

Analyzing the Project Management Body of Knowledge (PMBOK) Through Theoretical Lenses: A Study to Enhance the PMBOK Through the Project Management Theories

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Abstract

Project management is accepted as a young discipline from an academic point of view, especially when compared with other areas such as economic and strategic management. Project Management Institute first developed a guidebook in 1996, called *A Guide to the Project Management Body of Knowledge*. The guidebook used a systems approach to describe the methods and processes needed to generate the required output within the agreed time, cost, and quality standard. The guidebook, as a practical project management framework, lacks a clear and direct relationship with the schools of thought related to the field. This case study qualitative research used the concepts of five schools of thought (queuing theory, temporary organization theory, leadership theory, resource-based view of the firm theory, and knowledge flow theory) in search of a relationship between the guidebook and the theoretical side of the science. This research identified 32 weak points in the guidebook and recommends solutions to overcome these weak points based on the concepts of the five theoretical schools of thought. These solutions act as a link between the guidebook, as a practical framework, and the five theories, as a theoretical framework. The proposed modifications to the guidebook will enhance the selection of the project manager, the selection of the project team, the power and authority of the project manager, will build a more solid project structure for usage of the learned principles, and will support the organization to better use the project management science to achieve sustainable competitive advantage.

Key words: project management, PMBOK, project management theories, leadership theory, knowledge flow theory, resource based view, temporary organization, queuing theory.

Introduction

Project management is accepted as a young discipline from an academic point of view, especially when compared with other areas such as economic, strategic management and organizational theory (Leybourne, 2007). Projects are different from standard organization processes. In many cases, projects are performed beyond the normal hierarchical lines of authority in the organization, so they require special skills such as leadership, communication, and conflict management (Hanisch & Wald, 2011). One of the most important issues in the project management profession is the development of the solid and explicit theoretical bases for the project management field (Gauthier & Ika, 2012). As a result of the work in the theory development, there are seven schools of thought related to project management field: action in

project, neo-institutional, queuing, knowledge flow, temporary organization, leadership, and resource based (Carden & Egan, 2008).

The PMBOK is a standard that provides the required guidelines to successfully manage a single project (Kerzner, 2009) by describing the methods and processes needed to successfully generate the required output within the agreed time, cost, and quality standard (PMI, 2012). Starting from its first edition until current, the PMBOK provides the knowledge considered to be unique to the project management field, not the complete knowledge necessary to successfully manage a project. This causes weak points in the PMBOK as the book considers all the missing knowledge as prerequisites that should exist before and during the project (Morris, 2013).

Although the PMBOK (as a practical project management framework) is rich and helpful, there are many projects that fail to meet their objectives. According to the PMI pulse of profession report (2015), about 40% of projects failed to achieve the targeted objectives. Over the past four years (2012-2015), many of the findings about how well the organizations are delivering their strategic initiative have remained unchanged (PMI, 2015). The problem appears to not be the tools or application, nor the lack of process. The problem seems to be deeper (Shenhar & Dvir, 2007). According to Lalonde, Bourgault, and Findeli (2010) the relation between the theoretical side and the practical side of the project management field can have four types of relationship:

1. Practice as heuristic, characterized by practice with no associated scientific field.
2. Practices supported by perspective models focus on project management processes and its logical structure.
3. Practices supported by descriptive models focus on human side of the project.
4. Reflective practice and situated theorization challenges the criteria of both the relevance and rigor in project management.

The problem this research sought to address was the lack of a direct and clear relationship (connection) between the PMBOK and five schools of thought related to the project management field: queuing theory, knowledge flow theory, temporary organization theory, leadership theory, and resource based view of the firm theory (RBV) (Carden & Egan, 2008). This research used the concepts of the five schools of thought in searching for a relationship between the PMBOK and these five schools of thought to propose a solution to the weak points in the PMBOK.

This research tried to determine the weak points in the PMBOK and suggests a group of ideas to enhance and improve these weak points based on the concepts of the five schools of thought. These ideas act as the link (connection) between the PMBOK (as a practical framework) and the five schools of thought (as a theoretical framework). For example, the leadership theory focus on the transformational and transactional leadership skills while there is nothing related to these concepts in the PMBOK. Also, the PMBOK does not contain a proper information related to concepts of knowledge flow theory.

Significance of the Study

This research aimed to participate in the development of building a stronger relationship between the theoretical side and the practical side of project management by studying the PMBOK, as a practical project management framework, and seeking links to the five schools of thought of project management in order to enhance the framework through concepts presented. The proposed enhancement to the PMBOK as a practical project management framework would support the project-intensive industries such as: information services, oil and gas, construction, manufacturing, business services, finance, and insurance (PMI, 2013). The Project management field is vulnerable to criticism for not having a full solid theoretical background (Carden& Egan, 2008). Focusing only on the practical side of the project management field and seeing the project management only as a tool to complete finite pieces of work within certain time, budget and scope will turn the project managers as an actor to implement the project work and limit their role to the issues of control (Cicmil & Hodgson, 2006), which will neglect several important issues such as: the role of the project manager as a project leader, the social interaction between the project team members and the role of the project management as an intangible asset within the organization that enables the organization to achieve its strategic objective.

Research Methodology

The research methodology used was qualitative and the approach was case study. The case study qualitative research enabled the researcher to study and to focus on a single event, process, and person (Creswell, 2014; Saldana, 2011). The qualitative approach was selected because there was no need for result generalization (Sun, 2009). The objective was to go behind the numerical and statistical analysis and achieve a deeper understanding about the PMBOK and how to use the five schools of thought to enhance and overcome the weak points.

Data sources and collection for this research included interview and document analysis (Aziz, 2013). The interview enabled the participants to share their ideas and experience and have in-depth answers that focused on the participants' experiences and opinions as related to the research topic (Murtezaj, 2011). Document analysis provided the opportunity to review documents, such as research papers and books, related to the project management theories and the five schools of thought.

The participants in the interview included: project managers, program managers, project management office managers, and project management consultants (16 practitioners). Most of these participants are living in Egypt and working in the project management field in different industries such as: Information Technology (IT), oil and gas, construction, and university professors (6 professors). The interviews with the participant who live in Egypt were in person interviews. The interviews with the participants who live outside Egypt (the home country of the researcher) were through online meeting tools such as Skype. There were 17 face-to-face interviews and 5 online meetings through Skype.

This research focused on the following main research question:

- R₁: How does research into the five schools of thought connect to the PMBOK?

This research question has the following sub-questions:

- R_{1a}: How does connecting the five schools of thought to PMBOK influence the perceptions of project managers about achieving project success?
- R_{1b}: What adjustments (or changes) should be made to the PMBOK to incorporate the research?

