSS methodology to influence the PMO, in theory, could alleviate the stagnant nature of PMO sustainability through continuous improvement.

Lean and Six Sigma methodology has been evolving for the last half-century, but recently combined to offer a structured conceptual model, which builds efficiency and reduces variation in processes. The PMO governance modeling is extensively researched; however, PMOs still have room to evolve into sustainable practice (Badewi, 2016). Both LSS and PMO frameworks share similarities, and once combined, could provide a hybrid framework method.

Lean Six Sigma Methodology in Governance Modeling

Lean Six Sigma methodology is at the cornerstone of providing efficiency and variation elimination to engage and accelerate the improvement of processes within organizations (Burton, 2011). According to Burton (2011), the application of LSS into a PMO governance model sustains the ability of organizations to perform systematic project objectives in an efficient and concise manner to provide project deliverables. For that reason, injecting the benefits of LSS into the framework of the PMO might cause a mutually beneficial relationship of process control and revision not utilized in previous hybrid adaptations. LSS governance modeling encompasses

framework methodology around total quality management (TQM) and defines, measures, analyzes, improves, and controls (DMAIC).

The creation of LSS governance modeling increases the flow and speed of logistical relationships between process improvements and project deliverables (Goldsby & Martichenko, 2005). Moreover, redesigning logistical related processes through executing on the principles of process improvement builds on the organization's efficiencies and competitive presence in the market. The LSS governance framework identifies a model with the following key elements: Combining complexity reduction, elimination of waste within processes, and quality improvement as standards to deliver improvement (George, 2010). Additionally, DMAIC offers the continuous improvement ability to evaluate the current state and provide sustainability through integration as a LSS governance framework.

Lean Six Sigma governance modeling. The systematic control of organizational processes around strategy, structure, vision, political motivations, and people links the efficiencies of LSS to the execution of quality management of deliverables. According to Burch et al. (2016), the empirical evidence of strategic LSS business excellence falls on the understanding that overall process improvement enhances the governance model relationship between continuous improvement and increased levels of production. Subsequently, creating a model which encompasses the strengths of LSS practices, and building a framework of process efficiency around a governance system, will allow for the improvement of the PMO governance model. The injection of LSS into the methodology of project management delivery encases the presence of the mutually beneficial relationship between the practical implications of project management and the process efficiency controls of LSS.

LSS initiative success. The literature surrounding the dismal environment of stalled organizational initiatives is entrenched by failure in procuring structural models, which enhances organizational staff's perceptions of inefficiency. As concluded by Antony, Setijono, and Dahlgaard (2016), the drivers of control through efficiency and process variation elimination are hinging on the importance stakeholders place on establishing and sustaining LSS initiatives. The supporting roles of stakeholders association to the cultural sustainability of support and institutionalizing the process of LSS. In alignment with Schonberger's (2008) contributions, LSS technical capabilities support the improvement initiatives through the centrist culture of organization staff to deliver on the sustainable benefits of LSS. Furthermore, the perception and motivation of staff towards the goal of continuous improvement falls on the organizational element of willingness with the culture to continue down the path of process efficiency and variation improvement.

Efficiency and variation increases. The success of project management completion rates becomes dependent on the integration of stakeholder perception of responsibility to achieve the tasks and deliverables of the project (Sunder, 2016). Similarly, Timans, Ahaus, Solingen, Kumar, and Antony (2016) illustrate that there is a significant relationship between LSS organizational functionality and evidence that stakeholders pave the roadmap to successful LSS integrations into the methodology of project management. By the same token, Sunder (2016) and Timans et. al. (2016) draw on the assessment that stakeholder positive motivation to frame the deployment of LSS initiatives is paramount to the success of project management deliverables.

Define, measure, analyze, improve, and control. The tangible attributes LSS brings into the governance models of the PMO process strikes a support role in business practice

principles to champion the overwhelming scope of project development (Sarkar, 2004). To demonstrate, Sarkar (2004) acknowledges scripting the LSS framework would enhance process improvement initiatives while clarifying the structure which ties in the configuration of a PMO. The initiative would allow for the understanding of the PMO process in a continuous improvement environment to build upon performance and process efficiency and variation development. Furthermore, a holistic approach to the integration of LSS within the PMO governance model builds on the comprehensive deployment of process improvement methodology that transitions projects to clear and defined goals. According to Schonberger, (2008) the purpose of LSS strengthens the techniques and process control of correlating PMO measures by structuring the governance model to achieve positive results in efficiency and variation control.

LSS problem solving implementation tools. The composition of LSS governance modeling includes the context of achieving deliverables by defining, measuring, analyzing, improving, and controlling (DMAIC) (Sarkar, 2004). To clarify, DMAIC enhances the implementation strategy process by offering a standardizing methodology of systematic control. Incorporating DMAIC into the PMO process not only clarifies the framework but also comprises the primary characteristics of project scope management (Atkinson, 2014).

To solve the problem of improvement in process control of a PMO, Atkinson (2014) finds DMAIC methodology useful in the following context:

- Defining the project boundaries, formulating the project plan, and acquiring the resources needed for proper deployment of the project deliverables.
- Measuring the objectives outlined in the project scope definition by identifying a detailed process map and documenting performance levels throughout the project.

- Analyzing sources of variation and inefficiency through process leveraging tools which prioritize the elements of improvement minded tasks.
- Improve upon the measured and analyzed shortcomings to positively incorporate proposed processes which standardize the process.
- Control the performance measures by building to sustain efficiency and variation improvements as an ongoing process.

D: Define

Step 1: Subject Evaluation – To confirm the main problem and define what are the priorities for improvement.

M: Measure

Step 2: Goal Setting – To set up the baseline on management criterion and check points of the improvement project.

A: Analyze

Step 3: Situational Survey – To explore the environment situations, factors and root causes of the problems being considered. Situational surveys are not only to understand the related critical and influential factors, but also may uncover key points and concepts for the improvement process.

Step 4: Cause Finding – To use cause-and-effect approach to find problems (inconsistencies between actual results and anticipated performance), and thus to discover opportunities for improvement while looking for root problems.

I: Improve

Step 5: Implementing Strategy – To use the LSS approaches and methodologies to achieve greater quality performance.

Step 6: Results Confirmation – To examine corrective actions and see if actual results really do lead to the anticipated performance goals.

C: Control

Step 7: Maintaining Standardization – To validate the improvement action so that it becomes a standard of procedure (SOP).

Step 8: Future Projects – To apply the concept of continuous improvement inherent in LSS improvement cycle.

Figure 3. The representation of an integration model for DMAIC, which is built into an eight-step approach for a simulation-based assessment of process application adapted from, "Improving inventory performance through Lean Six Sigma approaches," by Jung-Lang Cheng, 2017, *IUP Journal of Operations Management*, p. 30.

To summarize, the DMAIC methodology integration into the PMO governance model clarifies the quality enhancements sought to ensure sustained quantified benefits in the project management process.

Project Management Office Governance

PMO has become recognized for the last half-century as a framework for an organizational discipline to manage projects in a concise systematized manner (Inman & Houston, 2015). The attribute of governance modeling within the PMO has recently driven a newly founded push to enhance the overall improvement of the PMO (Kutsch et al, 2015). Furthermore, the sustainability of the PMO remains strong if there is a driving force behind continuously improving buy-in value within organizations. In the context of governance, organizational PMO governance encompasses a managerial action defined by the accountability, viability, sustainability, change management, and organizational strategic management as it relates to the function of project management (Too & Weaver, 2013).

Sustainability of the PMO. Improvements surrounding the methodology of the PMO exist to gain advantages in value through the continued research performed in this field of study. According to Inman and Houston's research (2015) examination into the PMO's shelf life is driven through the value proposition of project performance. Moreover, the significant investment in time and resources needed to sustain a PMO's structural framework indicates the organizational pressure for the PMO to contribute to the success of an organization's strategic initiative.

