Project Management as a Dynamic Collaborative Social Practice

Collaborative Innovation Revisited

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1. Executive Summary

This report presents the findings of a two-and-a-half-year research project designed to address a critical priority in project management practice—how to cope with the simultaneity of multiple forms of complexity. The report marks the next chapter in project management research and practice by developing what will be referred to as the *Practicing School* in project managing. Extending Söderlund's (2011) optimization, factor, contingency, behavior, governance, relationship, and decision making schools in project management, the *Practicing School* introduces a greater focus on how to practically work to address project complexity not by simplifying it, but by learning to make powerful connections central to project success. This perspective marks an important contribution given that much of the project management literature, both practitioner and academic, has developed from a predominantly engineering-based background and has focused primarily on tools and techniques to plan and execute the work adequately. Using Maylor and Turner's (2017) terminology, these are "planning and control" approaches to deal with structural complexities. This is, without a doubt, powerful, and has supported the professionalization of the discipline over recent decades. However, we view such knowledge as necessary but not sufficient for managers in the environments we studied.

Extending earlier conceptualizations of project management as a practice (Floricel et al., 2014), this study goes beyond merely accounting for social interactions and the actions of social actors in projects and how this influences collaborative practice. The *Practicing School* explores the ways collaboration can lead to innovations and how these innovations, in turn, reflect how project complexity can be productively worked with. Innovation in project complexity is not merely about the outcomes of effective collaboration. It is more a matter of appreciating the complex dynamics in *practicing innovating* (Antonacopoulou, 2016) when embedding the unknown as an integral aspect of project design. This contribution marks a much-needed development in project managing.

It can help project practitioners (across the stakeholder groups that contribute in project work) to better account for the practical steps they take to refine, improve, and continuously transform their project management practices to foster innovation through collaboration. The ability to manage projects (i.e., the day-to-day practice of managing), is multifaceted. Project managers in our study acknowledge their responsibility for technical, financial, interpersonal, logistical, legal, and other issues. No single project manager is skilled in all of these functions, yet they must use practical judgment to make decisions about how best to respond to particular challenges. The inherent uncertainty and dynamics within the context of project managing necessitate that managers must use their judgment extensively, since complex environments are not amenable to simple or one-size-fits all solutions. The latter marks a critical value-added contribution in project management practice, demonstrating practical judgment as a key capability that can contribute to effectiveness and efficiency in project managing. Practicing holds a key in how to develop practical judgment (Antonacopoulou & Sheaffer, 2014).

The *Practicing School,* as a new perspective in project management, is presented in this report to help guide the continuous professional development support that the Project Management Institute provides to project managers. The focus on practicing project management is founded on a systematic analysis of the way project practitioners enact and embody project managing. We use a multimethod approach that enables us to combine qualitative and quantitative data and, from that, to distill the dynamic connections between different aspects of project management practice. Among the aspects of practice that our findings draw attention to are: project management practitioners and their phronesis (practical judgments); key players and the nature of their collaboration (perceived purpose, principles, and procedures)—context; past, present, and potential future conditions that affect the overall pace of progress, patterns of collaboration, and ultimately, the scope to deliver the promise of project management—on time, on budget, and so on. The complexity of project managing is captured in the way these 13 aspects of project management practice are connected in the course of practicing project managing. This offers a new framework for capturing not only the complexity of project managing but also the ways its dynamic nature

can be better supported. This is because practicing draws attention to the innovation that lies in the connections fostered.

In short, this report adds to and extends the current debate and, in doing so, provides a new lens but also a new approach for researching and supporting project managing in practice. The *Practicing School* perspective we present in this report provides project managers a new approach for maximizing the impact of their project management practice. It does so by supporting them to navigate through the complexity of connecting different aspects of their practice through effective collaborations from which innovations in process and products are also possible. Moreover, the practicing school fosters, as central to continuous professional development, the need for practicing project managing as a critical condition for learning to exercise good judgment to help ensure that the projects managed serve the common good beyond merely balancing the interests of multiple stakeholders.

2. Introduction

A growing body of project management research is calling for a better understanding of the complexities that underpin project management practice. This move beyond notions of control does not just embrace flexibility, it also accounts for the inherent complexity of projects as a contingent independent variable that impacts on many subsequent decisions that influence the practice of managing projects. This orientation toward the complexity of projects is also drawing attention to the underlying social complexities that constitute the practice of project managing. Adopting a social practice theory perspective (referred to as practice-based studies; see Gherardi, 2006) has extended our appreciation of project managing as a collective and collaborative process where the complexities in projects are as much triggered by wider environmental forces as they are endemic to the practice of project management itself (Blomquist et al., 2010; Floricel et al., 2014). The internal forces of complexity reinforce previous accounts of the sociopolitical, emergent, and structural complexity (Maylor & Turner, 2017). However, they also draw attention to the complexity of connecting multiple aspects of project management that have not been extensively discussed.

What this report draws attention to is how project managers experience, understand, and engage with the complexities of project managing. What perhaps makes the complexities of project managing unique is the simultaneity of multiple modes of project complexity (structural, sociopolitical, emergent). This simultaneity, in turn, highlights the importance of practical judgment in how to act. In other words, it emphasizes the lack of a prescribed approach in navigating the unknown regardless of how clear a plan is in place at the onset. These paradoxes are central to project managing and call for a better understanding of how project managers arrive at such judgments when balancing competing priorities and the interests of multiple stakeholder groups. The findings presented in this report provide further insights about the character of project managing when practical judgments seek to serve the common good. In this respect, they shed new light on the dynamism that constitutes the practice of project managing by revealing the centrality of *practicing*.

Practicing project managing is about the way judgments are formed in the way multiple aspects of project managing are connected to address the inherent complexities, in ways that permit innovative responses to be identified. We find that such innovation is not only based on individual creativity but also is embedded in the modes of collaboration between project stakeholders. This extends hitherto accounts of the practice of project managing by drawing attention to how social interactions and power and political dynamics affect the success or failure of projects. Instead, we introduce *collaborative innovation*, drawing on Ketchen et al. (2008), as a key aspect of project management practice. We define collaborative innovation as the pursuit of innovations across organizational boundaries through sharing ideas, knowledge, expertise, and opportunities (Ketchen et al., 2008).

