EXPANDING THE KNOWLEDGE ON PROJECT MANAGEMENT STANDARDS: A LOOK TO THE PMBOK® WITH DYNAMIC LENSES

Hermano Rebolledo, Víctor; Martín-Cruz, Natalia

Universidad de Valladolid

Although project management standards have become an important building block in project-based organizations, there is still the need to expand our knowledge in how to use them. The purpose of this paper is to develop an analytical principle-based approach for project management by identifying the elements of the PMBOK® that might enhance project performance in moderately dynamic environments. Specifically, we search for PMBOK®'s sections and processes that allow project managers to perform the roles and routines of dynamic capabilities builders. The paper shows that PMBOK® processes can be the source of sophisticated project plans but also, micro-foundations for dynamic capabilities.

Keywords: Dynamic capabilities; Project success; Principle-based approach; Routines

INCREMENTANDO EL CONOCIMIENTO SOBRE EL MANEJO DE LOS ESTÁNDARES EN DIRECCIÓN DE PROYECTOS: UNA VISIÓN DINÁMICA DEL PMBOK®

A pesar de que los estándares en dirección de proyectos se han convertido en una herramienta importante para las organizaciones basadas en proyectos, sigue existiendo la necesidad de que incrementemos nuestro conocimiento sobre cómo usarlos correctamente. El objetivo del presente artículo es desarrollar una visión de la dirección de proyectos basada en principios teóricos que pueda servir de base fundamental para dirigir proyectos en entornos moderadamente dinámicos. En concreto, el artículo realiza una revisión del PMBOK® destacando los principios y procesos que pueden ayudar a los directores de proyectos en el desarrollo de capacidades. Los resultados del artículo demuestran que determinados procesos del PMBOK® además de ser útiles en la planificación, pueden ser la base para el desarrollo de capacidades dinámicas en los proyectos así como en la organización.

Palabras clave: Capacidades dinámicas; Éxito; Organizaciones basadas en proyectos; Rutinas

Correspondencia: vhermano@eco.uva.es

1. Introduction

The role projects play in modern organizations has shifted from sporadic endeavors intended to implement changes to widespread practice for developing firm's daily work and implementing overall firm's strategy (Irja, 2006). This "projectification" process has come along with the rise of a whole discipline, i.e. project management, dedicated to improve the management of projects. In this sense, one of the main focus of project management has been the development of tools and techniques that, gathered in what it is called project management (PM) standards, pretend to increase chances of success in projects and also serve as a basis for the certification of professional project managers (Hällgren et al., 2012; Vaskimo 2013).

PM standards influence the practices of the project management community and represent an institutionalized collective identity of project managers worldwide (Morris, 2012; Hällgren et al., 2010). Moreover, they are expected to harmonize the terminology of the project management field and so reducing conflicts within the project team also with project stakeholders (Ahlemann et al., 2009). Therefore, PM standards are increasingly considered as an important building block in modern organizations (Ahlemann, et al., 2009). In fact, there is a wide range of available PM standards developed by several national and international project management associations, e.g. the Project Management body of Knowledge -PMBOK®- developed by the Project Management Institute, the IPMA Competence Baseline –ICB- developed by the International Project Management Association, the Projects IN Controlled Environments –PRINCE2- developed by the Association for Project Management, etc.

However, despite the efforts for developing and improving the content of PM standards, projects still fail (Lehtonen & Martinsuo, 2006). Furthermore, the explanation of the positive relationship between the use of PM standards and the success of projects is still missing both theoretically (Milosevic & Patanakul, 2005) and empirically (Joslin & Müller, 2015).

Among the different problems that researchers have identified in using PM standards (e.g. Ahlemann et al., 2009; Milosevic & Patanakul, 2005; Joslin & Müller, 2015; Hällgren et al., 2012) two of them have received greater attention. First, PM standards are generic and abstract (Hällgren et al., 2012; Ahlemann et al., 2009). Since PM standards cannot be unlimited and must fit every project, those only contain those things that are easy to codify while the most challenging or specific ones are missing (Hällgren et al., 2012). Moreover, PM standards only cover parts of the practice (those that can be written down in a formal document) and present ideal situations that, in the best case, only partially fit into reality (Hällgren et al., 2012). Therefore, PM standards can be considered as creations of a made-up world that fits every theoretical project but do not represent any real one (Hällgren et al., 2012). Second, PM standards suffer from a lack of flexibility and adaptability (Ahlemann et al., 2009). Most PM standards are based on an engineering approach where problems are fully specifiable and can be fully solved through optimal solutions (Dybå & Dingsøyr, 2008). Thus, PM standards contain predictable, fixed and relatively stable and simple models that allow project managers to specify the whole project management process into a project plan. However, today's projects are carried out in an extremely complex and turbulent environment (Shenhar & Dvir, 2007), and so none of them can be specified as a linear sequence of operations (Styhre et al., 2010).