Growing interest into the elements of the PMO's success has emerged in the last decade's research as an invitation to understand the significance in project performance in terms of management, scope, and scale (Joong-Hoon et al., 2015). To that end, the question of PMO

sustainability in organization project development is the process in which performance analytics is utilized through the continued rise of PMO deployment. Consequently, Kutsch et. al. (2015) found parallels in the growing need for project performance efficiency benchmarks through the formation of organizational PMOs. The theoretical background into the PMO efficiency identifies the value of organization project success through the input and output factors of Kurtsch et al. (2015) and Joong-Hoon et al. (2015) research studies.

The strategic conceptual model of a PMO is structured through an integrated organization framework, which has been extensively explored throughout research (Tasic, 2014). Specifically, the maturity of the PMO directly reflects the structural integrity in how supportive the PMO is to an organization's mission. In like manner, Inman and Houston's research (2015) found increased interest in how the standardization of mature PMOs leads to being responsible for the realization of overcoming challenges in the execution of projects. By the same token, the interactions between a mature PMO and project delivery consequently experience high levels of project success.

Characteristics of PMO success. As the PMO evolved throughout the last 50 years, the characteristics that make up a structurally sound framework are critically dependent on an organization's maturity level in managing the governance which positively affects the strategic nature of PMOs (Hubbard, & Bolles, 2015). In addition, the PMO framework requires establishing a mutual enterprise of organizational champions to build the PMO through concise and effective communication. The Guide to Project Management Body of Knowledge (PMBOK) Project Management Institute (2017) sections several elemental types of PMOs that organizations utilize:

- Supportive PMOs rely on the consultative piece, which anchors the role of providing templates, training, and best practices. Furthermore, the supportive PMO utilizes lessons learned and training access to ensure building upon project success.
- Controlling PMOs offer a more dynamic structured approach, which utilizes compliance and the adoption of specific rules, templates, and methodologies to execute governance in projects.
- Directive PMOs follow a strict adherence to rules and practices in an effort to control the deliverables from an organization-wide perspective.

In addition, Dinsmore (2000) finds the standards and elements derived within a PMO are subsequent to an environment that seeks to further expand the delivery of highly successful projects.

The standards and metrics of the PMO establish itself as a functional business unit which can be characterized as oversight of cost, control, and execution of project delivery (Hill, 2014). With that said, the purpose of a PMO is to guide organizations through a structured support system, increase productivity, and improve efficiency to achieve industry standards relevant to the organization. The categorical elements of the PMO specify execution deliverables through standardized processes, tools, and templates utilized across a range of organization projects.

Scalability of PMO governance. The scalability of PMO governance modeling, according to Badewi (2016), leads to the effectiveness of the project manager's performance within the constraints of the PMO framework. Moreover, PMO investment success significantly increases due to the experience and ability of a project manager to implement the effectiveness and benefits of a PMO governance system. Biesenthal and Wilden (2014) found opportunities in project governance models that could lead to a difference in the scalability success rate seen in

anticipated project deliverables. Furthermore, the emergence of project management governance evolved through the need for a tactical tool in refining the project management framework.

The systematic review of PMO governance success, in a scalable model, starts by linking the framework of organizational processes, decision-making models, and the delivery of projects (Biesenthal & Wilden, 2014). The adaptability of PMO governance modeling throughout organizations of differing size tests the ability to operate efficiently in scale. PMO governance relies on the compliance of rules, collective action, and controlled standards to execute projects in a uniform and regulated manner. According to Garland (2009) the failure of delivering project success did not fall on the scalability of a PMO governance system, but the lack of proper governance models executed across the project portfolio. Secondly, the scalability of PMO governance modeling is dependent on what attributes the project manager utilizes within the model to address the needs based on complexity and risk.

The limitation of scalability through Garland's (2009) research is comprised of the extent to which project governance can be scaled without compromising the integrity of governance arrangements. As referenced in Figure 4, project governance modeling has the capability to be regulated based on the dependence of complexity within the project need.

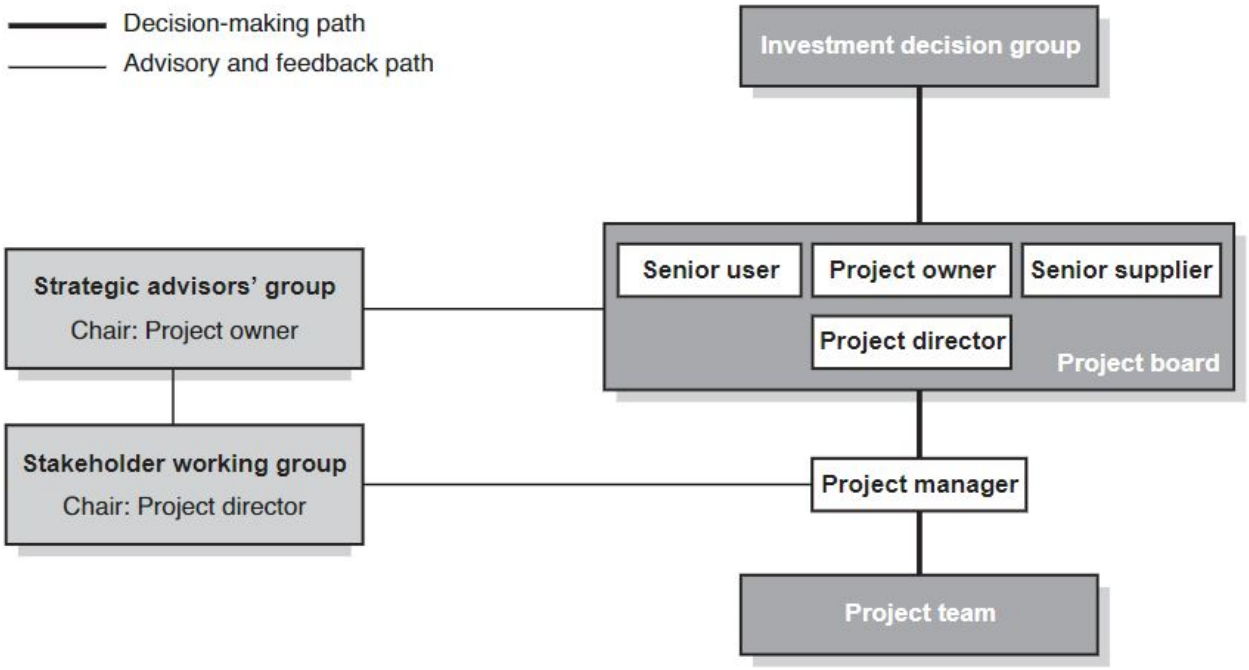

Figure 4. Project governance scalability model adapted from "Project governance: A practical guide to effective project decision making," by R. Garland, 2009, *Main scalability options,* p. 103.

Majra and Helena (2017) found PMO governance modeling relied more on the organizational effort to implement the framework system across the corporate level versus being individualistic on singular project use. To illustrate the dependence of scalability, utilizing projectization as it relates to the approach taken in governance modeling, is conveyed by project managers within assessing the circumstances of the project scope and organize the work accordingly within the constraints of the governance system. The successful relationship between project management complexity and the utilization of project governance models are perceived as a dependence on the ability of the project manager to control the mechanisms within the constraints of the accepted governance model (Garland, 2009). Therefore, the integrity of the governance model's effectiveness is determined by the adaptation of a project manager in the context of structural decision-making.

Establishing the connectivity of governance into a PMO, as seen by Garland (2009), the framework encompasses a management system which concerns itself with the decision-making requirements needed to execute a project. Furthermore, the framework surrounding governance principles within project management should provide a baseline understanding of policies and procedures to move projects through execution in a structured manner. In addition, the focal point of project governance places greater emphasis on delivering business objects in a structured partnership between PMOs and governance modeling.

PMO & LSS governance framework. The injection of LSS into PMO governance modeling must provide control, compliance, and project clarity to further build efficiency through process variation reduction (El-Haik, & Al-Aomar, 2006; Garland, 2009). Consequently, the LSS governance modeling identifies the correlated improvements within the existing PMO model to create an atmosphere of value-added processes through a controlled environment. The process continues when taking the two modeling methodologies and sifting through the context and deriving at a combined solution.