Project Management: Theoretical or Practical Field of Study

The project management field can be seen as a field of practice that emerged through the conversation, writing, and collaborative activities between professional practitioners, consultant, and academics (Crawford, 2006). As project management evolves in this way, there is debate about the nature of the field. From the theoretical point of view, the project management field lacks the theoretical foundation, while the practitioners claiming the discussion about the field is too theoretical. In many cases it cannot be applied in the practical life (Crawford, 2006). Most of the project management knowledge is based on the practitioner-driven normative approach (Jugdev, 2004). According to (Leybourne, 2007) there are three knowledge mode, Mode1, Mode2 and Mode3. Mode1 is the traditional scientific approach to knowledge creation, it is more concerned with a theoretical contextualization of how the world works (Leybourne, 2007). On the other hand, Mode 2 is less concerned with discipline base, it can be described as transdisciplinary and is concerned with knowledge as it works in practice, Mode 3 is seen as a composite Mode (Leybourne, 2007). Project management can be seen as Mode 2 knowledge, which is less concerned with discipline base and is concerned with knowledge as it works in practice in the context of application and how this knowledge could be applied by the practitioners to assist them in their contribution to achieve the organization requirements (Leybourne, 2007). The project management field suffers from not having a solid single accepted theory or paradigm that leads the research (Shenhar & Dvir, 2007) leaving it vulnerable to criticism for not having a fully established theoretical background (Carden & Egan, 2008). Lacking of this theoretical background negatively affects the project management field as follows:

- Lalonde, Bourgault, and Findeli (2010) showed there is no solid link between the theoretical side of the science and the practical implementation of project management.
- Project management is considered only as a tool to execute certain groups of activities. Project managers are only considered as implementers with a role of executing the project governance by using project control (cost and time) and project content (scope) (Cicmil & Hodgson, 2006).

Five Schools of Thought

This section illustrates the five schools of thought used in this research to enhance the usage of the PMBOK as a practical framework for managing a single project. The five schools of thought are: leadership, knowledge flow, resource-based view of the firm, temporary organization, and queuing.

Leadership theory

The word “leadership” has many definitions (Anca, 2014). Most researchers define leadership based on their individual perspective and the aspects of the phenomena under study (Yukl, 2010). Tyssen, Wald, and Spieth (2013) defined leadership as, “the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organization.” Other definitions of leadership include, “the process of influencing the activities of an organized group toward goal achievement” and “the ability to step outside the culture . . . to start evolutionary change processes that are more adaptive” (Yukl, 2010). The core of these definitions is the relationship between the leaders and the followers and the influence process (Tyssen et al., 2013). Over the past 75 years, six schools of thought on leadership have evolved (Muller & Turner, 2007). Table 1 illustrates these modern six leadership schools.

Table 1
Six Modern Schools of Thought on Leadership

Period	School of Thought	Main idea
1930s - 1940s	Trait	Effective leaders show common traits, leaders born not made
1940s-1950s	Behavior or style	Effective leaders adopt certain styles or behaviors. Leadership skills can be developed
1960s - 1970s	Contingency	What makes an effective leader depends on the situation
1980s - 1990s	Visionary or charismatic	Transformational: concern for relationships Transactional: concern for process
2000s	Emotional intelligence	Emotional intelligence has a greater impact on performance than intellect

2000s	Competency	Effective leaders exhibit certain competencies, including traits, behaviors and styles. Emotions, process, intellect. Different profiles of competence better in different situations
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Source: Muller & Turner (2007)

Resource based view of the firm theory (RBV)

The RBV is one of the most widely accepted theoretical perspectives in the strategic management field (Newbert, 2007). Barney's (1991) work can be seen as the first formalization of the resource-based literature into a comprehensive theoretical framework (Newbert, 2008). The two main assumptions made by Barney were: firm resources and capabilities are heterogeneously distributed among firms, and resources and capabilities are imperfectly immobile (Brahma & Chakraborty, 2011). In contrast to the industry view, which looks to the marketplace to help the firms determine the areas they want to compete, the RBV underscores the need for a balanced approach to competitive advantage involving a firm's strengths and weaknesses, along with industry components. The firm's performance depends on factors external to the firm, such as macro-economic environment, and internal factors, such as firm internal assets and management practices (Jugdev, 2004).

According to Coleman, Cotei, and Farhat (2013) a key element with the RBV theory is the heterogeneous nature of the firm resources and capabilities. All the resources within the organization can be classified into tangible and intangible resources. Tangible resources may include: physical resources (tools, machines, production facilities), financial resources, and technological resources. Intangible resources may include: capacity to innovate, capacity to provide leadership, reputation of the firm, and human and qualities of individual staff (White, 2004). The organization capability is a complex combination between assets, people, and processes organizations use to transform inputs to outputs (Jugdev, 2004).

In order for any firm to compete in the market, its resources should have the following four attributes: valuable, rare, inimitable, and organizational focus (Newbert, 2007). The resources, which satisfy these four attributes, are considered to be strategic resources, or strategic assets, meaning the resources have a strategic value (White, 2004). Strategic resources are unique to the firm and signify complex high order interaction between resources, processes, and knowledge (Jugdev, 2004).

Temporary organization theory

Temporary organization (TO) can be defined as an organized course of action aimed at evoking non-routine process, completing a non-routine product (Packendorff, 1995). As illustrated by

Kenis, Panjaitan, and Cambre (2009), TO is formed for the purpose of a pre-determined task that has a pre-determined termination point. The TO can be intra-organizational, occurring within existing permanent organization, or inter-organizational as a joint collaboration between a number of existing organizations (Kenis et al., 2009). Within the temporary organization, the individuals usually setup for a limited period of time in order to work in the task set (Tyssen et al., 2013). An attribute to the TO are the goals are usually predefined and the team is often isolated from the environment (Packendorff, 1995).

The project by nature is temporary and will be terminated once it achieves its objective (Kerzner, 2009), TO provides the opportunity to answer questions such as: How organizational actions and those of their members are affected when the intention of existing for eternity no longer holds. Temporary Organization identifies the project management practitioners (such as project managers) to assess how the expectations of limited duration affects the interaction and collaboration between the team within the project (Kenis et al., 2009).

Knowledge flow theory

Finding a single and unique definition for knowledge management can be difficult as there are more than 100 definitions (Dalkir, 2005). Knowledge can be defined as, “what comes to believe and value based on experience, communication, or inference” (Reich & Wee, 2006). According to Kivrak, Arslan, Dikmen, and Birgonul (2008) knowledge is, “a fluid mix of framed experience, values, contextual information, and expert insight.”