This report shows that whereas *collaborative innovation* is highly coveted by project managers, its deployment is highly practical in nature. The report shows that collaborative innovation is more focused on personal engagement than on the adoption and deployment of a technology-based tool. This provides a basis for developing collaborative innovation as a "contact sport." In effect, relationships and human dynamics within project teams—and extended to other project stakeholders—underpin efforts to address project complexity by embracing and deploying innovation.

In short, the study conveyed in this report addressed a pragmatic and real challenge faced by project managers—how to work with inherent project complexities. Our engagement with a diverse group of project managers in this study sheds fresh light on the ways in which they practice making connections between different aspects of project management practice. These connections, in turn, guide and are guided by their practical judgments and enable them to form, in collaboration with other stakeholders, innovative ways of engaging with such complexity. In other words, actions taken within the project managing arena are not merely applications of guidelines and rules dictated by professional bodies or organizational systems. Instead, whereas these guidelines and rules provide structure and a set of standards, the lived experience of project managing goes beyond the rules and reflects the judgments project managers and other project stakeholders are called upon to make to address the project complexities they contribute to creating. The latter point highlights that complexity is endemic to

projects as temporary forms of organizing not least because the social dynamics they invoke add layers of complexity that key players are unable to predict. This implies that project complexity is embedded in the ecology of projects as "temporal" and not only temporary forms of organizing. We refer to temporality to go beyond issues of time to account for the practical and pragmatic nature of project managing endemic to human affairs and relationships between people. In this respect, relationality is a form of temporality that is conditioned by the temporary, short-term, and changing nature of projects as collectives/forms of organizing and this necessitates a better understanding of how actions are taken at the individual and collective levels.

This report goes beyond accounting for the decision rationalities in projects and instead offers a closer understanding of the practical judgment project managers form as they navigate through multiple modes of complexity simultaneously. This lies at the heart of the temporality that underpins project managing. The latter provides a basis for capturing the dynamism of project managing practice in the way projects unfold and the way project stakeholders collaborate and interact beyond negotiating their interests. It is the way temporality enables project practitioners to identify common ground and elevate the purpose of their work to serve the common good—a higher purpose that emerges as a critical issue. Serving the common good, as opposed to simply completing the project on time and on budget, introduces additional ways of assessing the impact of project managing beyond the criteria for assessing project management. This change in orientation is critical because it provides the basis for extending the "measures" and criteria of project success beyond time and cost to also include *enduring impact*.

By understanding the dynamics of project complexity in the temporal and relational forms of collaboration that call for accommodating uncertainties and the scope for innovation therein, this study provides answers to the following two research questions:

1. What are the lived experiences of project complexity and how do project managers navigate through these and form their judgments?
2. How might collaborative capability foster innovations as aspects of the impact of project managing?

Each of these research questions reflects a key theme guiding the study and the core where the contribution in advancing project managing lies. The first theme addresses project management practice, where our key contribution is twofold. We extend the application of practice-based studies to rethinking project management as a practice, by introducing a more dynamic view of *practicing* project managing. Practicing is defined as deliberate, habitual, and spontaneous repetition. It is integral to the process of forming, performing, and transforming practice because it entails rehearsing, refining, improving, and changing elements of one's practice and one's self. In short, practicing is about creating new connections due to *repetition* not *replication* (Antonacopoulou, 2008, 2015).

This perspective on project managing explicates the conditions that make connections between different aspects of a practice possible. This means that in extending previous research that has focused on the microfoundations of project managing—what project managers actually do when they manage projects when balancing exploration and exploitation (Turner et al., 2016)—we are now able to practically support project managers better in recognizing that the success of their projects is in the ongoing refinements they make as they *practice* project managing. This is not merely a case of fulfilling the basic requirements of completing projects on time and within budget, or planning, monitoring, and executing the project (as per Project Management Institute [PMI] guidelines; see PMI, 2017). Managing projects is about *practicing* to ensure that the connections between different aspects of the practice (its *purpose, principles,* and *procedures* in relation to the *place* where they occur) are shaped and shape the *past, present,* and *potential* future *pace*, through emerging *patterns* that realize the *promise* of the project delivering the original outcomes and subject also to the way project managers as *practitioners* use their practical judgment—*phronesis*. These various "Ps" as aspects of any practice, form the framework we have tested in our empirical research. A diagrammatical representation of the 12 Ps framework is provided in the literature review. These 12 Ps (*purpose, principles, procedures, place, past, present, and potential* future *pace, patterns, promise, practitioners,* and *phronesis*) were applied in studying the project management practices described in the interviews we held with 48 project practitioners worldwide and across a range of sectors.

We are now able to show through our findings that the dynamism in project management practice can be largely attributed to tensions that project managers experience as they work with multiple project complexities simultaneously. Therefore, a key finding from our research is that central to the way project managers practice project managing are the connections they develop between different aspects of project management practice, which, in turn, guide the judgments that underpin their actions. Ultimately, the practical judgments project managers make can determine how the project unfolds. However, making good judgments in project managing is more than merely choosing between viable options based on a process of delineating between alternatives, typical of how decision making is understood. In our analysis, practicing project managing is about the way endogenous and exogenous tensions are transformed into extensions (Antonacopoulou, 2008). Extensions become not merely solutions but ways of rising above the tensions to create possibilities that better serve the common good—not only the interests of all players but also a higher purpose (e.g., improving the quality of life of communities that will be using the results of the project). This means that practicing is more than continuous improvement. It is a mode of innovating. This means that the various aspects of project managing can be connected and reconnected not only to strengthen the interdependencies between the various aspects of the practice, but also, they are reconnected by renewing and reviewing relationships between the key players (internal and external) who create positive and negative conditions affecting the project's viability and ultimately success. In short, practicing is an act of innovating that seeks to go beyond targets and standards to bring the best in all those who contribute to the best possible outcomes from the project. This implies that practicing project managing is the capacity of extending beyond the here and now, the "me" and "my perspective," to create the conditions of harmony that enable seeing the "there" and "then," as well as the "us" and "them" together. Therefore, our analysis draws attention to the relational power of players (internal and external to the project) and the nature of their collaboration (not mere interaction but relationships formed) in achieving what the project sets out to deliver— the common good. *Players* adds another key aspect of project management practice that allows us to extend the earlier 12 Ps framework and draw attention to the centrality of collaboration in projects and the conditions that create the scope for innovation therein.