LSS and PMO governance combination. Simulating the business process tangibles between LSS and PMO governance methodology represents the ability to produce system modeling and create a hybrid model (Tang, 2006; Burch, Strawderman, & Bullington, 2016; El-Haik, & Al-Aomar, 2006; Garland, 2009). To demonstrate, an integrated LSS and PMO governance model incorporates attributes of both methodologies to enhance the current PMO framework. Coordinating the attributes of both methodologies only serves to enhance the overall project experience through realizing which key concepts and processes are brought through to become the most feasible modeling method (El-Haik, & Al-Aomar, 2006).

The construction of a combined LSS and PMO governance process encompasses representing the key methodologies each framework represents and then adding key elements within each methodology. As an illustration, the integrated principles include the following elements:

- Define through the centralization of decision-making and implement a common methodology.
- Measure and analyze by assessing process compatibility and conducting LSS measurement analysis requirements to reveal the desired state and return on investment benefit.
- Plan and control the project environment by establishing a project steering committee and organize a project control chart.
- Execute the governance plan by managing the operational direction.
- Traceability includes the improvement levels of project success within the organization. The elements of traceability include documentation, project history, lessons learned, and benchmarking (Tang, 2006; El-Haik, & Al-Aomar, 2006; Garland, 2009).

Consequently, the model enriches the PMO governance model by building strength through the integration of LSS methodology to provide sustainable growth of the PMO governance model.

Summary

The literature research into LSS governance and PMO governance methodologies envelop volumes of each practice individually; however, when combining the two little or no research exists deriving the theoretical positive relationship both can bring as a unified effort for project success. Furthermore, both methodologies enclose various tools, techniques, and

processes, which build upon the need for a combination of elements. The research into the tangible benefits of integration of LSS and PMO governance models shows little attention in project management. The PMO governance model involves control through compliance with structural integrity that structures the project management process. LSS governance modeling strives to find the efficiency and process variation reduction within the framework of LSS practices.

The strength behind both methodologies has been extended on an individual methodological approach. LSS and PMO governance models share the desire to improve project outcomes through a structured method of definition, measurement, control, planning, execution, and traceability. The weaknesses presented are found in the lack of research in combining these two methodologies to enhance the overall project management structure. This literature review revealed strengths as individual methodologies; however, there is a lack of related outputs in understanding the concept of unifying these methodologies.

On the world business platform, projects of complexity and scale are in need of methodology adaptations, which encompass the flexibility to control complexity while sustaining changing environments through process efficiency and variation depletion (Müller, 2009; Pisani, Hayes, Kumar, & Lepisto, 2009). Consequently, more research into the integration of LSS and PMO governance methodology could fill in the missing pieces, which sustain PMOs and enhance their existence in project management success.

Chapter 3 – Solution

The drive to evaluate the integration of LSS efficiency and variation reduction properties has a purpose in formulating a newly conceived LSS project management office (PMO) to further strengthen the governance of business project processes (Cherrafi, Elfezazi, Govindan, Garza-Reyes, Benhida, & Mokhlis, 2017). In addition, developing a theorized model encompassing the attributes of LSS essentially constructs governance of continuous improvement within the stationary environment of a PMO. Within Figure 5, the five wastes of a PMO are depicted to illustrate the effectiveness of an LSS governance framework integration.

Figure 5. Five wastes in a PMO. Adapted from "Range of project governance activities across the PMO continuum," Hill, G. M. (2014). The complete project management office handbook. Boca Raton, Fla: *Auerbach Publications, 13*(3), 1-623. doi:10.1016/j.ijproman.2014.06.005

According to Hill (2014), the problem in business problems depicts the PMO as a bureaucratic system of rules, controls, and unwavering structure that impedes the ability with a project become agile and fluid.

Solution Model Overview

The focus of this chapter is to build a theoretical solution by improving a PMO through the integration of LSS governance methodology as seen in Figure 6. The quantifiable measurement of PMO success can find enrichment in the ability to draw on efficiency and variation reduction through LSS (Anbari, 2002). In like manner, the governance model integration depicted in Figure 5 between LSS and the PMO framework creates the ability to sustain increased quality improvements for the purpose of organizational process efficiency.

Figure 6. The simplified model of the integration between Lean Six Sigma and the governance model within a PMO. Adapted from "Cause and effect diagram," Cherrafi, A., Elfezazi, S., Govindan, K., Garza-Reyes, J. A., Benhida, K., & Mokhlis, A. (2017). A framework for the integration of Green and Lean Six Sigma for superior sustainability performance. *International Journal of Production Research*, *55*(15), 4481–4515. Doi. 10.1080/00207543.2016.1266406

The underlying fulfillment to enhance the PMO by integration of LSS governance poses a method to clarify implications and benefits in project management (Anbari, 2003). Furthermore, the integrated LSS methodology into a PMO governance model better supports the strategic direction of an organization.

Solution Description

The theorized solution between LSS and the PMO governance framework formulates through a tangible relationship. The focus of this relationship stems from a similarity within the scope of governance. As Atkinson (2014) describes, the set of structured rules in the LSS's define, measure, analyze, improve, and control (DMAIC) could possibly contribute to Hubbard, and Bolles' (2015) description of PMO governance and produce a comparable framework sustainable within the scope of a unified model. Therefore, extracting tangible attributes between the two separate governance methodologies could theoretically work in conjunction to provide a hybrid governance model.

Theoretical solution subdivisions. The PMO has stood for the last half-century as a mechanism to structuralize a complex project system within the context of a governance framework (Kutsch et al, 2015). The PMO governance model, as shown in Figure 6, is organized as a system of authority parameters to formulate phases in which an organization can frame project complexity. The adaptation of Biesenthal & Wilden's (2014) research describes a systematic approach to control the complexity of project management integration into organization operations. Consequently, the PMO governance model in Figure 6 utilizes a concise design separated through five structural elements established to mutually benefit an organization's strategic mission.

The project management office depicted in the instance of Figure 7 bases the roles and responsibilities of organizational project control by structuring project management principles and practices from industry standards (Inman, C., & Houston, M. E. (2015). Subsequently, the PMO is designed around this organizational strategy for maximum effectiveness as a project

repository for tactical delivery. The PMO becomes a business-centric enterprise, which is utilized as a source of project methodologies and standards (Hubbard & Bolles, 2015).