Knowledge management is the process of creating value from an organization's intangible assets. Another definition is knowledge management deals with creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge (Kivrak et al., 2008).

In management literature knowledge can be divided into different categories, one of these categories is to classify the knowledge into tacit knowledge and explicit knowledge (Koskinen, 2004). Tacit knowledge is difficult to express and define, subconsciously understood and applied, developed from direct experience, and shared through highly interactive conversation. Conversely, explicit knowledge can be more precisely and formally articulated. It can be more easily codified, documented, transferred, or shared (Reich & Wee, 2006).

Knowledge can be seen as something capable to be shared, transferred, and socially created (Nissen, 2006). Knowledge flow is the movement of knowledge across people, organization, places, and time (Nissen, 2006). Knowledge flows according to three perspectives:

1. Knowledge, as solution, focuses on the real time movement of the knowledge between the people seeking to solve certain problems (Snider & Nissen, 2003).
2. Knowledge, as experience, focuses on the recording and storing of the knowledge for future use. Knowledge flow is done across the time rather than across people or organizations as per the knowledge as solution perspective (Snider & Nissen, 2003).

3. Knowledge, as socially created, sees the knowledge as a result of interaction and collaboration between the people in problematic situations.

Queuing theory

Queuing theory is the study of random events and waiting lines (Yates, 2006). Any organization is trying to minimize the total waiting cost and the cost of providing service to their customers (Obamiro, 2010). Figure 1 illustrates the main components of the queuing system.

There are four components in the queuing system:

1. System represents all the components under analysis and is the houses of the queue and the service station (server).
2. Arrivals enter the system at random intervals. From project management perspective the arrivals can be presented by the activities or the work packages, in queuing theory the arrivals are expressed in two ways: the mean rate of arrival, the number of arrivals per unit of time, or the mean interarrival time, the mean time between arrivals.
3. Queue represents arrivals waiting in line before they are served.
4. Service station, or the server, represents the person (or machine) that serve the arrivals. An arrival leaves the queue the moment the server begins service, the service duration is called service time (Yates, 2006).

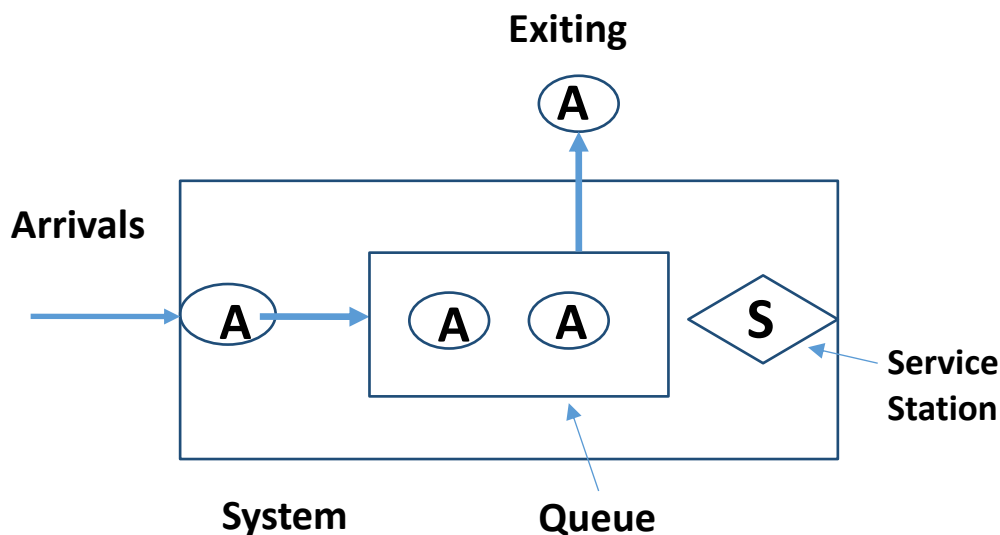


Figure 1. The basic components of the queuing system. Source: Yates (2006).

Achieving successful project management activities depends mainly on the selection of the project team and their capabilities to perform the project work (Kerzner, 2009). One of the main issues the project manager faces is negotiation with the functional managers (line managers) to select the most suitable resources for the project (Kerzner, 2009). The problem of resource allocation becomes more complicated if the organization runs multiple projects at the same time, which all require the same resources (Levy & Globerson, 1997). The allocation of resources does

not appear only in the case of having multiple projects, it also appears in the large and complex projects that include multiple phases (Levy & Globerson, 1997).

Each phase can be seen and handled as a separate project. The queuing phenomena of waiting work packages and idle resources includes three types of costs:

1. Waiting cost refers to if a critical work package is delayed for one day (as an example) as a result of waiting in line, the project will be delayed by the same amount of time (one day), meaning there will be an extra cost the performing organization will have to pay it as a result (Levy & Globerson, 1997).
2. The underutilization cost, in case of workload of certain resources (such as team members), is below the capacity of the resource, the cost of inefficient use of this resource is then borne by the organization (Levy & Globerson, 1997).
3. Delayed projects cost includes penalties such as cost of delayed deliverables, loss of reputation, and loss of marketing opportunities (Levy & Globerson, 1997).

Figure 2 illustrates the relationship between the waiting cost and the underutilization cost.

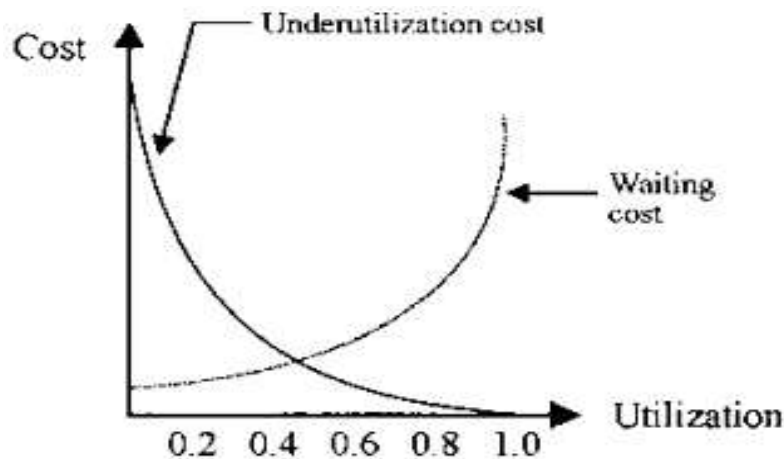


Figure 2. Waiting cost and underutilization cost. Source: Pennypacker & Dye (2002).