The problem of coping with a dynamic and uncertain environment affects not only the management of projects but the overall management of companies, and so it has been discussed by researchers in the field of strategic management. Scholars posit that the time has come to broaden the traditional approach to strategic management and decision making with a new perspective founded on complexity science (Snowden & Boone, 2007, p. 1).

Managers cannot keep relying on approaches that work well just in a single set of circumstances, but they have to apply more flexible strategies (Snowden & Boone, 2007). As an example of a flexible strategy, the Cynefin framework classifies the context into 5 categories based on the existence of cause-effect relationships and the possibility of achieving right decisions (Snowden & Boone, 2007). Once mangers sense with type of environment they are facing, they can choose an appropriate management style avoiding wrong decisions (Snowden & Boone, 2007).

Regarding project management, practitioners have developed a new type of methodologies, i.e. agile methods, which instead of focusing on the development of a baseline plan, these agile methods assume customer satisfaction, continuous work deliver, welcome of changes, etc. as their principles (Beck et al., 2001). Moreover, scholars claim that there is a need to expand knowledge about how to use traditional PM standards by including instructions about which of their tools and methods are appropriate and relevant to each industry or project type (Hällgren et al., 2012). Furthermore, project management research needs a better foundation based on theoretical arguments that can be found in strategic management theories (Hällgren et al., 2012; Shenhar & Dvir, 2007; Killen et al., 2012). In this sense, it is worth to mention the application of the dynamic capabilities approach for the treatment of uncertainty (Petit, 2012), and for the achievement of project and portfolio performance (Biedenbach & Müller, 2012; Killen et al., 2012; Petit & Hobbs, 2010).

This article responds to the call for expanding the knowledge on PM standards. Specifically, the article seeks to take the first step for articulating a principle-based approach to project management that is applicable to a widely set of circumstances. Drawing on the dynamic capabilities approach, our aim is to identify the elements of the PMBOK®, the world's leading PM standard (Ahlemann et al., 2009; Milosevic & Patanakul, 2005), that are specially relevant for managing projects in moderately dynamic environments, where the introduction of new unknowns is constant as projects progress and there is the need for sensing emerging situations and to allow for plan reconfiguration (Styhre et al., 2010; Collyer & Warren, 2009).

We start Section 2 by reviewing the dynamic capabilities approach, the role and advancement of PM standards, and then we create an integrative framework of these two worlds. Section 3 identifies the elements of the PMBOK® that are relevant to manage dynamic projects by assessing how they deal with the roles and microfoundations of project dynamic capabilities. Finally, in Section 4, we present the main conclusions, managerial implications, limitations and the directions for future research.

2. Theoretical Framework

2.1 The Dynamic Capabilities Approach

Frequently conceived as an extension of the resource-based view (Barney, 1991; Peteraf, 1993), the dynamic capabilities approach seeks to explain why some organizations perform better than others in turbulent and dynamic environments (Teece et al., 1997; Zollo & Winter, 2002; Eisenhardt & Martin, 2000). First defined as "the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments", dynamic capabilities stand as the cornerstone for creating and maintaining competitive advantages (Teece et al., 1997, p. 516; Teece 2009). Thus, the dynamic capabilities framework arises as a solution of the main critique for the resource-based view, i.e. its inherently static nature (Priem & Butler, 2001). According to Di Stefano et al., (2010) there are three main articles integrating the intellectual core of the dynamic capabilities

framework, that is Teece et al., (1997), Eisenhardt and Martin (2000), and Zollo and Winter (2002). Although differing in some points, these three articles are complementary in many respects. There is clear distinction between dynamic and ordinary capabilities. Dynamic capabilities imply change and evolution, and are the potential to do things (Easterby-Smith & Prieto, 2008). Therefore, changes in ordinary capabilities are the outcome of dynamic capabilities (Winter, 2003). Since the roots of the concept of dynamic capabilities lie on the notions of organizational routines and processes (Teece et al., 1997), learning is an important aspect of their creation and evolution (Helfat & Peteraf, 2003; Zollo & Winter, 2002).