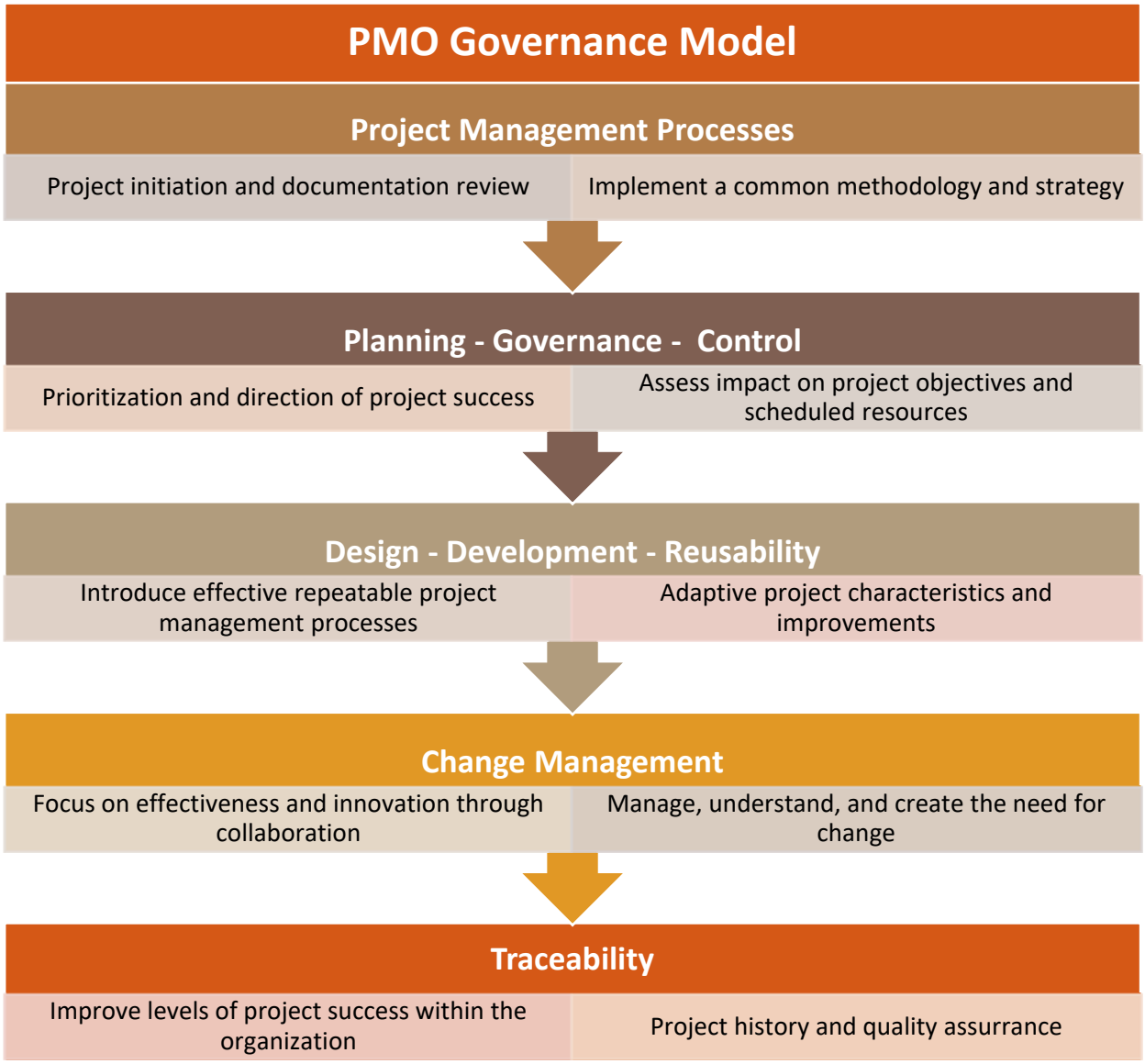

Figure 7. PMO governance model featuring a concentrated summarization of structured baselines within an organization's facilities. Adapted from "Level that links parent organization to project," Biesenthal, C., & Wilden, R. (2014). Multi-level project governance: Trends and opportunities. *International Journal of Project Management, 1*(32), 1291-1308. doi:10.1016/j.ijproman.2014.06.005

The second attribute of a solution for PMO hybrid governance modeling is found in Figure 8 through the application of DMAIC. Figure 8 rendering of an LSS governance model process consists of several outputs transforming projects through the execution of the DMAIC approach. Through the research of Albeanu, Radford, & Hunter (2010), LSS governance model phases transform projects with the intent to interject control and apply situational attention within the analysis of process movement. Furthermore, the systematic control of organizational processes enhances the improvement of efficiency and variation depletion as shown in Figure 8.

The relationship encompassing DMAIC usage within the LSS governance model discovers a method in which continuous improvement can interject within the overall process control and adaptation of project progression (Atkinson, 2014). For that reason, the structural elements of DMAIC play an essential part in the ability to measure, analyze, and provide a beneficial relationship to governance modeling. The usage of DMAIC offers the ability for project practitioners to analyze and improve PMO governance modeling to execute projects effectively (Cherrafi, et al., 2017).

According to Tang (2006), Lean Six Sigma, as a quality management tool, improves upon the framework of governance by adopting a business excellence strategy through a comprehensive system of tools, processes, and practices aimed at successfully procuring projects. To illustrate, LSS governance modeling features several techniques to integrate a logical flow of analysis, design, and quantitative process control. A major factor in utilizing LSS methodology is that the outcome or achievement is generally expressed in financial terms (Tang, 2006). Relying on a financial measurement, the LSS governance model phased approach in Figure 6 represents the application of statistical thinking to demonstrate quality improvement.

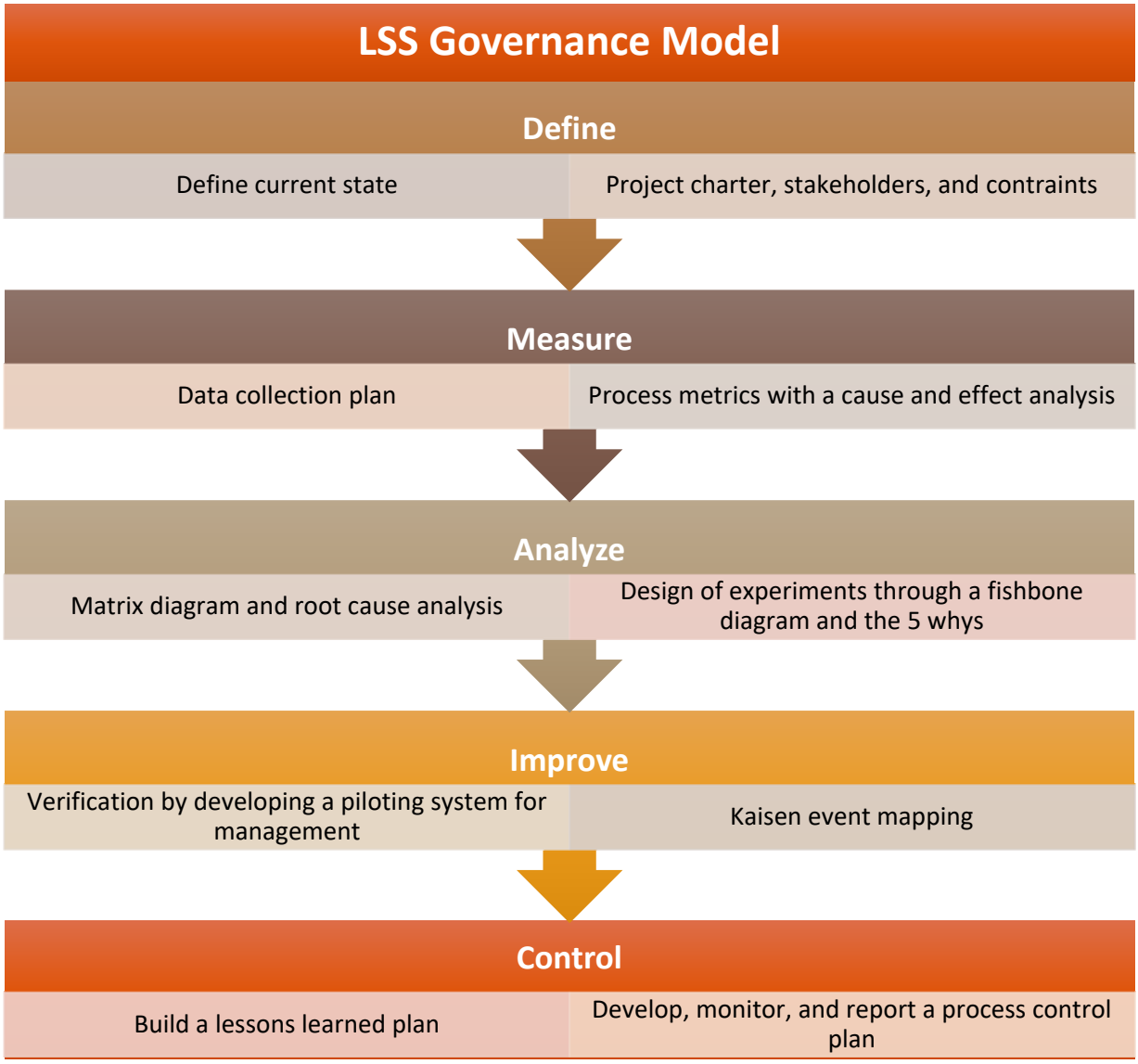

Figure 8. The DMAIC description of LSS methodology showing an approach to process improvement. Adapted from "Stages of a Six Sigma project", Albeanu, M., Radford, J., & Hunter, I. (2010). Six Sigma in HR transformation: achieving excellence in service delivery. Farnham: Routledge.