Analysis and Presentation of Results

As a result of reviewing the PMBOK, PMI publications (such as PMJ, pulse of profession), books and research papers related to the project management field and the five theories, the researcher identified a list of weak points in the PMBOK. This list presented to the research participants (the university professors group and project management practitioners group) to provide their point of views and opinions regarding the identified weak points. During the meeting the participants added comments about some weak points and also identify new weak points in the PMBOK that

were not identified by the researcher. Table 2 illustrates the identified weak points and the proposed solution by adding one or more theory to the PMBOK.

Table 2

List of identified weak points and the proposed solution

Serial	Weak Point ID	Weak Point	PMBOK Section	Proposed Solution (Adding theory(s) to the PMBOK)
1	1.1	The PMBOK does not provide all the knowledge needed to manage a single project, but it identifies only that subset of the project management body of knowledge recognized as good practice.	Introduction.	leadership theory, TO theory, knowledge flow theory, RBV, and queuing theory
2	1.2	The PMBOK does not provide sufficient information about how to handle the project if it contains different organizations	Introduction.	TO theory
3	1.3	The PMBOK relates the success of the project to only four factors: the time, the cost, product and project quality, and customer satisfaction (PMI, 2012). Other factors such as: benefits, added business value, and how the project participates in implementing the organization strategy are not presented in the PMBOK in a proper way.	Introduction.	RBV theory
4	1.4	The PMBOK uses the concept of project-based organization to create a temporary system within the organization without providing any guide or information about the nature of this system.	Introduction.	TO theory

5	1.5	The PMBOK introduces the concept of business value, but it does not provide clear information about the role of the project manager in enhancing and achieving the business value. The PMBOK does not show how to continuously link the project to the strategic objectives of the organization and continuously ensure the realization of the required benefit.	Introduction.	RBV theory and knowledge flow theory
6	2.1	The PMBOK does not provide proper information about factors that may affect the project performance and its success such as: organization maturity level in applying project management concepts, the relationship between the organizations involved in the project, and the project management information system that could be used to manage the project.	Organizational Influences and Project Life Cycle	Knowledge flow theory, leadership theory, and TO theory.
7	3.1	The PMBOK does not provide a clear guide about how to select the most suitable processes, out of the total 47 processes	Project Management Processes	Knowledge flow theory
8	3.2	The PMBOK does not provide a proper information about the product-oriented processes	Project Management Processes	RVB theory
9	4.1	The develop project charter process does not provide any guidance about how to select the project manager	Project Integration Management	leadership theory
10	4.2	Develop project charter contains nothing about how the project manager will ensure the benefit realization throughout the project life cycle	Project Integration Management	Knowledge flow theory and RBV theory
11	4.3	All the processes within the project integration management knowledge area have nothing related to the knowledge flow theory or knowledge management	Project Integration Management	Knowledge flow theory

concepts

12	5.1	All the processes within the project scope management have nothing related to the knowledge flow theory, or knowledge management concepts, and who is the most suitable team to perform the processes of this knowledge area.	Project Scope Management	Knowledge flow theory and leadership
13	6.1	The section lacks the concepts of knowledge management and knowledge flow theory	Project Time Management	Knowledge flow theory
14	6.2	There is no proper information in the PMBOK about how to include resource utilization to calculate activity duration and the required resources	Project Time Management	Queuing theory, knowledge flow theory, and RBV theory
15	7.1	The cost management knowledge area has nothing related to knowledge management and knowledge flow theory	Project Cost Management	knowledge flow theory
16	7.2	The Section has nothing related to the queuing theory and how to use it to minimize the waiting line cost, underutilization cost, and delayed project cost.	Project Cost Management	queuing theory
17	8.1	The quality knowledge area does not provide a proper guide to the project manager regarding how to enhance and improve the project and product processes used during the project	Project Quality Management	RBV theory
18	8.2	The quality management knowledge area does not provide proper information about knowledge management concepts and knowledge flow theory	Project Quality Management	Knowledge flow theory

19	9.1	The knowledge area does not provide proper information about the leadership skills of the project team and how the project manager can select the most suitable team members according to their technical and non-technical skills	Project Human Resource Management	Leadership theory
20	9.2	The PMBOK does not address how the attitude, behavior, and the performance of the project team will change near the end of the project and how the temporary nature of the project affects the behavior and attitude of the project team	Project Human Resource Management	Leadership theory and TO theory
21	9.3	This knowledge area has nothing related to the usage of knowledge management and knowledge flow theory	Project Human Resource Management	Knowledge flow theory
22	9.4	There is no proper information about how to decrease the conflict between the project manager and the functional managers regarding how and when the resources will be available for the project	Project Human Resource Management	TO theory
23	9.5	The PMBOK does not give any guidance about the ultimate goal of enhancing the skills and competencies of the project team	Project Human Resource Management	RBV theory
24	10.1	The PMBOK focuses on explicit knowledge and does not give the same focus to tacit knowledge. The PMBOK does not provide proper guidance about how to classify the project knowledge.	Project Communication Management	Knowledge flow theory
25	10.2	The PMBOK does not address, in clear and proper way, the issue of international projects and how to manage the communication between the team and with the project stakeholders in international projects.	Project Communication Management	Knowledge flow theory, leadership theory

26	11.1	The risk management knowledge area, like all the other knowledge areas in the PMBOK, has nothing related to the knowledge management.	Project Risk Management	Knowledge flow theory
27	11.2	The PMBOK does not illustrate that project risk management activities may differ according to the project type, size and complexity, and risk level.	Project Risk Management	Knowledge flow theory, leadership theory
28	12.1	The PMBOK did does not provide a clear guidance regarding how to develop the contract, nor how to control and administer the contract.	Project Procurement Management	Knowledge flow theory
29	12.2	The procurement management knowledge area has nothing related to the knowledge management.	Project Procurement Management	Knowledge flow theory
30	12.3	The knowledge area did does not illustrate, in an adequate way, how to manage an international projects.	Project Procurement Management	Knowledge flow theory, leadership theory, and TO theory
31	13.1	The PMBOK does not illustrate management-of-stakeholders and management-for-stakeholders approaches in clear and proper way.	Project Stakeholder Management	leadership theory. Adding the concept of stakeholder management theory to the PMBOK will support to overcome this weak point. This theory is out of the scope of the this research study.
32	13.2	The stakeholder management knowledge area has nothing related to the knowledge management	Project Stakeholder Management	Knowledge flow theory

Discussion of the Results

This section provides a discussion of the results and links these results to the previous research related to each school of thought, and how it links to project management field.