2.2 The role of PM Standards

Throughout project management's more than 60 years as an independent discipline (Morris, 2012), one of the most profuse research topics has been that of project success (Joslin & Müller, 2015). Specifically, many papers have been written trying to properly identify what has been called critical success factors (CSFs) (e.g. Pinto & Slevin, 1987; Fortune & White, 2006). Thus, since companies' effectiveness partially depends on their projects success (Milosevic & Patanakul, 2005), PM standards have become an important element for modern organizations and their development and improvement have become one of the main concerns for academics, practitioners, and especially for professional associations. Much of the PM standards, which also are the most widely used, are labeled as plan-based, and follow an engineering-based approach where problems are considered predictable and fully specifiable, hence they can be solved with an optimal solution (Dybå & Dingsøyr, 2008). The benefits provided through the application of these plan-based PM standards are helping in terminology harmonization, which facilitates communications, promoting the professionalization of project management discipline, and enhancing project success (Collyer & Warren, 2009).

However, the business environment is changing at an increasing pace and companies are increasingly implementing projects in dynamic and uncertain environments. Traditional plan-based PM standards suffer from several liabilities such as knowledge loosing, demotivation of talented project team members and separation between strategy makers (top managers) and strategy implementers (project managers), when applied in dynamic environments (Levitt, 2011). In fact, the management of projects in dynamic environments is considered as an unresolved project management issue.

From a theoretical point of view, scholars claim that while classic projects can be managed by following a, projects developed in dynamic environments are better managed under a learning strategy that involves continuum scanning, problem solving and flexibility (Pich et al., 2002). Regarding project management practice, the challenges of managing projects in dynamic environments are facing by the development of a new type of PM standard –agile methods- that rather than following the engineering plan-based approach, they are founded on recurring activities such as feedback loops, iterative reviews and close customer contact (Stettina & Hörz, 2015). However, agile methods cannot be considered the silver bullets for managing projects in dynamic environments. Scholars have identified several liabilities in the application of agile methods like the absence of theoretical support for their claims and the application problems when the project team is large and their members work in several projects at same time (Dybå & Dingsøyr, 2008).

2.3 Theoretical Cross-fertilization between Dynamic Capabilities and Project Management

In some recent studies, different aspects of the project management discipline have been addressed through the dynamic capabilities approach. Theoretically, the building of project dynamic capabilities inside organizations is conceived as a way to overcome the

tensions of having a dual structure- both project-based and functional (Melkonian & Picq, 2011). Davies and Brady (2000; 2004) claim that only those organizations capable of learning and building project dynamic capabilities would be able to overcome the dichotomy among projects' short-term objectives and organizations long-term goals. Empirically, Jugdev et al., (2007) study which of the project management assets support project dynamic capabilities formation. Petit (2012) asses the role played by project dynamic capabilities when managing portfolios in turbulent environments. Biedenbach and Müller (2012) study how the components of project dynamic capabilities, absorptive, innovative and adaptive capabilities, enhance the performance of projects, programs and portfolios in the pharmaceutical industry.

As we are interested in the elements of PM standards especially suitable for managing projects in dynamic and uncertain environments, we conceptualize a dynamic capabilities perspective of project management. Based on previous analyses, we posit that project managers enhance project dynamic capabilities building if they consider the following principles (Petit & Hobbs, 2010; Boh, 2007; Brady & Davies, 2004; Kujala et al., 2010):

- To identify potential changes in project scope and in stakeholders behavior.
- To establish action plans and decision-making protocols for the opportunities and threats previously identified within project environment.
- To modify project plan and to redesign project activities and project team as the project proceeds.
- To document lessons learned and to communicate them to subsequent projects.

This principle-based approach for project management highlights that the building of project dynamic capabilities help to face the challenges of managing projects in dynamic and turbulent environments and to achieve organizational success through multiple projects implementation.