LSS governance integration into the PMO. Like the elements of LSS and PMO governance models, the adaptation of the PMO to encompass the principles and methodologies of LSS constitutes a new interactive design to make a shift away from stringent practices to a

continuously improving method. The theoretical representation in Figure 7 serves as a fluid design, which demonstrates the PMO's reach into an approach that emphasizes centralized decision-making along with the necessary measurements and controls to recognize needed change (Badewi, 2016). As the Figure 9 governance model progresses, structural elements familiar with the traditional PMO exist around the interjection of LSS methodologies and practices that allow for the PMO governance model to transition and adapt to changing elements.

Solution model description. The centralized depository illustrates a multi-project organization that funnels projects in a resource-limited environment. To establish clarity in the strategically minded organization, the LSS integration into a hybrid PMO governance model works to align project importance through a centralized strategic project methodology. Further, the strategic methods utilized build upon the traditional PMO governance system to establish the initial framework needed to progress projects in a systematic process (Majra & Helena, 2017). As a typical PMO is framed, the essential project matrices are included to formulate a project implementation once organizational approval is granted.

The incorporation of LSS practices ensures a project's performance is continuously analyzed, reworked, and measured to extract efficiencies. Additionally, the desired state of a PMO design solution makes the goal of achieving project success through the management of costs, time, and resources efficiently to procure a positive outcome (Majra, & Helena, 2017). Essentially, the utilization of LSS methodologies such as DMAIC provides structuring within the PMO and allows for the measurement and analysis throughout the project lifecycle (Sarkar, 2004).

One of the essential elements of the Figure 8 governance model is the adaptation potential integration through a continuous improvement focus on the design, development, and

reusability of the PMO. The strength of LSS integration into the PMO governance model comes through two main objectives: continuous improvement and quality assurance. According to Taghizadegan (2006), quality in products or services requires a process, which ensures the quality in a process. Consequently, the LSS improvement initiative established in Figure 9 works to build upon achieving organizational goals by recognizing the changing world and a system to adapt quickly to these pressures.

Along with the practices of continuous improvement, Figure 8 represents the traceability and control management of monitored processes. Additionally, Taghizadegan (2006) finds process control helps construct the requirements that are found to have positive functionality in the properties of PMO management. Subsequently, the development of a control plan is responsible for the sustainment of best practices enhanced through the documented lessons learned process.

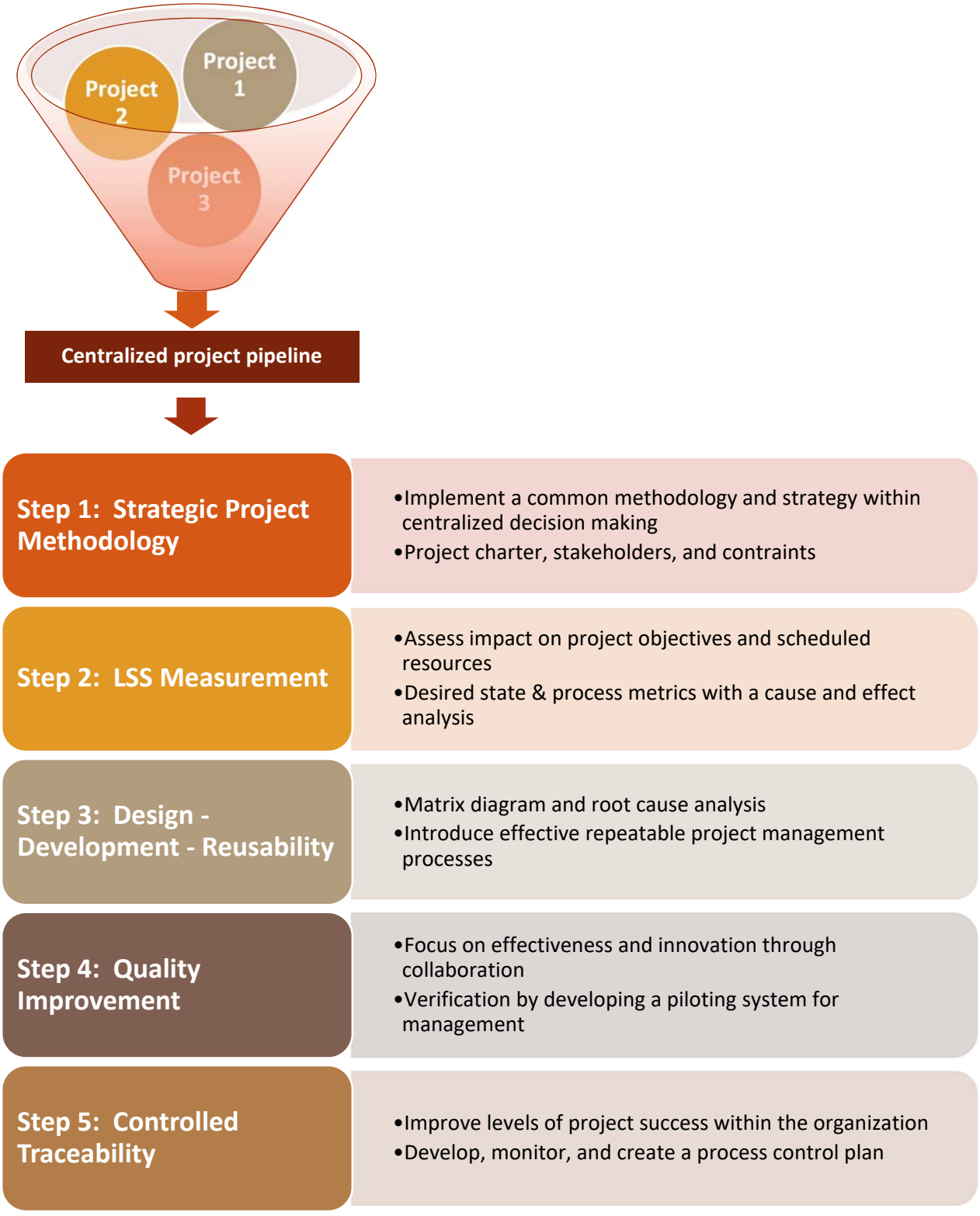

Figure 9. The summarization of the LSS PMO governance model.

Potential impact of governance modeling between LSS and PMOs. The optimization of process characteristics becomes the primary focus of Lean Six Sigma's influence on the PMO integrated LSS governance model depicted in Figure 8 (Taghizadegan, 2006). As represented in Figure 10, LSS is designed to measure variation and waste through a framework of analysis and implementation of new processes. In addition, the functional relationship between an LSS and the PMO framework would serve to enhance the satisfaction of organization project delivery.

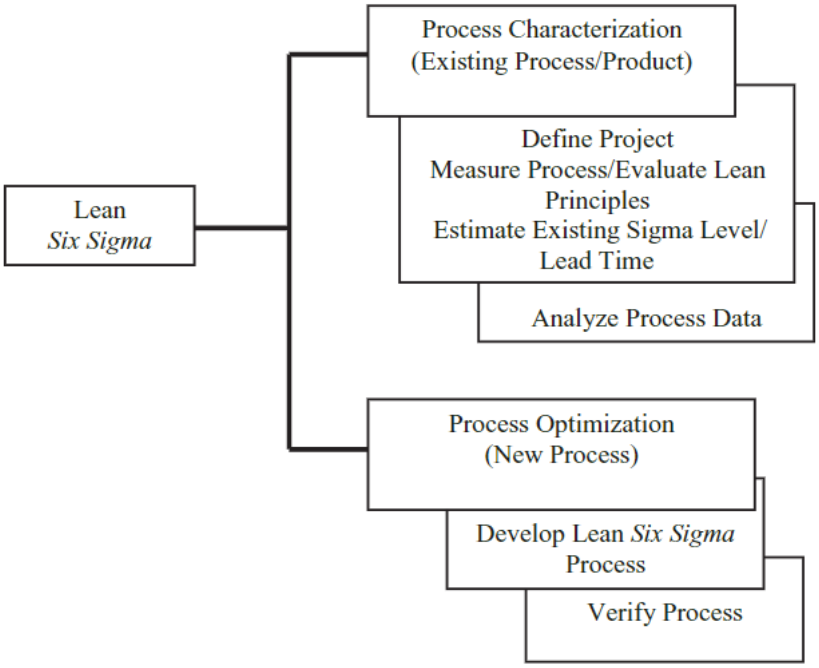

Figure 10. Representation of a Lean Six Sigma DMAIC levels to achieve process optimization. Taghizadegan, S. (2006). Essentials of Lean Six Sigma. Amsterdam: Butterworth-Heinemann, 74.