The knowledge flow theory is the most suggested theory to remedy the weak points in the PMBOK, as it appears 22 times as a proposed solution, this indicates the PMBOK is lacking a proper presentation of this theory’s concepts, such as: the concept of tacit knowledge, how the project manager should use tacit knowledge during the project, the difference between strategic knowledge and operation knowledge, and how to use both strategic and operation knowledge. The PMBOK does not properly illustrate how to capture and use the knowledge generated from performing the project management processes in each knowledge area. The PMBOK shows a strong bias toward explicit knowledge (the “how”) and less attention to the tacit (the “why”) (Reich & Wee, 2006).

According to a report issued by PMI in March 2015 entitled *Pulse of the profession: Capturing the value of project management through knowledge transfer* (PMI, 2015), the organizations most effective at knowledge transfer improve project outcomes by nearly 35%. The PMBOK does not contain proper guidance about how to apply the concept of the knowledge flow in order to enhance the project performance. Figure 3 shows how effective knowledge transfer improves project performance, and shows the difference between the most effective and least effective organization in knowledge transfer.

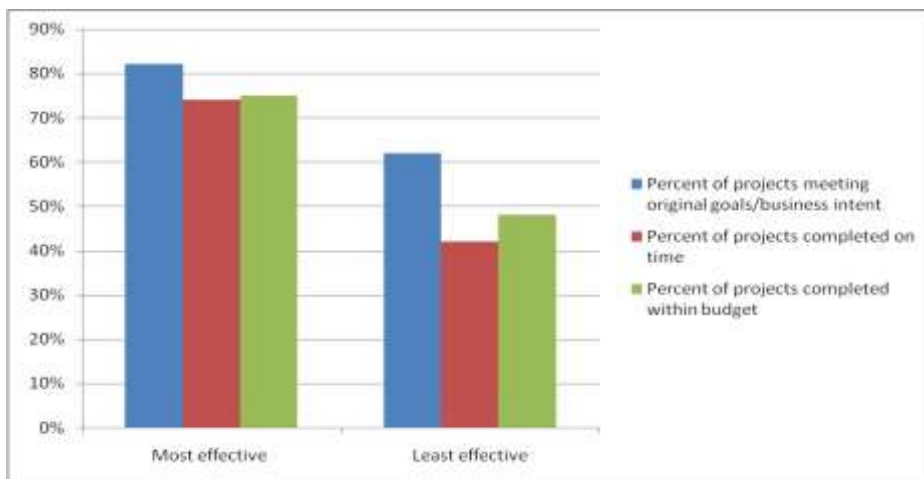


Figure 3. How effective knowledge transfer improves project performance. Source: PMI (2015).

Table 3: OPA in Input and Output Lists

Section name	OPA appears in the input list	OPA appears in the output list
Integration management	6	1
Scope management	4	1
Time management	7	1
Cost management	4	1
Quality management	2	2

Human resource management	3	1
Communication management	3	2
Risk management	4	1
Procurement management	2	2
Stakeholder management	3	2
Total	38	14
Percentage	80.8 %	29.8 %

Table 3 shows the OPA, which includes lessons learned, appears in most of the processes as a part of the inputs while it appears in only 14 processes as an output. This indicates the PMBOK does not give proper attention to update the lessons learned, and the concepts of project-based learning are not properly noted in the PMBOK. The PMBOK uses the responsibility assignment matrix (illustrates the responsibility of each team member) and the project staff assignment (confirms the availability of the team member) to apply the concepts related to the knowledge map model. This means the PMBOK applies this model in only two processes out of 47 (Reich & Wee, 2006). The concepts of cognitive collaboration appear only through two tools and techniques: team building activities and conflict management, and through only one document, the Issue log (Reich & Wee, 2006).

Leadership theory appears as a proposed solution for nine weak points. Most of the interviewees agreed there is a strong need to introduce the leadership theory into the PMBOK in order to enhance the project manager capabilities to successfully manage the project, and to interact with the project team. The PMBOK refers to leadership skills as a part of the interpersonal skills of the project manager. Appendix X3 illustrates the important interpersonal skills needed of the project manager (PMI, 2012). Appendix X3 provides a small definition of leadership without any detailed information about the theoretical side, nor the theories related to leadership, and how the project manager and the project management team could apply these theories during the project, especially in the case of international projects where factors such as culture differences and language differences are of great importance (Grisham, 2011).

The PMBOK addresses in just a few lines the issue of different culture, language, and industry experience, however, these few lines are not sufficient enough to provide the project manager with a proper guide about the importance of leadership and its impact on the project performance, especially in international projects. The PMBOK does not address how the temporary nature of a project poses a specific challenge to leadership, which is because long-established leadership styles and approaches might not work in temporary settings (Tyssen et al., 2013). The PMBOK does not illustrate, even in the appendix, the six schools of thought related to leadership. The

PMBOK also does not illustrate how the project manager could benefit from these theories in order to enhance methods of handling and managing the project team.

Turner and Muller (2005) investigated the relationship between the project manager leadership style and the project success. Geoghegan and Dulewicz (2008) showed there is a statistical relationship between the project manager's leadership and the project success. In the IT projects, the nontechnical leadership practices are important to the project success (Kaminsky, 2012). Another study by Muller and Turner (2007) showed the project manager's leadership style influences project success and different leadership styles are appropriate for different types of project.

Resource based view theory appears as a proposed solution (or part of the solution) to nine weak points in the PMBOK. Resource based view theory, however, is mainly concerned with the internal resources, both tangible and intangible resources, of the organization and sees these resources as a main source of achieving sustained competitive advantage (Jugdev & Mathur, 2006). Resource based view appears in PMBOK as a proposed solution in the weak points related to the project resources. The main target of using this theory is to illustrate how the project manager could use the concepts of RBV theory to transform the project resources into strategic resources that are part of achieving a sustained competitive advantage for the performing organization.

The PMBOK illustrates the importance of using project management as a tool to implement the organization strategy (PMI, 2012). Organizational project management is a strategy execution framework that utilizes project, program, and portfolio management to consistently achieve sustainable competitive advantages (PMI, 2012). The RBV theory will allow the project manager to deal with project resources as a source of competitive advantages (Mathur et al., 2013).

The develop project team process, the third process in the human resource knowledge area, focuses on enhancing the skills and competencies of the project team, motivating them to enhance the project performance (PMI, 2012). The process does not properly illustrate how the project team (as a part of the organization resources) could be turned into strategic assets by being a valuable, rare, inimitable, and organizational focus. The addition of the RBV theory to the PMBOK would encourage project managers to think more strategically not only to focus on satisfying the time, cost, and scope constraints of the project.