In short, we are able to show that innovation is not only central to project managing due to the dynamic collaborations that it fosters, but also that innovation lies at the core of what makes project managing dynamic. What we offer, therefore, in our analysis is both new findings that account for the antecedents and consequences of collaboration in projects such that collaborative innovation may be fostered. Moreover, we shed new light on the practice of project managing by accounting for the dynamic connections between various aspects of the practice we describe as 13 Ps of project management practice (*purpose, principles, procedures, place, past, present, and potential* future *pace, patterns, promise, players, practitioners,* and *phronesis*). We, therefore, offer a new framework that can practically guide project managers to understand that working with the complexities of project managing calls for learning to make connections through practicing to create possibilities harmonizing otherwise competing priorities and transforming tensions into extensions.

The second theme in this study is the investigation of collaborative innovation in projects. We are now able to show through our findings that there are significant differences in terms of the collaborative innovation practices and initiatives used by firms. For example, a stronger clarity of responsibilities among collaborators, an alignment of motivations, as well as a transparency of tasks and power distribution was demonstrated in large firms. For example, larger firms understood the importance of including collaborative teams in all project scoping meetings to improve project quality and innovative performance. In addition, the findings show significant differences in perceptions of the effectiveness and value of collaborative innovation in projects between experienced project managers and inexperienced ones. The implication here is that open engagement with exogenous collaborators for idea creation and innovation needs to improve and become core in the continuous professional development of new and existing project managers.

Our analysis uses suitable qualitative and quantitative research methods and analysis to distill from the data some of the conditions that can foster collaborative innovation. The impact of a greater understanding of the collaborative innovation potential in projects will be established as a key future capability and measure of project success.

3. Literature

Project management is replete with models for managing effective and efficient projects, standards, and frameworks across various sectors and guidelines of how to "manage" projects. And yet, project management practitioners continue to experience challenges in "managing" projects due to the unsubstantive value of project management methods' usefulness and effectiveness (Crawford, 2005; Thomas & Mullaly, 2007), the lack of evidence of uniform applicability across sectors (Besner & Hobbs, 2006), and the low adoption of the project management methods (Ahlemann et al., 2009). Aubry et al. (2007) go further in highlighting that current project management literature is lacking both theoretical foundations, as well as valid, verified empirical models.

This begs the question whether project management theory designed around a linear set of stages, such as the five Process Groups outlined in *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Sixth Edition (PMI, 2017)—Initiating, Planning, Executing, Monitoring and Controlling, and Closing—suffer from severe shortcomings, as some scholars argue (Koskela & Howell, 2002). For example, Blomquist et al. (2010), drawing on Hällgren and Maaninen-Olssson (2009), claim that how the content of plans is used as a basis for everyday action, how procedures for changes in the plans are actually carried out, and how deviations from plans are responded to are all essential aspects of project management practice that merit further consideration. This is critical so that planning procedures become better understood in order to alleviate long-standing problems of meeting project goals and objectives, difficulty in training and effective professionalization of project management, and lack of a blueprint for continuous improvement and further progress, as Koskela and Howell (2002) claim.

Söderlund (2011), in what is one of the most comprehensive consolidations of the body of knowledge in the project management field, offers seven schools of thought to account for the development in thinking, and also the emphasis placed on different aspects deemed critical to our understanding of project management. He describes:

1. The optimization school as focusing on logic and adopting a prescriptive research orientation drawing on management science, optimization techniques, and systems analysis;

2. The factor school as adopting an empirical research orientation, relying on descriptive statistics on the criteria and factors of project success and failure;

3. The contingency school, which uses case study-based and survey-based empirical research to account for the differences between projects, the project characteristics, and the impact of context;

4. The behavior school, which focuses on organizational behavior, processes, and learning in projects relying predominantly on interpretative and descriptive research;

5. The governance school, which contrasts problems in projects on the basis of their governance structures and mechanisms through prescriptive research;

6. The relationship school, which focuses on the relations between actors in projects adopting descriptive case study research approaches; and

7. The decision school, which exposes politics and decision making in projects using descriptive and interpretative research.

Taking the current state of the field and the concerns of practitioners, there is a compelling need to capture the inherent dynamics in project complexity and, in particular, the emergent nature of projects, which has hitherto not been fully accounted for (Ahlemann et al., 2013). The exception is the recent contribution by Maylor and Turner (2017), which acknowledges emergence as a mode of project complexity. If we continue to simplify managing projects into linear steps and measures of success that do not correspond to the sheer complexity project managers experience, we will not be able to realistically support them to improve the scope for innovation so central in *project managing*.

There is, therefore, a need to shift our theoretical conceptualizations of project management as a *practice*, such that we can unearth the innovation capabilities that projects and their management entail,

particularly due to the dynamics of social interaction embedded in collaboration among project stakeholders. It is this collaborative element inherent in project management that this project seeks to address. Understanding how innovation capability through collaboration in projects can be developed is a key priority. This focus on collaborative innovation, we argue, will not only reflect the complex dynamics of project management in practice but, more fundamentally, will also reflect the scope for innovation within and between projects (as part of a program or portfolio) due to the strong collaborative character of projects. Moreover, the focus on collaboration reflects a timely and important contribution to the ongoing development of project management practice through research that is directly relevant to the world of business (project managers) and policy (e.g., PMI).

This is consistent with Lalonde et al. (2012) who emphasize the significance of re-examining the complex relationship between project management theory and practice, a point that Söderlund and Maylor (2012) also promote a greater alignment of. We share in Hodgson and Cicmil's (2006, p. 684) assertion that "the understanding which drives much of the project management literature does not satisfactorily explain the richness of what actually occurs in project environments." Therefore, through this report, we seek to show how greater attention to the lived experiences of the complexity of the practice of managing projects can provide a more pragmatic appreciation of the process of project managing.

We organize the review of the extant literature in three sections. We first outline the state of the field and draw attention to the way the process of project managing has been engaged with as well as the value-added contribution of the recent emphasis on the practice perspective drawing on social practice theory. We then outline the 12 Ps framework that captures project complexity and seeks to draw attention to different aspects of practice and their interconnectivity. We show that central to the connections between different aspects of practice are dynamics that emanate as tensions (internal and external to the project), which contribute to the ongoing reconfiguration of the practice of project managing. We explain this reconfiguration with a greater attention to practicing as a source of innovation. We explicate practicing innovating in relation to the way project stakeholders collaborate in the final section.