3. Identifying the Dynamic Elements of the PMBOK®

3.1 Methodology

In order to take an initial step towards the operationalization of the principle-based approach for project management presented in section 2.3, we identify the elements of a plan-based PM standard that might help project managers to manage projects in moderately dynamic environments, i.e. complicated and complex environments. Specifically, we have applied the analytical concepts of the literature review on the practices proposed in the PMBOK®, *the global de facto standard for those engaged in project management* (Starkweather & Stevenson, 2011, p.31). First developed as a white paper in 1983, the PMBOK® is a formal document that describes norms, methods, processes and practices generally recognize as good practices by project management professionals (Project Management Institute, 2008; Eskerod & Huemann, 2013). Moreover, the PMBOK® has been accepted as a standard by the American National Standards Institute and is used globally as a basis for managing projects and certified professionals (Hällgren et al., 2012).

Several papers have referred to PMBOK® for assessing how much their theoretical findings are in agreement the practices in project management (Milosevic & Patanakul, 2005; Hällgren et al., 2012; Eskerod & Huemann, 2013; Collyer & Warren, 2009). Specifically, for the purpose of this paper we examine PMBOK® content in an attempt to determine which of its sections and specific processes might be specially suitable for performing the three roles of dynamic capabilities builders (Teece et al., 1997) and the routines that constitute the microfoundations of project dynamic capabilities (Teece 2009). Moreover, disciplines such as

accounting (Carmona & Trombetta, 2008) or environmental regulation (Gunningham & Sinclair, 1999) have built a principle-based approach by analyzing the available tools and standards, harnessing the strengths of each individual instrument while compensating for their individual weaknesses.

3.2 Performing Dynamic Capabilities' Eoles through PMBOK® application

In their seminal paper, Teece et al. (1997) establish three different roles top managers should perform to develop dynamic capabilities within their firms: coordination/integration, learning, and reconfiguration/transformation (Teece et al. 1997). In the following, we search into PMBOK®'s content to appoint to the sections and processes especially relevant for performing these roles. Moreover, Exhibit 1 shows in greater detail, different examples and specific sections of the PMBOK® that represent how project managers might perform each of the three roles.

The first role, coordination/integration refers to the tasks managers perform for coordinating and integrating activities inside the firm and also for the coordination of external activities and technologies (Teece et al., 1997, p.518). The PMBOK® possess a whole chapter dedicated to project integration management in which the integration role is defined as *the processes and activities needed to identify, define, combine, unify and coordinate the various processes and project management activities within the PM Process Group (Project Management Institute 2008). Project integration management entails making choices about resource allocation, making trade-offs among competitive objectives and alternatives, and managing the interdependences among the project management knowledge areas (Project Management Institute 2008).* Moreover, project integration management includes those activities aimed at ensuring the consistency project documents, project plan and product deliverables. Regarding the second role, learning, is defined as a process by which repetition and experimentation enable tasks to be performed better and quicker (Teece et al., 1997, p.520). By learning, firms recognize dysfunctional routines and prevent strategic blindspots (Teece et al., 1997, p.520). The learning role is a prevalent concept in the PMBOK®. Practitioners claim that after developing a project, the implementing organization and actors must have learned something, and the PMBOK® includes that idea by including *document lessons learned* as a component of the closing process group (Project Management Institute, 2008). The concept of lessons learned appears 56 times and it is especially relevant during the closing phase of the project (section 4.6), and when performing project quality management (section 8.3.3) and developing the communications plan (section 10.2). Finally, the reconfiguration/transformation role refers to the need to reconfigure the organizational asset structure to address environmental changes (Teece et al., 1997, p.520). The PMBOK® establishes change requests as an output of almost all of its 42 processes. These change requests refer to those modifications in project procedures, policies or documents that are requested by the project team due to issues found while project work is being performed. PMBOK® also advise project managers to perform the task called *integrated changed control* (sections 3.6 and 4.5) by which project managers have to review all change requests, approve changes, and manage changes to deliverables, organizational process assets, and project documents and plans (Project Management Institute 2008).