Although the PMBOK asks the project manager to develop a process improvement plan (as a part of the output list of plan quality management) to enhance the project management processes and product oriented processes, the PMBOK does not provide clear guidance about how to achieve this target. The addition of RBV theory to the quality management knowledge area would encourage the project manager to consider project management and product oriented processes as a part of an organization's intangible resources. The addition also would promote the project management as being more valuable to a company in the sense that project managers can exploit opportunities and/or neutralize threats within the organization's environment. This is an

advantage, which is rare among current and potential competitors, and is imperfectly imitable, and provides organizational support (Barney & Clark, 2007). The addition of RBV would encourage the organization to consider the project management capability as a source of achieving sustainable competitive advantages (Jugdev & Mathur, 2006).

Temporary organization theory appears as a solution (or part of the solution) for seven weak points in the PMBOK. Temporary organization theory appears in the weak points that could be classified into three categories: handling the relationship between the project manager and the functional manager, the power and authority of the project manager, and the impact of the temporary nature of the project on the performance and behavior of the project team.

In TO literature, there are two types of temporary organization: intra-organizational form and inter-organizational form (Kenis et al., 2009). The intra-organizational type appears as temporary organization within the performing organization and the inter-organizational type exists when the project is created as a result of joint collaboration between more than one organization (Packendorff, 1995). Although the PMBOK uses the term "Project-based organization" to refer to the TO, it does not illustrate this concept in a proper way and does not illustrate how the performing organization can create this temporary system. The PMBOK does not differentiate between creating the project as internal project (intra-organizational TO) and external project, which involves more than one organization (inter-organizational TO). According to the discussion with the interviewee (especially the project management practitioners), the interaction between the involved parties in the project needs to have more focus in the PMBOK rather than just handling each one of them as a separate stakeholder. Factors, such as the impact of the limited duration of the project on the behavior and the authority of each party, should be addressed in a more clear and proper way.

The conflict between the project manager and the functional manager mainly revolves about items such as the priority of project work, cost of the resources, and the availability of the resources to work in the project (Kerzner, 2009). By introducing the concepts of TO in the PMBOK, and seeing the project manager as the chief executive officer of this new temporary organization, the project manager would be provided with more power and authority to handle the project and solve the conflict with the functional managers, especially if the project is performed in functional and weak matrix organization.

The PMBOK does not properly illustrate, in any knowledge area, how the temporary nature of the project would affect the performance of the processes within each knowledge area. The project manager needs to take into consideration factors such as in the temporary system, project team members tend to focus on the present more than on the past and future and team members are less entrained to cycles in the environment (Kenis et al., 2009).

Queuing theory appears as a solution for only three weak points in the PMBOK. Queuing theory is mainly related to the time and cost management knowledge areas. The main idea behind using this theory is to draw the attention of the project manager to consider the utilization of the project

resources when performing the following processes: estimating activity resource, estimating activity duration, and estimating cost. Adding the QT to the PMBOK as part of the time and cost management knowledge areas would enable the project manager, from the researcher’s point of view, to consider the following points:

1. the impact of the waiting line cost, underutilization cost, and project delayed cost (the three types of cost defined in the QT) on the total budget of the project in order to manage the cost in more efficient way;
2. the resource utilization when analyzing any change request that may affect the assigned tasks to each resources;
3. in the case the project is part of a program or portfolio, the QT would enable the project manager to address the impact of waiting line cost, underutilization cost, and project delayed cost on the performance of the program and/or the portfolio; and
4. the QT would enable the project manager to take into account the resource utilization when developing the project funding requirement.

Conclusions and Practical Recommendations

The PMBOK depends mainly on two fundamental assumptions: (a) the project objectives are clear when starting the project and given by the top management, and (b) the means used to reach the project objectives are identifiable and plannable. Although the PMBOK illustrates the project management processes, it does not illustrate, in a clear and proper way, how to perform each process and what the logic and theoretical background behind performing each process and using certain tools. Figure 4 illustrates how the knowledge and information presented in the PMBOK could be classified (from the researchers’ point of view).

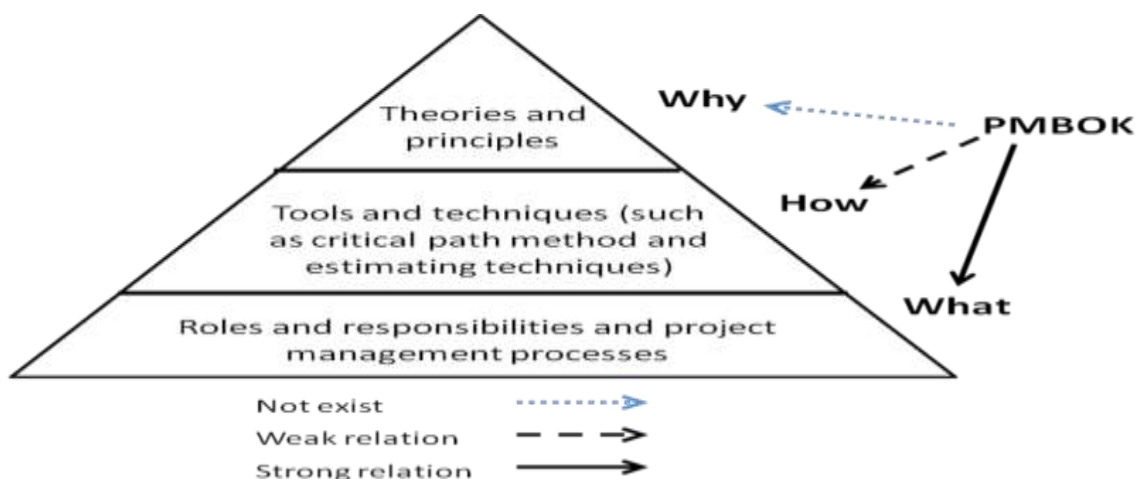


Figure 4. Classification of knowledge and information in the PMBOK.

Why the five theories required to be presented in the PMBOK?.

Knowledge flow theory

Knowledge flow theory concerns concepts related to creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge (Kivrak et al., 2008). This theory will provide the project manager, and the project management team, with information about concepts such as, tacit knowledge, explicit knowledge, strategic knowledge, and operational knowledge. The knowledge that is specific for certain projects, the knowledge that is related to the industry, and the knowledge that is related to the organization. This theory would enable the project management practitioners to more effectively utilize the historical information of the previous projects throughout the project. In turn, the theory would support the project manager to manage the project team, communicate with the project stakeholders, and implement the 47 processes of the project management. Adding the concepts of the knowledge flow theory would enable the organization to create the environment and the atmosphere within that enables the team to interact with each other and to share and exchange their knowledge (mainly the tacit knowledge). The concepts of the knowledge flow theory would enable all the stakeholders to use their skills and experience throughout the project life cycle.