3.1 The Process of Managing Projects: The Complexities Experienced in Practice

According to Papke-Shields et al. (2010), organizations are increasingly using projects to achieve their objectives. However, project outcomes often fall short of target goals. Over the past decade, the application of standardized and deterministic knowledge to managing projects has come under intense scrutiny (Blomquist et al., 2010; Hodgson & Cicmil, 2006; Hodgson & Cicmil, 2007; Smith, 2007). In fact, there has been an increase in the amount of literature that has documented project failures (cf. De Meyer, Loch, & Pich, 2002; Hodgson & Cicmil, 2006; Lalonde et al., 2012; Lee & Xia, 2005; Miller & Lessard, 2001) attributed to a knowledge crisis in the project management field (Lalonde et al., 2012) and a recognition that the focus on control as opposed to flexibility is no longer relevant (Lenfle & Loch, 2010).

The increasing levels of uncertainty and social complexity being experienced by the project management practitioners on many projects (Cooke-Davies et al., 2007; Perminova et al., 2008; Sage et al., 2010) call for new ways both of understanding and engaging with such complexity. We recognize, of course, that complexity is endemic not only to projects. Ongoing efforts to understand complexity in management studies also continues to draw attention to the tendency of taking steps to eliminate or simplify complexity instead of working with complexity itself. Tsoukas (2017) argues that theoretical complexity is needed to account for organizational complexity. Recent complexity literature spans the macro level (environmental, environmental complexity) or micro level (management complexity) (Ahmadi et al., 2017; Palermo et al., 2017), with few accounts of constellations of different complexities. Schneider et al. (2017) take a systems theory approach to looking at how organizations respond to their environments and identify that interorganizational collaborative complexity is underexplored as a route to generating requisite variety.

The difficulty of decision making is incorporating the competing alternatives of innovative versus more established solutions. Within the project management literature, this has ties with the exploitative/exploratory aspects of project delivery (e.g., Turner et al., 2016). Ahmadi et al. (2017) look at decision making under conditions of complexity and show that individuals who

are more focused on growth and advancement are more likely to engage in exploratory behavior. Palermo et al. (2017) look at the finance sector and identify the institutional complexity when actors are faced with both a "logic of opportunity" (prevalent pre-crisis) and a competing "logic of precaution," arising post-crisis. This tension also has parallels with the project context, where managers are faced with the requirements of organizational "process," yet, in-the-moment decision making is supported by the judgment based on experience, which has a more tacit foundation.

In the project management field, complexity has been long debated and a recent consolidation of the thinking (Geraldi et al., 2011) has drawn a distinction between the complexity *in* projects and the complexity *of* projects (Cicmil et al., 2009). The former would treat complexity as an object, while the latter takes a lived-experience perspective. Systematic reviews of project complexities, however, have not fully accounted for the ways in which those experiencing complexity are likely to respond to it (Geraldi et al., 2011; Maylor & Turner, 2017; Vidal & Marle, 2008). We follow the complexity journey that Maylor and Turner (2017) outline in proposing a framework for arresting how project practitioners "understand," "reduce," and "respond" to multiple modes of complexity they define as "structural," "sociopolitical," and "emergent" complexity. Based on previous literature (Geraldi et al., 2011; Maylor et al., 2013), they define three types of complexity (structural, sociopolitical, and emergent), as detailed in Table 1.

The dimensions of complexity posit that structural complexities can be addressed by a "planning and control" approach (in line with established and widely recognized project management principles), sociopolitical complexities via a relationship-building focus, and emergent complexities by supporting flexibility within the project. However, through workshop data, Maylor and Turner (2017) showed that a wider set of responses were, in fact, evident, and structural complexities could also be addressed with relationship development, flexibility solutions, and so forth. Maylor and Turner (2017) give examples of all nine permutations, as shown in Table 2.

Their framework enables us to appreciate that projects have a unique set of complexities not merely due to the relative "planning and control," "relationship development," and "flexibility" options that different complexities call for. This gives insight into the practicalities of complexity responses, and leads to two further areas for research. First, we currently lack detailed knowledge of the relative prevalence of the different forms of complexity and the types of responses enacted. In addition, their framework signals that we need to understand the unique complexities as they are experienced, by those who also contribute to creating them. This implies that project complexities experienced in practice demand an analysis that goes beyond accounting for the temporal aspects and changes over time as project organizing unfolds, a topic that has already commanded the attention of some scholars (Lundin & Söderholm, 1995; Packendorff, 1995). We need to account for the complexity of "managing" projects and draw on established theoretical perspectives—process studies and social practice theory—to do so.

Table 1. Dimensions of Complexity (Maylor & Turner, 2017)

Structural complexity: increases with the number of people involved, financial scale, number of interdependencies within and without, variety of work being performed, pace, breadth of scope, number of specialist disciplines involved, and number of locations and time zones.
Sociopolitical complexity: increases with the divergence of people involved, level of politics or power play to which the project is subjected, lack of stakeholder/sponsor commitment, degree of resistance to work being undertaken, lack of shared understanding of the project goals, lack of fit with strategic goals, hidden agendas, and conflicting priorities of stakeholders.
Emergent complexity: increases with novelty of project, lack of technological and commercial maturity, lack of clarity of vision/goals, lack of clear success criteria/benefits, lack of previous experience, failure to disclose information, rising to prominence of previously unidentified stakeholders, and any changes imposed on or by the project.

Table 2. Complexities and Responses (Maylor & Turner, 2017)

	STRUCTURAL	SOCIOPOLITICAL	EMERGENT
Planning and control	Perform initiating, planning, and monitoring (e.g., applying earned value systems). Use an integrated master schedule.	Develop a communications plan. Establish a project board of stakeholders.	Apply risk management and change control processes.
Relationship development	Prioritize communications with stakeholders. Conduct project outreach activities.	Engage in team-building activities. Invest in social capital.	Socialize changes. Increase informal communications.
Flexibility	Embrace changes from process. Anticipate change. Enable parallel development.	Manage expectations of change. Engage in joint look-ahead planning with major stakeholders.	Use agile approaches to project management. Encourage entrepreneurial project management.

3.1.1 The Process and Practice of Project Managing

Scholars who have adopted a process orientation (informed by process ontology; Hernes, 2014) have acknowledged the temporality inherent in projects and the modes of organizing that demand cooperation, leadership, and most centrally, balancing stability and change (Karrbom & Hallin, 2015; Packendorff & Lindgren, 2014; Söderlund, 2008). This work provides scope to capture the emergence of projects as various forces coalesce and create conditions affecting how projects unfold. In this context, the emergent complexity of the project is understood as the ongoing negotiation between force fields of stability and change.