Solution Application

The diversification of project governance serves to achieve organizational objectives by adjoining several methodologies to establish hybrid modeling for mutually beneficial relationships (Müller, 2009). To demonstrate, governance in the realm of projects approaches

the identification of solutions within organizations by finding the interface between project execution and efficiency of its parts. The application of the LSS PMO governance model addresses the need for collective governance of projects within the attributes of opportunities in variation reduction and efficiency by the organizational process.

Assumptions. The assumption of an implementation plan factors on the organization's familiarity with LSS and PMO governance management. Consequently, utilization of the LSS PMO governance model relies largely on the facilitating ability and the change management practices in place to gain willingness of the organizational stakeholders to execute the plan. Furthermore, the PMO manager must possess leadership, change management, and executive influence to establish and sustain the attention of stakeholders to implement the LSS PMO governance model.

Sustainability. The sustainability of changing an existing PMO to integrate LSS practices and principles focuses on the enablers within an organization (Khan, Skibniewski, & Cable, 2014). As a result, the sustainability of the LSS PMO governance model is dependent on the methods surrounding how a new project management methodology understands the importance of stakeholder influence to project completion. Stakeholder responsibility factors in on the dedication to procedurally follow the LSS PMO governance model with the intent of sustainment through continuous improvement. The alignment of the PMO objectives is the baseline of support delivered through a value centered around the executive team's influence on the continued sustainment of the LSS PMO governance model.

Evaluation of the solution. The comparison and evaluation of the LSS PMO governance model implementation identify with the willingness, experience, and the need for a facilitated model, which enhances the traditional PMO through adaptation and measurement of

fiscal execution. The critical success factors identified in the literature review trace back to measurement and analysis practices in the model (El-Haik & Al-Aomar, 2006). The tangible benefits of effective reduction in variation and increased efficiency in the PMO processes build the theoretical focus on organizational outcomes. The enabling force for LSS PMO governance model success demands potential in the improvements the organization's leadership is willing to provide.

Weaknesses of an LSS and PMO governance model. The weaknesses presented in the research existed through the lack of integration research between LSS methodology and PMO governance structuring (Too & Weaver, 2014). The strength behind LSS and the PMO is the separate and extensive research conducted on either side of these two methodologies. There are, however, gaps in knowledge and understanding of how LSS and the PMO methodologies could mutually benefit the governance process by integrating their principles.

Summary

As recognized in the literature review, the PMO facing a stagnant forecast in maintaining superiority in organizational portfolio management of project deliverables. Unfortunately, there is a gap in knowledge and understanding of how combining LSS methodologies into the dated practices of PMO governance modeling could enhance the positive attributes within these methods. Further evaluation and studies are needed to commence in order to establish tangible evidence the terrorized concept can truly bring efficiency and reduction in the facilitation of the PMO framework.

Chapter 4 - Discussion

The following chapter is a description of the proposed solution and framework for an implementation plan. The purpose of this study is to find efficiency and variation reduction in the PMO process through the establishment and utilization of the LSS based PMO governance methodologies. The standardization of the LSS integration into the PMO process includes the conceptual framework supported by a literature review into the metrics of LSS and the PMO governance modeling. The chapter will demonstrate a plan for distribution, change management recommendations, explanation of benefits, limitations, and enhancements that will further the integration of LSS principles into the framework of PMO governance modeling.

Description of the Approach

The approach to implementing a solution encompasses utilizing the LSS governance tools, techniques, and processes to ensure a uniform integration to the PMO framework within the management of a project portfolio. The plan of distribution should create an outline for how LSS tools and techniques will be employed to establish a baseline for efficiency and variation reduction throughout the PMO governance model. As depicted in Chapter 3, Figure 4, the five wastes in a PMO, LSS initiatives will specifically manage process inefficiency in preparation for eliminating waste (Hill, 2014). Therefore, production within the PMO governance model can be synchronized to simplify operational processes to reduce the excessiveness of movement, over processing, project inventory, waiting, and defects.

Plan of Distribution

The distribution plan for this solution involves several structural elements, which first needs an examination for the application. The literature review illustrates the LSS methodology surrounding the process to build a template for a sustainable quality management system within

the PMO (Burton, 2011). Initiation of the LSS integration into a PMO governance model should follow the process depicted in Figure 11.

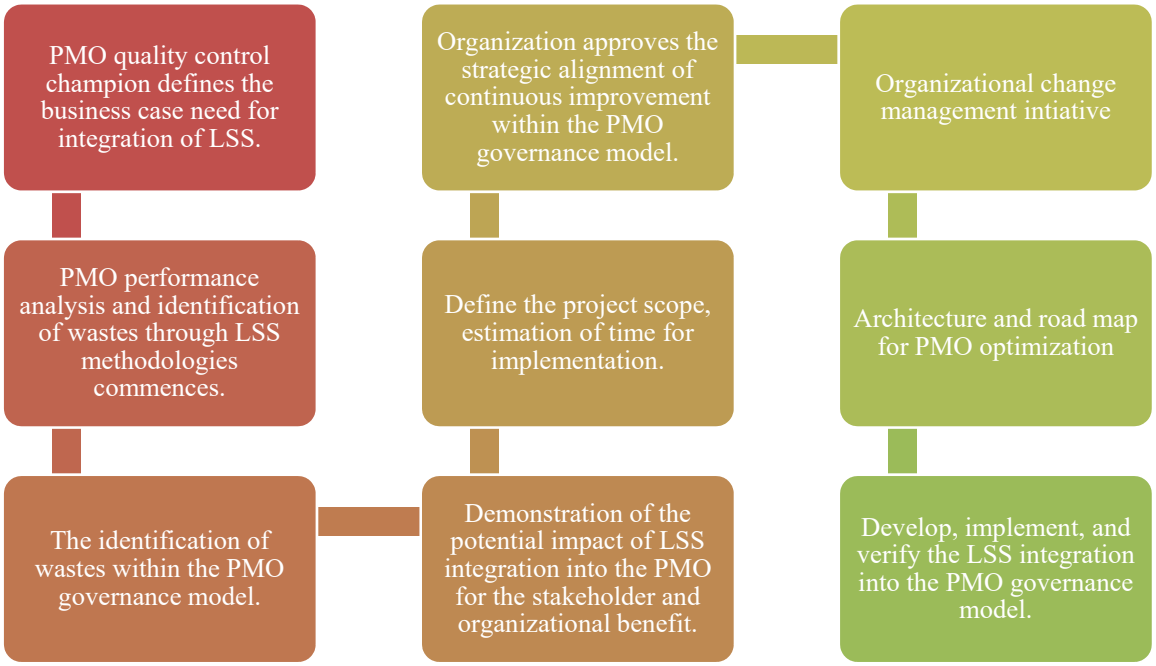

Figure 11. The synchronized methodology for execution of LSS integration into the organizational PMO governance model.