Leadership theory

The PMBOK does not provide any information about how to select the most appropriate project manager for certain projects. The PMBOK also does not illustrate in, a clear and proper way, how the leadership skills should be considered as an important factor when the project manager selects the project team members. Adding the concepts related to the leadership theory, would help to illustrate the different leadership schools of thought and how the leadership skills of the project manager and the team members would affect the project performance. All of these concepts would enable the organization to have a solid base, select the project manager, and support the project manager to select the most suitable project team. The leadership theory would enable the project manager to work more effectively on international projects. The concepts of the leadership theory would provide an opportunity to take into account the non-technical skills of the project team when selecting them for certain projects. Adding the concepts of leadership theory would move the PMBOK away from considering the project management, just as a system that should deliver certain output to give more attention to the social science within the project management context.

Resource based view of the firm theory

Project management is used as a part of an organizational project management framework to implement the organization strategy (PMI, 2012). The organization uses its internal resources (tangible and intangible resources) to execute and implement its strategy (Jugdev, 2004). Adding the resource based view of the firm theory would enable the project manager to know how to turn

the project resources into strategic resources to contribute in achieving a sustainable competitive advantages for the organization. Adding the concepts of RBV to the PMBOK would enable the organization to differentiate between project management successes, which could be achieved through satisfying the time, cost, and scope constraints and project success, which is related more to determining to what level the project is able to achieve (or contribute to achieve) the strategic objectives of the organization, adding the RBV concepts to the PMBOK, would move the project management from considered simply as a machine that produces a certain output to be a more valuable asset within the organization.

Temporary organization theory

Recalling the definitions of temporary organization from Chapter 2, TO can be defined as an organized course of action aimed at evoking non-routine process, completing a non-routine product (Packendorff, 1995). As illustrated by Kenis, Panjaitan, and Cambre (2009), TO is formed for the purpose of a pre-determined task with a pre-determined termination point. This definition of TO indicates a high level of similarity between the definition of the project (as per the PMBOK) and temporary organization. Handling the project as temporary organization and considering the project manager as the chief executive officer of a newly created organization would (a) enhance the power and authority of the project manager, (b) enable the project manager to predict the behavior of the project team during the different phases of the project, and (c) support the organization in solving the conflict between the project manager and the functional managers, especially in the functional and weak matrix organization structure. The "transition" concept in the TO would support the project manager and the project management team to overcome the inertia founded in the permanent organization and move the organization from the "before" state (the state of the organization before performing the project) to "after" state (the state of the organization after performing the project) (Lundin & Soderholm, 1995). Adding the concepts of the TO to the PMBOK would contribute in building a clear and solid project structure, improve the team loyalty to the project, and enhance the communication between the project team.

Queuing theory

Adding the concepts of the queuing theory to the PMBOK would enable the project manager to consider the concepts of this theory during estimating the required duration, resources, and cost to complete the project enabling the project manager to determine the most appropriate resource utilization percentage in order to minimize the waiting line cost, underutilization cost, and delayed project cost (Levy & Globerson, 1997). Adding the queuing theory to the PMBOK would provide a chance for the project manager to focus more on the impact of his/her project on the other related projects, especially if the project is part of program.

Recommended Modifications to the PMBOK

Based on the review of the PMBOK, papers and articles related to the project management field, and discussions with the practitioners and PhD holders, the following are the proposed ideas to overcome the identified weak points in the PMBOK.

Project knowledge management

This is a recommendation to create a new knowledge area in the PMBOK, named Project Knowledge Management. This knowledge area would be based on the concepts of the knowledge flow theory and the concepts of knowledge management science. This new knowledge area would solve all the weak points related to missing a proper presentation of the knowledge management concepts in current 10 knowledge areas in the PMBOK. A brief introduction about knowledge flow theory could be added to the first section in the PMBOK to indicate what theories are included in the book. This new knowledge area would provide the project manager and the project management team with information, tools, and techniques needed to successfully create, secure, capture, coordinate, combine, retrieve, and distribute the project knowledge. Knowledge is the most valuable asset within an organization (PMI, 2015), and the flow of the knowledge within the project is like the flow of the blood within the human body. Adding the concepts of the knowledge flow theory through this new knowledge area would enable the project manager, and the project management team to know better (a) how and why certain tools could be used when performing certain project management process, (b) how to perform the 47 project management processes presented in the PMBOK, and (c) how to customize the implementation of the 47 project management processes according to the type, size, complexity, level of risk and uncertainty, and importance of the project to the organization. This knowledge area would contain the following parts:

1. Introduction: This part of the knowledge area would contain the main concepts related to the knowledge flow theory and knowledge management concepts, and provides the project manager with the required information to enable him/her to effectively perform the four proposed processes of this knowledge area. The introduction part would include information such as:
 - a. Definition of knowledge and knowledge management.
 - b. Importance of knowledge management and its relation to project management.
 - c. Knowledge management life cycle and models
 - d. Classification of knowledge, such as tacit knowledge, explicit knowledge, strategic knowledge and operation knowledge.
2. Plan knowledge management process in the planning process group: This process would be the planning process of the knowledge area. The main objective of this process would be to develop the knowledge management plan that will guide the project manager

throughout the project to perform the knowledge management related activities. This plan is part of the project management plan.

3. Manage project knowledge in the executing process group: In this process the project manager would be guided in implementing the knowledge management plan and in performing all the identified knowledge management activities in order to effectively create, secure, capture, coordinate, combine, retrieve, and distribute the project knowledge.
4. Control project knowledge in the monitoring and controlling process group: This process would focus on monitoring and controlling the implementation of the knowledge management activities throughout the project lifecycle. It would guide the project manager and the project management team through any needed corrective and /or preventive actions regarding the implementation of the project knowledge management activities.
5. Close project knowledge in the closing process group: This process would finalize all the knowledge management related activities and guide how to generate the final lesson learned reports that describe how the knowledge management activities were performed during the project and what should be enhanced in future projects.

Update to the first section in the PMBOK (Introduction)

This is a recommendation to update the first Section in the PMBOK by adding a brief introduction about the five theories and more detailed information about the concepts of the temporary organization theory. The PMBOK provides a clear and proper illustration about the nature of the project and its structure and defines the project as a temporary endeavor undertaken to create product, service, or result (PMI, 2012). This definition views the project as simply a group of activities that should be done in order to produce certain output. The definition should be enhanced to take into consideration the impact, and effect, of the project team (Turner & Muller, 2003). The PMBOK lacks a clear and proper illustration of what should be the structure of the project and the relation between the involved parties (stakeholders) in this new organization. Introducing the concepts of the temporary organization would help to overcome this weak point.