Similarly, attempts to address project complexity have sought to account for the sociopolitical and structural complexity embedded in the practice of project managing. Here, scholars who advanced a "project-as-practice" perspective (Blomquist et al., 2010; Floricel et al., 2014; Hällgren & Söderholm, 2011) have drawn on social practice theory (Gherardi, 2006; Nicolini, 2013; Schatzki, 2002) and earlier variations like structuration theory (Giddens, 1984), activity theory (Engeström, 1987), and actor network theory (Latour, 1986) to account for activities, actions, agency, and the power of social interactions in networks, communities, and other social arrangements. By focusing on the interactions between project actors during project execution (Lalonde et al., 2012), a deeper understanding of the dynamics of project management processes can be revealed.

Valuable as these perspectives are, they do not fully account for project complexity as lived and experienced by project practitioners. More needs to be done to capture project complexity, not merely by acknowledging the internal and external forces creating conditions that shape project complexity. We need to account for the ways in which project practitioners navigate and work with multiple complexities simultaneously and, in doing so, how they form judgments that guide their actions and practical approaches to project managing. We also need to better understand how innovative solutions emerge in engaging with multiple complexities and the extent to which modes of collaboration between internal and external actors in the management of projects bears not only positive or negative effects to project managing, but realizes its impact in serving the common good.

3.2 Practicing Project Managing

As we accounted in the previous section, social practice theory in its various theoretical interpretations draws attention to modes of knowing, activities, what practitioners actually do, the modes of interaction among members of the social group, and the interaction of social actors and the resulting structures they create that also govern their actions and trans-actions (Bourdieu, 1990). As a theoretical lens, it has been employed in a variety of management practices and has been invaluable in rethinking strategy (Jarzabkiowski, 2005), leadership (Carroll et al., 2008), learning and knowing (Nicolini et al., 2003), and other organizational and management practices. However, the common denominator driving practice-based studies is a focus on reproduction and institutionalization (Gherardi, 2006). This orientation does not fully account for the complexity and dynamic reconfiguration of practices—something that, to different degrees, recent research exploring the logic of practice has sought to account for (see Antonacopoulou, 2015; Feldman & Orlikowski, 2011; Sandberg & Tsoukas, 2011).

The need for ways of capturing the reconfiguration of practice has been recently identified as a key priority in future research adopting a social practice orientation (see Vaara & Whittington, 2012). We also feel that a practice-based view applied to project management as a practice is a direct response to calls for innovative approaches in project management research (Müller & Söderlund, 2014; Nightingale & Brady, 2011; Söderlund & Maylor, 2012;). Although there are some emerging attempts to understand project management as a practice (Blomquist et al., 2010), these tend to be rather limited and predominantly copying the three aspects of practice—praxis, practitioners, and practice—drawn from earlier interpretations of social practice theory and its application to strategy (Whittington, 2006). Although a practice perspective has guided some empirical research in project management (Hällgren & Söderholm, 2010), this has predominantly been more concerned with the application of a practice perspective as a methodological orientation toward a study of activities and through ethnographic data collection. The analysis does not advance our understanding of the dynamics of project management practice as such, nor does it help explain how the project complexity can be better worked with, even if we allow for more improvisation to be accommodated (Klein et al., 2015). There is a need for more research on the dynamic and complex nature of project managing as a practice that goes beyond accounting for the ways in which social actors interact and shape their social structures. There is a need to better capture the ways in which interdependencies are formed that affect and are affected by collaboration and, by implication, also reflect the inherent complexity and emergence of social practices like project management, not least due to the relationality that underpins their character.

This dynamic orientation toward practices recasts the focus on the practice of practice and makes the case that practicing, as a key characteristic of all social practices, helps us better understand how practices are continuously formed, performed, and transformed (Antonacopoulou, 2008). Practicing is defined as "deliberate, habitual and spontaneous repetition . . . because it entails rehearsing, refining, improving, and changing elements of one's practice and one's self" (Antonacopoulou, 2008, p. 124). In short, practicing is about "creating new connections due to repetition not replication" (Antonacopoulou, 2008, p. 124).

The focus on practice and practicing also introduces an exposition of the various aspects of a practice and the ways their interconnections reflect the complexity and dynamic reconfiguration of practices. The practice-centered view (Antonacopoulou, 2016) still maintains a focus on the powerful social forces that shape how practices are performed (Reckwitz, 2002). This means that project management practice, as is the case with other social practices, cannot simply be understood as a set of activities, actions, and modes of knowing without an appreciation also of how all these aspects of practice interconnect. The focus on the connections between different aspects of practice calls for a more detailed account of the aspects of practice beyond practitioners, actions (praxis), norms, routines, traditions, and rules that have dominated our hitherto understanding of management practices.

Antonacopoulou (2015) introduces a 12 P framework to account for the various aspects of practice. The 12 Ps are:

- *Practitioners* and their *phronesis:* the choices they make as they exercise their practical judgment, particularly when they deal with tensions and competing priorities;
- *Purpose:* intentions, competing priorities, internal conflict, and telos;
- *Procedures:* rules, routines, resources, guidelines, and standards;
- *Principles:* values, principles, and assumptions;
- *Place:* context, cultural conditions, and social conditions;
- *Past, present, potential future:* time boundaries, history, and future projections;
- *Patterns:* of connecting different aspects of a practice as this is performed;
- *Pace:* momentum and rhythm of performance and reconfiguration of practice; and
- *Promise:* of a practice emerging/becoming/organizing delivering intentions and impact of practice.

Figure 1 presents diagrammatically the 12 Ps of practice, and positions *practicing* as the force orchestrating the connection of the various aspects of practice. The framework, other than alerting us to the tensions of connecting all these aspects of practice in a coherent whole, also emphasizes the impact of the orchestration of these aspects of practice in realizing its promise to contribute to the common good.