Environmental prerequisites for the solution. The initiation of a conceptual hybrid PMO governance model requires the organization to establish a purpose for staff motivation. As translated through Figure 11, the organizational champion of PMO continuous quality improvement seeks to define the need for changes to the PMO with a goal of waste reduction within the framework (Albeanu, Radford, & Hunter, 2010; Biesenthal & Wilden, 2014; Taghizadegan, 2006). For purposes of this solution, the environmental prerequisites for a solution hinge on the success rate of the current PMO governance. The champion of improvement needs to establish through analysis the inconsistencies of the current PMO to incite a motivation towards the change initiative needed to move forward.

The prioritization of resources for a large-scale change initiative in an organization's PMO governance system requires a connection with strong incentives of cost, time, and efficiency solutions, which prove a change to be beneficial. The decrease in the organization's PMO efficiency is relevant to project failures and challenges in the current business environment. The dedicated attention to the business environment comes from the champion of improvement to work as the cornerstone element to prove an alignment of inefficiency within the PMO situation assessment.

Process prerequisites for the solution. The first step toward initiation is through the support of leadership within the organization to ensure the changes to the PMO governance model is established through a top-down approach. In addition, securing an executive sponsor becomes necessary to structure the rest of the organizational support framework for the development and identification of wastes within the PMO. Subsequently, the executive support and approval will translate into the creation of a quantitative analysis of the current PMO governance model to direct which areas would benefit from process optimization.

Organizational changes required. Evaluation of the current organizational state is pivotal in defining the necessary implications of not adopting a continuous improvement model within the PMO governance system. Adequately projecting the importance of analysis behind any change initiative is systematic of moving towards efficiency within the system of governance structuring (Cabanis-Brewin, 2014). Consequently, uncovering inefficiency in the organization comes through audits and analysis to address the improvements needed for process solutions.

The organization's culture and ability to change will foster the beliefs and attitudes towards success in the implementation of a new hybrid PMO governance model. The alignment

of organizational projects builds an atmosphere of singular focus to establish the organizational goals, aspirations, and expectations of the newly founded mission (Milosevic and Srivannaboon, 2006). Specifically, understanding the cultural element will assist in the establishment of key reasons behind changing the current state of the PMO governance system.

Process changes required. To establish the process behind a change requires the answering of *what* is currently being done in the PMO, *why* the change in the process should be recommended, and *how* the PMO governance model change will positively affect the current state of operations. A benefit analysis created through the quantitative and qualitative analysis should be presented to the stakeholder team to visualize the implementation to completion process for positive reinforcement of the LSS integration initiative. The transition from the current state PMO to the new model is essential to demonstrate the reasoning acquired through assessments and translate that to the stakeholder team for complete understanding.

Change Management Recommendations

The framework needed to implement the hybrid of an LSS integrated PMO governance model takes into account an initiative in change management done throughout the organization. An organization's openness to change becomes an elemental factor in the success of process improvement within an LSS initiative (Bhandola, 2015). Nonetheless, leveraging change in an environment to establish continuous improvement evolves as a dependency to successfully obtain the development of a PMO governance system. According to Bhandola (2015), change is managed through a systematic structuring of intentional motivation by the oversight of behavioral targets to steer the organization to another visionary purpose.

Processes needed. Gauging the impact of change management comes with the responsibility to focus control over the human intention to withdraw from the necessary changes

needed for positive results (Aziz & Curlee, 2017). Specifically, the ability of an organization to produce supported and effective priorities for the new founded concepts and vision is quintessential to establish a foundation that sustains the business environment.

Shortly after the leadership of the organization produces a benefit analysis of the hybrid PMO governance model and establishes the weaknesses of their existing PMO governance system, change can be put into practice. This is the intentional stage of change management. Executive leaders share the situational assessment or current state, vision, and the mission of how the organization moves to the future state. Within this conceptual model, the change must be overwhelmingly accepted by the organization before the initiative can commence otherwise a state of failure is predictably high in probability.

Secondary, the executive leadership team must evaluate the timing and acceptance of the organization's ability and motivation to move forward with the hybrid model. According to Aziz and Curlee (2017), the change needed is systematic in resolving inefficiencies within the current PMO governance system and integrating an LSS continuous improvement process will institute a shift in the poor timing, cost, and over-processing of the current state PMO. Therefore, proactive tracking of the change initiatives, training, and retraining should commence as a continuous and sustainable practice moving forward in the future state hybrid PMO governance model.

Procedurally, Aziz and Curlee (2017) find that the feasibility of proposed change initiatives should launch to understand the concept as a whole:

- *"Do we have the required skill sets?*
- *Do we have the resources in sufficient numbers?*
- *Are any specific technologies required, and do we have access to them?*
- *What opportunity costs will we face by proceeding with this initiative?*

- *What assumptions do we have regarding the internal and external environment in which this project executes?*
- *Do we have the funding for the project?*
- *What specific resources and funding are required for the next project phase?*
- *What is the proposed timeline of the next project phase?*
- *What benefits are expected from completing this project?*
- *What return on investment can be expected?"*

Explanation of benefits. The benefits analysis work done within the scope of the hybrid PMO governance model implementation is one of the first examination points utilized to push the project into practice. The literature review focused on defining the benefit stream of LSS continuous improvement methodology and how these practices can have an impact on the sustainability of the PMO governance model (Cherrafi, et. al, 2017). Additionally, LSS and more specifically DMAIC have redefined the structural framework of the PMO to always circle around in a continuous improvement system for enhancements in efficiency, over processing, motion, project inventory, waiting, and PMO defects.

Limitations

There are a number of limitations to study, which upon further investigation could lead to the development of several possibilities beyond the present conceptual model. The preliminary limitation of this study is the lack of research into how LSS methodology can enact efficiencies into the PMO governance model. The tangibility of LSS and PMO methodology find separate research over the course of decades, however, the incorporation of the two methodologies into one has not been pursued. The literature review found no research depicting the outcomes of LSS integration into PMO governance modeling. The positioning of LSS as a tool to enhance

the PMO process is at this point a conceptual practice which as of yet has not been proven to produce a level of efficiency to heighten the PMO process.

Future Enhancements

The research into future enhancements for potentially positive outcomes should be considered to enhance the sustainability of the PMO process. Although PMOs have been extensively researched throughout the last half-century there remains an omission in the concept of continuous improvement through the methodology and practices of LSS (Badewi, 2016). Achieving the successful relationship of project success within a PMO environment could be enhanced by the sustainability efforts within further research of the properties in LSS governance modeling.

Concluding Remarks

Improvements, which are adjacent to the success of PMO governance methodology, find tangible benefits in the usage of LSS practices integrated into the structural framework. Moreover, Inman, and Houston (2015) find the sustainability of PMOs to be in jeopardy of a valuable resource in the portfolio management of projects within an organization. Additionally, the significance of resources needed to support the ongoing efforts of PMO sustainment draws on the weaknesses within the processing projects efficiently.

Organizations have bureaucracy within the structural elements of their PMO governance that inhibits process efficiency and the ability to continuously improve through a defined set of methodological practices (Dinsmore, 2000). Specifically, the value of an LSS continuous improvement model builds a metaphorical bridge to the enhancement of current processes and their ability of adaptation to changing environments. The solidified processes of an organization's PMO governance system could experience outdated practices if there is not a

mechanism for change to the business environment. How LSS could influence a continuous improvement venture is determinant on the willingness and ability of an organization to implement the proposed hybrid governance model.

The pursuit of an efficient means to improve upon the PMO governance model highlights the incorporation of LSS methodology to exemplify the elimination of wastes. Moreover, Burch et al. (2016) found the utilization of LSS has shown important strengths in logistical efficiencies within business practices. To exploit these efficiencies, the integration of LSS into PMO governance modeling produced a conceptual model depicted in Figure 8 as a means to heighten certain sustainability through continuous improvement.

The application of the LSS integrated PMO governance model encapsulates the drive to ensure project portfolio frameworks are continuously analyzed, measured to extract efficiencies, and revised as a means to provide positive results in an ever-changing environment. The pursuit of clarity within PMO governance comes in the capacity to manipulate the structured framework in parallel to changing business settings. Lastly, the incorporation of proven LSS methodologies in the realm of continuous improvement and quality control further the traditional PMO governance structure by appealing to the alignment of positive process configuration.