Adding the concepts of the leadership theory, and illustrating the six leadership schools (trait, behavior, contingency, visionary or charismatic, emotional intelligence, and competency), would enable the project management practitioners to understand (a) how to lead and manage the project team in more effective way, (b) the behavior of the team and how this behavior may change from phase to phase, and (c) how to select the most suitable team member(s) to perform certain activities based on their technical and non-technical skills.

Adding the concepts of resource base view of the firm theory to the PMBOK would provide a clear answer to the question pertaining to why the project manager needs to enhance and improve the project resources (including human resource, non-human resource, tangible resources, and

intangible resources). Adding the RBV theory would enable the performing organization to use the project management as a way to achieve sustainable competitive advantages.

Update develop project charter process

This is a recommendation to update the Develop Project Charter Process in the Project Integration Management Knowledge area by adding the leadership theory and temporary organization theory to the tools and techniques, listed in order, to achieve the following:

1. Project manager selection: The PMBOK does not contain a clear and proper guide about how to select the suitable project manager for certain projects. The project manager's leadership style influences project success and different leadership styles are appropriate for different types of project (Muller & Turner, 2007). The project manager needs not only technical skills, but also should have positive values, high level of ethics, personal capabilities, and interpersonal skills (DuBois et al., 2015). For example, with fixed price contracts, sensitivity skills (as a part of emotional competencies) and communication skills (as a part of managerial competencies) are important; whereas with re-measurement contracts, influence skills (as a part of emotional competencies) and communication skills are important. The objective of this research was to highlight weak points in the PMBOK as it relates to processes in assigning the project manager to certain projects and to propose solutions to these weak points by introducing the concepts of leadership theory.
2. Creating the project as temporary organization with the parent organization: The project charter is the formal document used by the PMBOK to create or initiate a new project or phase within an existing project (PMI, 2012). Creating the project as a temporary organization, especially if the project is performed in a functional and weak matrix organization, would provide the project manager with the appropriate level of power and authority to effectively manage the project, which would enable the project team to focus on the project activity as a team since the temporary organization is formed around this task (Lundin & Soderholm, 1995). This new recommended part would illustrate the characteristics of the temporary organization and how the project manager and project management team could benefit from these characteristics.
3. Provide the project manager, and all the project stakeholders, with a clear picture about the structure of the project, the relationships among the involved entities in the project, and the reporting structure within the project.

Update develop project team process

This is a recommendation to update the develop project team process in the project human resource management knowledge area by adding the concepts of the leadership theory and resource based view of the firm theory. This enables the project manager to use the concepts of the leadership theory (such as the six leadership schools) to enhance and develop the technical,

personal, and interpersonal skills of the project team. The ultimate objective of this resource development is to achieve the four attributes of the strategic resources: valuable, rare, inimitable, and organizational focus (Newbert, 2007). A description of these four attributes could be added to the list of tools and techniques the process.

Update estimate activity resources, estimate activity durations, and estimate costs processes

This is a recommendation to update the estimating processes in the time and cost management knowledge areas by adding the concepts of the queuing theory to each process. The update would illustrate the three types of costs: the waiting line cost, underutilization cost, and delayed project cost (Levy & Globerson, 1997). The queuing theory would enable the project manager and the project management team to better use the available resources and to take into consideration how the resource utilization may affect the performance of other projects and programs.

Most of the interviewees in the practitioner group said they try to utilize the resources (human and non-human resources) at 100% utilization ratio, while most of the academic group (university professors) said that the resource utilization ratio should be around 70% in order to be able to take into account any unexpected changes in the project plan. This difference in perception between the two groups is a result of a lack of proper presentation in the PMBOK of the theoretical concepts.

Update plan quality management process

This is a recommendation to update the planning process in the quality management knowledge area by adding the concepts of resource based views of the firm theory to the process. This new update will enable the project manager to effectively develop the process improvement plan (part of the outputs list of this process). Although the PMBOK lists the process improvement plan as an output and includes how to enhance both the project management processes and product oriented processes, it does not illustrate how to achieve this objective, what the ultimate goal of this improvement plan is, nor what the organization's benefit would be by having this plan.

Practical Results

The practical results of the recommended modifications of the PMBOK are summarized in the following points:

1. Provide the organization with a better way to select the most suitable project manager and project team.
2. Enhance how the project management processes could be customized based on the project environment.
3. Improve the resources, time, and cost estimating processes.

4. Support the organization to better use the project management science to achieve sustainable competitive advantages.
5. Enhance the ability of the project manager to manage and lead the project team, especially in international projects.
6. Improve the project manager's ability to use, and benefit, from the lesson learned in previous projects.
7. Enhance the organizations ability to create a solid project structure that provided the project manager with more power and authority to manage the project and to decrease the level of conflict between the project manager and functional managers.

Recommendations for Further Research

The results generated from this case study provide direction for future research in the project management field. Below are some recommended areas that would benefit from added research:

1. This research study used the PMBOK as a unit of research. Future research could identify the weak points in the program management, and/or portfolio management standard, and apply the same or other new theories in proposing solutions to the identified weak points.
2. Future research could explore the impact of organizational culture, and the ability of the organization to apply temporary Organization Theory (or another theory), to create the project as a temporary system.
3. A quasi-experimental study could be designed to use and apply the results of this study (such as queuing theory to enhance the estimating processes) to an experimental project(s) and compare the results with another project(s), which perform without using the theory. Results would strongly illustrate what the real problem(s) are that the organization and project management practitioners may face and when applying the concepts of the five theories.
4. The Knowledge Flow Theory could be tested using factors such as (a) number of problems solved using the knowledge management system, (b) average time of solving the problem using the knowledge management system, and (c) how many times the project manager and/or the team used the knowledge management system to implement the project management processes.
5. Leadership Theory could be measured by measuring team satisfaction with the project manager performance behavior and attitude during the project.
6. RBV Theory could be measured by factors such as (a) turnover rate of the project team, (b) acquired skills, and (c) project and product processes compliance with organization standards.
7. TO Theory could be measured by (a) percentage of the accountability and control of the project manager over the project tasks to determine whether there is a clear chain of command within the project, (b) level of conflict between the project manager and the functional manager, and (c) team performance during the projects created as temporary organization.

8. Queuing Theory could be measured by factors such as (a) measuring the accuracy of time, cost, and resource estimating, (b) how the theory enhances the cooperation between the project manager and the program manager, and (b) measuring the projects delay and cost overrun when using the queuing theory.

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