Practicing helps explain why no practice is ever the same and why the same practitioner can perform the same practice very differently at different times and across space. Moreover, different practitioners in the same context can perform the same practice very differently. These variations in practice and their delivery are all reflecting the reconfiguring dynamics—practicing— embedded in practices. Practicing, therefore, draws attention to the elasticity inherent in practices that underpins their ongoing reconfiguration in the midst of everyday action. This reconfiguration entails an inherent transformation of the way intentions and the tensions practices entail, as competing priorities and interests are negotiated, become extensions, in some cases, beyond what may be deemed as being in line with institutional structures (Antonacopoulou, 2015). Put differently, there is an inherent innovation within a practice in the way it is transformed every time it is performed, which places *practicing* as a central aspect of all management practices. This perspective has been applied in rethinking strategy, learning, knowing, leadership, human resource management, and dialogic exchanges (Antonacopoulou, 2006, 2009, 2016; Antonacopoulou & Bento, 2010; Antonacopoulou & Sheaffer, 2014; Beech, et al., 2012).
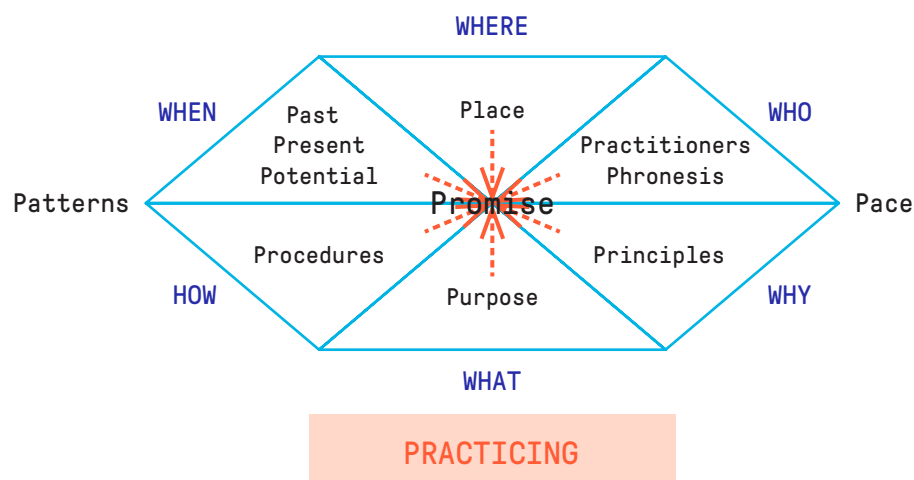
Figure 1. The 12 Ps of practice framework (adapted from Antonacopoulou, 2015).

In this research, we explore how the 12 Ps framework can shed new light on the dynamics of project management practice. Through a focus on how project managers explain what they do, how they do what they do, and why they do what they do when they project manage, we will seek to better capture the dynamism of project managing. In doing so, our objective will be to also test whether the 12 Ps framework adequately captures all aspects of project management practice.

Hence, the practice of project managing reveals the scope for ongoing innovation as an inherent aspect of mobilizing and reconnecting a whole variety of aspects of project management practice that are geared toward fostering the delicate balance between individual and collective development and growth. Project managing through this perspective is best understood in the ways practicing exposes the expectations formed, judgments made, and actions taken by project practitioners, which also potentially defines the character of project management practice in different contexts. To better understand how practicing project managing can also lead to innovating—a critically integral aspect of project managing—we need to critically account for the project complexities that project management is confronted with and to which practicing may offer a viable response. Practicing, however, especially in relation to project managing, is rarely a task undertaken by project practitioners in solitude or isolation from each other. On the contrary, to more fully appreciate practicing project managing, we need to understand the nature of collaboration in project management.

3.3 Collaboration in Project Management

Collaboration is highlighted in academic and professional project management publications as a key practice leading to improved project performance. This is understandable as projects tend to require specialized resources with a wide range of capabilities rarely found within a single organization. Thus, it follows that collaboration with both inter- and intra- organizational partners can improve innovative team capabilities, efficiency, and scalability (Adler et al., 2011; Faems et al., 2005; Gann & Slater, 2000). Collaboration has been used as a theoretical lens in a multitude of management studies looking recently at firms' collaboration structures for effective performance in projects that

involve multiple partners (Mishra et al., 2015), dynamic organizational processes associated with collaboration partners' leadership roles (Davis & Eisenhardt, 2011), and collaborative partner breadth that provides greater scope for knowledge recombination due to the variety of skills, relationships, and other assets held by collaborators (Lakemond et al., 2016; Laursen & Salter, 2006). Yet, this does not fully reflect the dynamics of social interactions within complex projects where uncertainty and temporality force project teams to engage with different sets of actors across multiple projects and project phases. There is a need to understand further the relational aspects of collaborative practice, particularly in fostering the level of learning necessary among collaborators (Antonacopoulou, 2010c).

Ollus et al. (2011, p. 452) define collaboration as "a process in which entities share information, resources, and responsibilities to jointly plan, implement, and evaluate a program of activities to achieve a common goal." In short, the focal idea behind collaborative organizations is to develop a value chain with excellent competencies (Lee et al., 2012). Ollus et al. (2011) define collaborative project management in terms of interaction levels, spanning from simply transactional interactions and engagement in system and business process and management, to information exchange and dynamic monitoring and active management and learning. Despite the boundary-spanning learning opportunities a project offers, and the subsequent opportunities for complementary skills matching, collaborative projects still encounter poor coordination and cohesion of project activities.

The collaborative character of projects and project managing as a practice provides a particular focus on the ways in which social actors learn to collaborate just as they learn from the collaboration (Antonacopoulou, 2010a). In other words, projects are seen as a space for forming interdependencies and through these relational connections they provide scope for homogeneity and heterogeneity among social actors and their approach to conducting specific aspects of the project. For example, it is often the case in projects that different tasks relevant to the final outcome of the project are conducted by different members of the project team, which often comprises of collaborators across departments, units, or organizations.

Perhaps a fundamental differentiating factor which merits consideration is the political tensions that are inherent in projects. Such political tensions would reflect that difficulties of aligning often competing priorities among collaborators, a point that is well made in the collaboration literature (Davis & Eisenhardt, 2011; Huxham & Hibbert, 2008) as well as in the practice literature (Antonacopoulou, 2008). It follows, therefore, that project managers have now a much wider remit beyond execution-based project managing to facilitate and enable a collaborative environment within projects to deal with supply chains, contractors, and partners. This means that often project managers strive to convince project team members to work together, even if they don't like each other, by inspiring them with vision beyond their individual powers, convincing them about the importance of others' efforts, and avoiding exploiting one party's contribution at the expense of others. Therefore, when looking at collaborative practices in project management, we observe micro- and firm-level collaborations by employing three levels of analysis: the project team, the project manager, and the firm (Howard et al., 2016). What is evident is that from whichever perspective one looks, the project team, the project manager, or the firm, acquiring new knowledge and skills from a collaborating partner is not an inevitable outcome as one might expect, but rather requires enabling and open interactions.