References

Albeanu, M., Radford, J., & Hunter, I. (2010). Six sigma in HR transformation: Achieving excellence in service delivery. Farnham: Routledge.

Anbari, F. T. (2002). Six sigma method and its applications in project management. Paper presented at Project Management Institute Annual Seminars & Symposium, San Antonio, TX. Newtown Square, PA

Anbari, F. T. (2003). Strategic implementation of six sigma and project management. Paper presented at PMI® Global Congress 2003—EMEA, The Hague, South Holland, The Netherlands. Newtown Square, PA

Antony, J., Setijono, D., & Dahlgaard, J. J. (2016). Lean six sigma and innovation – an exploratory study among UK organizations. *Total Quality Management & Business Excellence, 27*(1/2), 124-140.

Atkinson, P. (2014). DMAIC: A methodology for lean six sigma business transformation. *Management Services -Enfield-, 58*(1), 12-17.

Aziz, E. E., & Curlee, W. (2017). *How successful organizations implement change: Integrating organizational change management and project management to deliver strategic value.* Newton Square, PA: Project Management Institute.

Badewi, A. (2016). The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework. *International Journal of Project Management, 34,* 761-778. doi:10.1016/j.ijproman.2015.05.005

Bhandola, P. (2015). Leveraging change for continuous process improvement. *Pharmaceutical Technology*, *39*(10), 62–68.

Biesenthal, C., & Wilden, R. (2014). Multi-level project governance: Trends and opportunities. *International Journal of Project Management,1*(32), 1291-1308. doi:10.1016/j.ijproman.2014.06.005

Burch V. R. F., Strawderman, L., & Bullington, S. (2016). Global corporation rollout of ruggedized handheld devices: A Lean Six Sigma case study. *Total Quality Management & Business Excellence, 27*(1/2), 1-16. Retrieved from https://doi.org/10.1080/14783363.2014.934521

Burton, T. T. (2011). *Accelerating Lean Six Sigma results: How to achieve improvement excellence in the new economy.* Ft. Lauderdale, FL: J. Ross

Cabanis-Brewin, J. (2014). Government project management offices struggle to prove their value. *Public Manager, 43*(3), 29-30.

Cherrafi, A., Elfezazi, S., Govindan, K., Garza-Reyes, J. A., Benhida, K., & Mokhlis, A. (2017). A framework for the integration of Green and Lean Six Sigma for superior sustainability performance. *International Journal of Production Research*, *55*(15), 4481–4515. Doi. 10.1080/00207543.2016.1266406

De Koning, H., De Mast, J., Does, R. M., Vermaat, T., & Simons, S. (2008). Generic lean six sigma project definitions in financial services. *Quality Management Journal, 15*(4), 32-45.

Dinsmore, P. C. (2000). Positioning the project office: What's your opinion? *PM Network, 14*(8), 28–29. Retrieved from https://www.pmi.org

Fu-Kwun, W., & Kao-Shan, C. (2010). Applying Lean Six Sigma and TRIZ methodology in banking services. *Total Quality Management & Business Excellence, 21*, 301-315. doi:10.1080/14783360903553248

Garland, R. (2009). *Project governance: A practical guide to effective project decision making*. London, England: Kogan Page.

Goldsby, T. J., & Martichenko, R. (2005). *Lean Six Sigma logistics: Strategic development to operational success.* Boca Raton, FL: J. Ross Publishing.

George, M. O. (2010). *The Lean Six Sigma guide to doing more with less: Cut costs, reduce waste, and lower your overhead.* Hoboken, NJ: Wiley.

Grima, P., Marco-Almagro, L., Santiago, S., & Tort-Martorell, X. (2014). Six Sigma: Hints from practice to overcome difficulties. *Total Quality Management & Business Excellence, 25*(3/4), 198-208.

Hill, G. M. (2014). The complete project management office handbook. *Auerbach Publications, 13*(3), 1-623.

Hubbard, D. G., & Bolles, D. L. (2015). PMOs of today and tomorrow. *PM World Journal, 4*(12), 1-16. Retrieved from https://pmworldjournal.com/

Inman, C., & Houston, M. E. (2015). The first 90 days of PMO leadership. *PM World Journal, 4*(12), 1-8. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=116991128&site=eds-live&scope=site.

Joong-Hoon, K., Sung-Hun, P., & Dae-Cheol, K. (2015). Efficiency analysis of project management offices for large-scale information system projects: Insights for construction megaprojects. *Construction Economics & Building, 15*(3), 34-47.

Jung-Lang Cheng. (2017). Improving inventory performance through Lean Six Sigma approaches. *IUP Journal of Operations Management*, *16*(3), 23–38.

Kalashnikov, V., Benita, F., López-Ramos, F., & Hernández-Luna, A. (2017). Bi-objective project portfolio selection in Lean Six Sigma. *International Journal of Production Economics, 18*(6), 81-88. doi:10.1016/j.ijpe.2017.01.015

Khan, A. Z., Skibniewski, M., & Cable, J. H. (2014). A governance framework for managing and engaging project stakeholders. *PM World Journal, 3*(9), 1. Retrieved from https://pmworldjournal.com/

Kovach, J. V., & Borikar, S. (2018). Enhancing financial performance: An application of Lean Six Sigma to reduce insurance claim denials. *Quality Management in Health Care, 27*, 165-171. doi:10.1097/QMH.0000000000000175

Kutsch, E., Ward, J., Hall, M., & Algar, J. (2015). The contribution of the project management office: A balanced scorecard perspective. *Information Systems Management, 32*(2), 105-118.

Majra, H., & Helena, H. (2017). New directions in project management: The rise of project governance. *Project Management Development - Practice & Perspectives*, 112-117.

Miller, R., & Hobbs, B. (2005). Governance regimes for large complex projects. *Project Management Journal, 36*(3), 42-50.

Milosevic, D. & Srivannaboon, S. (2006). A theoretical framework for aligning project management with business strategy. *Project Management Journal, 37*(3), 98–110.

Müller, R. (2009). *Project governance*. Farnham, Surrey, England: Routledge.

Pisani, M. J., Hayes, R., Kumar, A., & Lepisto, L. (2009). Is Six Sigma culture bound? A conceptual model and propositions for further inquiry. T*otal Quality Management & Business Excellence, 20*(10), 1123-1137. https://doi.org/10.1080/14783360903246884

Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK® Guide)* (6th ed.). Newtown Square, PA: Author.

Sarkar, D. (2004). *Lessons in Six Sigma: 72 must-know truths for managers.* New Delhi: Sage Publications.

Schonberger, R. (2008). *Best practices in Lean Six Sigma process improvement: A deeper look*. Hoboken, NJ: Wiley.

Sunder, M. V. (2016). Lean Six Sigma project management – A stakeholder management perspective. *TQM Journal, 28*(1), 132-150. doi:10.1108/TQM-09-2014-0070

Taghizadegan, S. (2006). *Essentials of Lean Six Sigma*. Amsterdam: Butterworth-Heinemann.

Tang, L. C. (2006). *Six Sigma: Advanced tools for black belts and master black belts*. Chichester, England: Wiley. doi:10.1002/0470062002

Tasic, V. (2014). Project management office - Typology and benefits. *Business Informatics / Informatyka Ekonomiczna, 1*(31), 173-182. doi:10.15611/ie.2014.1.14

Timans, W., Ahaus, K., Solingen, R. V., Kumar, M., & Antony, J. (2016). Implementation of continuous improvement based on Lean Six Sigma in small- and medium-sized enterprises. *Total Quality Management & Business Excellence, 27*(3/4), 309-324. https://doi.org/10.1080/14783363.2014.980140

Too, E. G., & Weaver, P. (2014). The management of project management: A conceptual framework for project governance. *International Journal of Project Management,* (32), 1382-1394. doi:10.1016/j.ijproman.2013.07.006