Table 1. The three roles performed by dynamic capabilities builders thorugh PMBOK® content

Dynamic capabilties roles	PMBOK®'s areas and activities that might allow project managers to perform the three roles
Coordination/Integration role Tasks managers perform for coordinating and integrating activities inside the firm and also for the coordination of external activities and technologies (Teece et al., 1997, p.518).	Chapter 4 is dedicated to project integration management and it includes the processes and activities needed to identify, define, combine, unify and coordinate the various processes and project management activities within the PM Process Group. Moreover, project integration management includes the activities aimed at ensuring the consistency project documents, project plan and product deliverables. The PMBOK (page 72) includes an example of a situiation where project managers need to perform the coordination/integration role: *A cost estimate needed for a contingency plan involves integrating the processes in the cost, time, and risk knowledge areas. When additional risks associated with various staffing alternatives are identified, then one or moreo of those processes may be revisited. The project deliverables may also may also need to be integrated with ongoing operations of either the preforming organization or the customers' organization*.
Learning role Process by which repetition and experimentation enable tasks to be performed better and quicker (Teece et al., 1997, p.520).	The concept of learning is pervasive in PMBOK's content and it is represented by the lessons learned conterm, which appears 56 times. The concept of lessons learned is defined in section 2.4.3 when the different knowledge bases of a project are explained. The task of documenting and applying lessons learned is especially relevant during the closing phase (section 4.6) where the PMBOK talks about the importance of the historical information, when performing quality management, and finally, when developing the communications plan, where lessons learned of past projects might be used for guiding the planning of communication activities of the current project.
Reconfiguration/Transformation role Refers to the need to reconfigure the organizational asset structure to address environmental changes (Teece et al., 1997, p.520).	PMBOK® establishes change requests as an output of almost all of its 42 processes. Furthermore, PMBOK advise project managers to perform the task integrated changed control that it is explained in sections 3.6 and 4.5. The PMBOK emphasizes the importance of change requests when describing how to direct and manage project execution. Specificallly, it talks about approving change requests as an important part of the process of integrated change control: *approved change requests are scheduled for implementation by the project team. Approved change requests are the documented, authorized changes to expand or reduce project scope. The approved change requests can also modify policies, the project management plan, procedures, costs, or budgets, or revise schedules. Approved change requests may require implementation of preventive or corrective actions (section 4.3.1).*

3.3 PMBOK® Processes and Outputs as Microfoundations for Dynamic Capabilities

Project dynamic capabilities lead to achieve project performance under conditions of uncertainty and changes in client needs. We define project dynamic capabilities as those routines and processes that allow project team to detect project opportunities and threats, and to establish and execute decision making protocols for exploiting these opportunities and defend against these threats. In order to operationalize project dynamic capabilities we apply Teece's model (2009) in which dynamic capabilities disaggregate into three different sets of routines: routines to sense opportunities and threats, routines to seize opportunities, and routines to maintain competitiveness by reconfiguring organizational capabilities. As Exhibit 2 shows, the application of some of the processes described in the PMBOK®, mainly those related to monitoring and controlling, generate outputs that might be considered as microfoundations for project dynamic capabilities.

Project sensing routines encompass activities related to identify potential changes in project scope, to assess stakeholders' behavior and changes in the project environment (Aaltonen & Kujala, 2010; Petit & Hobbs, 2010). The new wave of risk management is based on the assumption that although planning activities are necessary, there are constraints and unclear tasks that cannot be recognized at an early stage (Perminova et al., 2008). Thus, project managers need to continuously sense project environment in the search for uncertainties that could affect the project, both negatively and positively, and may imply changes in project scope and plans (Pollack, 2007). Besides, the role and influence of stakeholders, especially clients, over project success is being increasingly acknowledged (Eskerod & Huemann, 2013). The scanning for changes in the environment must be extended to the study of stakeholders' behavior, their capacity to redefine project parameters, and their changing influence over project performance (Petit & Hobbs, 2010). Therefore, by developing sensing routines, project plans become flexible enough to allow for revisions and the incorporation of new ideas, improving their accuracy and suitability with the project dynamic environment (Pollack, 2007; Petit & Hobbs, 2010). As depicted in Exhibit 2, monitoring and controlling processes (sections 3.6.1 and 4.4) described in the PMBOK® capture the essence of sensing routines since they urge project managers to evaluate the progress of the project in an attempt to identify possible deviations and environmental changes.