From the firm perspective, Adler et al. (2011) observed three different corporate approaches relating to collaboration and fostering project teams' innovation capabilities:

- Traditional industrial approach with conventional, closed collaborations across the firm and their suppliers with strong values, traditions, clear roles, job security, loyalty, and a rigid/bureaucratic structure;

- Free-agent approach with a flexible, innovative structure that forgoes procedure and rules in favor of individual effort and supporting modular projects; and

- Collaborative community approach with a shared purpose and collaboratively coordinated with documented procedures fostering a diversity of capabilities to stimulate innovation and promote interdependent knowledge-based work.

What is evidenced through these firm approaches to collaboration is a transition from a tightly controlled "command and control" process (Ibarra & Hansen, 2011)

to a more open and connected approach that fosters collaborative innovation through rotating leadership (Davis & Eisenhardt, 2011). In other words, collaboration has moved beyond formal structures, such as partnerships, strategic alliances, joint ventures, and technology-/patent-sharing arrangements. We can also see this within the project environment where dominating rationalization decisions and execution-based conceptualization of project managing as a system of processes (Floricel et al., 2014; Morris et al., 2011; Pinto & Winch, 2016) are questioned. This begs the question: How would the modern project manager lead and manage collaboration in their organization? How could they amplify the shared behaviors that literature tells us unify teams and increase performance (Goleman & Boyatzis, 2008)?

Collaborative leadership engages project team members and inspires them toward a common goal outside formal control, despite cultural and conviction differences (Ibarra & Hansen, 2011). Some of the main capabilities that collaborative project leaders highlighted in the literature include:

- Ability to connect people and ideas that are outside the organization to those inside it. This is known as "tipping point leadership" (Ibarra & Hansen, 2011), which becomes part of the global network by extending knowledge networks and collaborating with external parties such as competitors, consumers, government officials, and university contacts;

- Ability to leverage diverse talent by forming teams that have diverse nationalities, genders, and ages; and

- Ability to model collaborative behavior at the top of the organization by providing team members with collaboration opportunities beyond individual goals and to avoid competing agendas. This can be done by compensating for collective goals, eradicating power struggles within teams, and reporting on performance as part of the intended learning goals. A comparison between leadership styles in management is shown in Table 3.

The informal communication avenues that facilitate interaction and team engagement in a temporary, complex project setting have been made possible due to the pervasive use of collaborative technologies. In this study, complexity is recognized as an umbrella term associated with difficulty and interconnectedness in projects (Geraldi & Albrecht, 2007). Although web-based

Table 3. Management Trend Shifts from "Command and Control" to Group Collaboration (Ibarra & Hansen, 2011)

	COMMAND AND CONTROL	CONSENSUS	COLLABORATIVE
Definition	Old, separated structure	All agree on same thing	Common goal inspiration
Organization structure	Hierarchal	Matrix or small group	Cross-organization network
Who has information	Senior management	Formal representatives	All employees at all levels and stakeholders
Who has decision authority	Top management	All	People leading
Basis of accountability	Financial result against plan	Performance indicator	Performance of achieving shared goal
Where it works best	Defined hierarchy	Small teams	Cross-unit/company diverse group within innovative organization
Where it works worst	Complex and innovative organizations	Dynamic and speedy environment	Works well for diverse groups, cross-unit, and cross-company work, when innovation and creativity are critical

project management collaboration and communication tools have been rapidly advancing, the adoption rate of utilizing these technologies in certain regions is not high, specifically within the construction industry (Becerik-Gerber, 2004). Project team members still rely on simple document storage and formal communication methods, resisting adopting these new technologies (Issa et al., 2003).

3.3.1 Innovation and Collaborative Innovation in Project Management

Recent studies confirm the link between open forms of innovation and collaboration (Greer & Lei, 2012; Kadefors et al., 2007; Lloyd-Walker et al., 2014; Rutten et al, 2014) in dynamic, uncertain, and complex environments (Gambatese & Hallowell, 2011). The term innovation has a "notoriously ambiguous nature" and Thomas et al. (2013) attribute this multiplicity of definitions of innovation, as well as the inconsistencies emanating from the complex nature of this concept. It could be argued that innovation as a concept is undergoing an evolutionary transformation from highly vertical research and development approaches to collaborative innovation and

open innovation (Chesbrough & Bogers, 2014; Lee et al., 2010). Collaborative innovation is the pursuit of innovations across organizational boundaries through sharing ideas, knowledge, expertise, and opportunities (Ketchen et al., 2008) through new network forms of collaboration such as communities, consortia, ecosystems, and platforms (West & Bogers, 2017). Obviously, collaboration does not always lead to innovation (Greer & Lei, 2012) though it significantly improves the likelihood of innovation (Yu et al., 2013).

It is accepted that enhanced collaboration in the form of knowledge flows and open information exchanges are key determinants of successful innovation and new product development processes (Brown & Eisenhardt, 1995; Rothwell, 1994; Tidd et al., 1997), and this flexibility provides the firm with the agility needed to respond to rapidly changing market demands (Kanter, 2006). More recently, scholars have deduced that it is the more informal and open information exchanges for sharing knowledge that hold the key to successful collaborations (Ahn et al., 2015; McDermott & Archibald, 2010). Knowledge flows are both inbound and outbound (Dahlander & Gann, 2010). For the purpose of this study,

knowledge flows are seen as expert information exchanged simultaneously in both directions between project collaborators—across organizational boundaries—to acquire the necessary new or complementary knowledge to create new value and commercial success (Ahn et al., 2015).

Different streams of research on collaborative innovation have investigated different elements and features of innovation, including innovation structures (Mishra et al., 2015; Torres & Ibarra, 2015), organizational routines to acquire innovation (Davis & Eisenhardt, 2011; Howard et al., 2016), innovation culture (Shaner et al., 2016), barriers to collaborative innovation (Suprapto et al., 2015), and innovation drivers and speed (Gambatese & Hallowell, 2011).