Project seizing routines are the structures, procedures, designs, and incentives for identifying changes required once an opportunity or threat is sensed (Teece, 2009). By developing project seizing routines, project managers evaluate the influence of changes previously sensed over project content and PM decision-making process. Thus, project seizing routines imply establishing action plans for all the opportunities and threats previously sensed in each project. First, project managers determine how the opportunities and threats previously sensed would affect project content, and then, decision-making protocols and governance rules must be established to determine the changes that are actually going to be undertake (e.g. if several changes in customers' needs have been sensed, project managers should establish decision-making protocols determining which of those customers' needs are aligned with organization's business model and thus, have to be addressed). Seizing routines might be contained into the PMBOK® group of processes named *performing integrated change control* by which project managers review and evaluate the changes requests made due to environmental changes previously sensed (see Exhibit 2).

The last group of routines, project transforming routines, relates to managing threats and reconfiguration (Teece, 2009). When competing in dynamic environments, firms have to recombine their resources and reconfigure their existing capabilities, and even build new ones i.e. organizations need to change their routines to address environmental shifts (Teece, 2009).

Table 2. PMBOK® processes, activities and outputs as microfoundations of project dynamic capabilities

PMBOK® processes (sections they are contained in)	PMBOK® activities and outputs
Monitor and control project work (3.6.1 and 4.4) Processof tracking, reviewing and regulating the progress to meet the performance objectives defined in the PM plan	**Sensing:** comparing actual project performance agaist the plan **Seizing:** change requests **Transforming:** updates in PM plan and documents
Perform integrated change control (3.6.2 and 4.5) Process of reviewing all change requests, approving changes, and managing changes to the deliverables, organizationsal process assets and PM plan	**Sensing:** - **Seizing:** reviewing all change requests and approving changes **Transforming:** managing the approve changes/ updates in PM plan and documents
Verify scope (3.6.3 and 5.4) Process of formalizing acceptance of the completed project deliverables	**Sensing:** measuring and verifying to determine whether work and deliverables meet requirements **Seizing:** change request **Transforming:** updates in PM documents
Control Scope (3.6.4 and 5.5) Process of monitoring the status of the project and product scope and managing changes to the scope baseline	**Sensing:** work performance measurements **Seizing:** change requests **Transforming:** updates in organizational process assets, scope baselines, and in the traceability matrix
Control Schedule (3.6.5 and 6.6) Process of monitoring the status of the project to update project progress and mange changes to the schedule baseline	**Sensing:** work performance measurements (schedule performance index) **Seizing:** change requests **Transforming:** updates in organizational process assets, schedule baseline, and in schedule data
Control Costs (3.6.6 and 7.3) Process of monitoring the status of the project to update the project budget and managing changes to the cost baseline	**Sensing:** : work performance measurements (cost performance index, budget forecasts) **Seizing:** change requests **Transforming:** : updates in organizational process assets, cost performance baseline, and in costs stimates
Perform Quality Control (3.6.7 and 8.3) The process of monitoring and recording results of executing the quality activities to asses performance and recommended necessary changes	**Sensing:** - **Seizing:** validate changes and deliverables **Transforming:** updates in quality management plan and process improvement plan
Manage Stakeholders Expectations (5.2.3) Process of communicating and working with stakeholders to meet their needs and addressing issues as they occur	**Sensing:** identifying concerns that have not become issues yet **Seizing:** clarifying and resolving issues that have been identified **Transforming:** updates in stakeholder management strategy, stakeholder register and issue log
Risk Management (Chapter 11) The objective of risk management is to increase the probability and impact of positive events, and decrease the probability and impact of negative effects	**Sensing:** Identify risks **Seizing:** Perform both qualitative and quantitative risk analysis; Plan risks responses **Transforming:** Implementing risks response plans

Reconfiguration routines imply the execution of the action plans previously designed for facing environmental shifts previously sensed (Petit, 2012). Moreover, reconfiguration entails modifications in project plan and activities redesign as project proceeds and later details become clearer. Therefore, by developing reconfiguration routines project managers achieve semi-continuous projects' asset orchestration and PM processes renewal (Teece, 2009). As Exhibit2 shows, the PMBOK® provides several processes for updating project plan and documents during project life-cycle that might be consider as project transforming routines. Moreover, the PMBOK® assumes the need for reconfiguration by establishing the *rolling wave of planning* and *progressive elaboration* as guidelines when developing project plans. Both the rolling wave of planning and progressive elaboration establish a policy where the project plan is not fully developed but only outlined during project initiation and then is developed in greater detail as the project progresses (Collyer & Warren, 2009).

4. Conclusions, Limitations, and Direction for Future Research

In an empirical study on innovation projects from a major multinational pharmaceutical company, Styhre et al., (2010, p. 134) state that "no [project] can be fully self-enclosed and rendered as a linear sequence of operations, but there is always a need for recognizing emergent properties of the system and to allow for some deviance from the prescribed procedures." Thus, in order to manage projects in dynamic and uncertain environments, we have to "expand knowledge of how standards are used" (Hällgreen et al., 2012, p.480).

Drawing on the dynamic capabilities approach, this paper takes an initial step toward a principle-based methodology for project management by identifying the PMBOK® sections and processes that might be especially suitable for managing projects in moderately dynamic environments. Exploring PM standards through dynamic capabilities lens might enable development of both strategies and tools to assist project managers when managing projects in dynamic environments, where traditional plan-based standards have been claimed as not suitable or even counterproductive (Koskela & Howell, 2002). As an initial step in this direction, this paper maps the fundamental concepts of dynamic capabilities contained in PMBOK®'s content. Mapping the fundamental concepts of the dynamic capabilities approach to the project management processes is the first step in the development of a framework that synthesizes the dynamic capabilities and project management literature.

Furthermore, as many scholars highlight, the application of strategic management theories to the study of projects and project management is highly potential (Grundy, 1998; Killen et al., 2012). Specifically, the implications of this PMBOK® revision are threefold. First, we respond to the need to determine which processes and project management methods are appropriate for managing projects in dynamic and uncertain environments (Ahlemann et al., 2009, p. 294; Collyer & Warren, 2009). The specific features of projects developed in dynamic environments drive project managers to abandon methods based on the plan-based approach turning towards learning strategies based on problem scanning and flexibility (Pich et al., 2002). Our paper shows which of the sections and processes of the PMBOK® are especially relevant to develop that learning strategy.

Second, the cross-fertilization among project management and dynamic capabilities approach provides the PM discipline with a strong theoretical framework. The lack of stable theoretical foundations is recognized as one of the most important obstacles for the PM progress (Koskela & Howell, 2002; Pollack, 2007). Thus, we strengthen the incipient PM theoretical framework with the explanatory power and theoretical foundations of the dynamic capabilities approach, helping PM discipline to understand its main assumptions. Dynamic capabilities foundations could be useful to face PM problems such as frequent project failures or slow rate of methodological renewal (Koskela & Howell, 2002; Kharbanda & Pinto, 1996). Recent studies are demanding to focus on managerial aspects instead of technical

ones, since frequently, the root cause of project failure is constituted by organizational and strategic issues such as the decision-making process (Sauser et al., 2009; Shore, 2008; Shepherd et al., 2011).

Finally, this paper provides several implications for project management professionals. On the one hand, project managers should not be slaves of project plans. Although planning activities are necessary, there are constraints and unclear tasks that cannot be recognized at an early stage. Thus project plans need to be flexible enough to allow for revisions and the incorporation of new ideas, and changes during project life-cycle. Project managers need to continuously scan project environment in a search for uncertainties that could affect the project, both negatively and positively. On the other hand, project managers should understand that PM standards are not a panacea that automatically leads to project success, but they have to be interpreted and adapted to the specific features of each project.

Two different limitations can be identified in our paper. First, our analysis is based on secondary data since we used the PMBOK® as the only document in our study. Thus, we cannot be sure that PMBOK® content represents the project management practices carried out by project management professionals. However, PMBOK® is consider the world leading standard and is used as basis for certification of project management professionals, hence, we assume that many people have studied, and therefore, known its prescriptions and processes. Second, although we have identified the sections and processes of the PMBOK® especially suitable for managing projects in moderately dynamic environments, its overall philosophy focuses on bringing activities in line with a plan which ultimately may lead to project failure in turbulent and dynamic environments (Collyer & Warren, 2009). Therefore, the majority of the sections and processes of the PMBOK® might hamper the building of project dynamic capabilities, hence shattering the benefits of the dynamic elements previously identified.

We suggest that future research on the topic should advance the development of the project management principle-based approach by continuing with the strategy of harnessing the strengths of each PM standard. The dynamic review of the PMBOK® should be replicated for all available PM standards in a search for the processes and routines that foster project dynamic capabilities building. Secondly, future studies should include both empirical and case studies where the actual practices developed by project management professionals are analyzed. Furthermore, the study of project dynamic capabilities could be extended to the portfolio and the overall firm level.

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