A collaborative innovation project is "a project in which firms join forces to cooperate in the development and commercialization of a new building product, system, or service for a range of potential customers or clients" (Rutten et al., 2014, pp. 695–696). Similar to collaboration, Gambatese and Hallowell (2011) suggest that, to achieve innovation, it is necessary to understand its process, drivers, and measurements. Some of the drivers identified in the literature (Artto et al., 2009; Gambatese & Hallowell, 2011; Greer & Lei, 2012) as affecting innovation are:

- Demand of customization;
- Technological change;
- Product modularity (attempts to make standard interfaces for different components to make the connections between them easier);
- Expertise and depth of knowledge;
- Motivation for collaboration (collaborative efforts are requested to be sustainable);
- Strategy (to avoid competitors posing as clients or clients becoming competitors in the future);
- Cultural views on collaboration (collaboration issues that may also affect innovation);
- Presence or absence of trust and empathy;
- Availability of time;
- Managerial buy-in and support; and
- Climate and structure of the organization.

In practical terms, collaboration is essential for innovative efforts, and this draws attention to innovation antecedents such as managerial experience and buy-in; education, age, and gender of project managers; willingness and ability to manage conflicts; business structure of the firm; and organizational culture. Gambatese and Hallowell (2011) found that current literature seeks frameworks for successful innovation, mirroring research on collaboration. However, they interestingly find that existing models of innovation have not been proven in practice. As such, transition of innovation into practice experiences the same issues as collaboration into practice efforts. Similarly, metrics to assess innovation have been suggested, but have limited practical implementation (Gambatese & Hallowell, 2011).

At the level of organizational and project innovation, barriers can be based on selective perception and the social factors of vested interests, rejection of outsiders, misunderstandings, incompatibility of innovation with organizational structure, and the lack of top-level support. Further issues potentially inhibiting innovation include lack of cohesion; lack of project-based working patterns; lack of technology; lack of time, resources, and staff; lack of cohesion in common goals; and lack of shared resources, knowledge, and competencies (Loewe & Dominiquini 2006).

Nevertheless, perceptive organizations that recognize these barriers create structures for innovation to overcome them and allow for meaningful conversation, reflection, and debate to flourish as mechanisms to encourage performance improvements at the individual and team or group level and, hence, to the overall performance of the organization (Camarinha-Matos & Afsarmanesh, 2005).

More than ever, complex contemporary projects are being initiated, executed, and managed within unparalleled uncertainty impacting the guarantee of delivering project outcomes as intended and anticipated and, worse still, as originally planned. This means, practically, that the anticipated strategic objectives may not be met. Of course, classic project management offers many tools and methods to identify, assess, and mitigate project risks. However, what we see nowadays are challenges of ecological, social, economic, and geopolitical uncertainty that cause turbulence

within project environments. PMI research regarding project uncertainty identified the following uncertainty categories: stakeholder uncertainty, organizational uncertainty, technological uncertainty, contextual turbulences, project characteristics, and mismanagement (Lechler, Gao, & Edington, 2013). Inevitably, project uncertainty puts the focus on project managers' abilities to respond and adjust to these instances. In practical terms, heightened uncertainty requires project staff to be agile, resilient, and use their professional judgment to rebalance the project. And this shift in research orientation (from classic project management that assumes that a clutch of risk tools are sufficient for a project manager to deliver a project to the actual contemporary project management where uncertainty and turbulence test the project manager's bounded rationality) is at the nexus of our research. In our work, herein the *Practicing School* of project managing, we seek to explore the ways that collaboration knowledge relationships can lead to innovations and how these innovations, in turn, reflect how project complexity can be responded to and productively worked with through temporal relationships.

4. Methodology

From the literature review, this study posits that a wider empirical view of project management practice with a focus on collaboration and innovation across sectors and project types, reflecting project complexities, is lacking. This study aims to bridge this gap by providing primary data from an empirical study of 275 project managers (drawn across Europe, Middle East, Africa, the Americas, and Asia) who are also students of the online master's degree program on project management at the University of Liverpool. The selection of this empirical sample was quite key to our research. We were interested in practitioners' project management practices across industries and regions, as well as situated actions taken—praxis. Importantly, we were also seeking to understand how practitioners develop collaborative innovation capabilities in the course of managing projects. This greatly diverse collection of project management practices represents a range of project managers across many industries and regions with varied project management experience and capabilities. The research incorporated two streams of work around contemporary project management practice that formed the research questions guiding the study:

1. What are the lived experiences of project complexity and how do project managers navigate through these and form their judgments?

2. How might collaborative capability foster innovations as aspects of the impact of project managing?

A mixed methods research approach was adopted, as it offered many advantages over the use of either a quantitative or qualitative approach. According to Johnson and Onwuegbuzie (2004), Creswell (2009), and Creswell and Plano-Clark (2011), some of these advantages include the opportunity to analyze both patterns and causes of behavior, improve the reliability of the research findings, and triangulate data as a means of seeking convergence across qualitative and quantitative methods, as well as providing a mechanism to improve the quality of the research findings.

4.1 Research Design: Data Collection and Analysis

Expanding upon the literature discussion, we extracted from the collaboration literature the key conditions that affect the success of collaboration and tested the theoretical findings with the experiences of project managers through interviews. Following the interviews, more targeted and in-depth questions were carried out in three focus groups. Common threads emerging from the interviews and focus groups formed the survey themes, and a survey was developed and distributed electronically to 800 practitioners with 289 responses. To ensure survey content validity and to test for construct validity, we conducted a pilot study to test the survey. The research process followed here follows a sequential approach, as illustrated in Figure 2.

4.1.1   Phase A: Qualitative Research—Interviews

Phase A was led by the two co-principal investigators of this project and involved conversational interviews employed to capture stories of lived experiences of collaboration in projects. The qualitative research design explored ways project practitioners engaged in practicing project managing. This meant that we sought to arrest the dynamics in project managing as a social practice focusing on:

- How project managers understand and articulate what, how, and why they do project management in the ways they do. Beyond their actions, particular attention was given to test if their understanding of project managing is different when the 12 aspects of project management as a practice were explored;

- How they experience collaboration in projects and what conditions contribute to innovation becoming an integral part of collaborating; in other words, how collective knowledge is used as they learn to collaborate and learn from the collaboration; and

- How project success is defined and whether collaborative innovation may be fostered as a key capability.
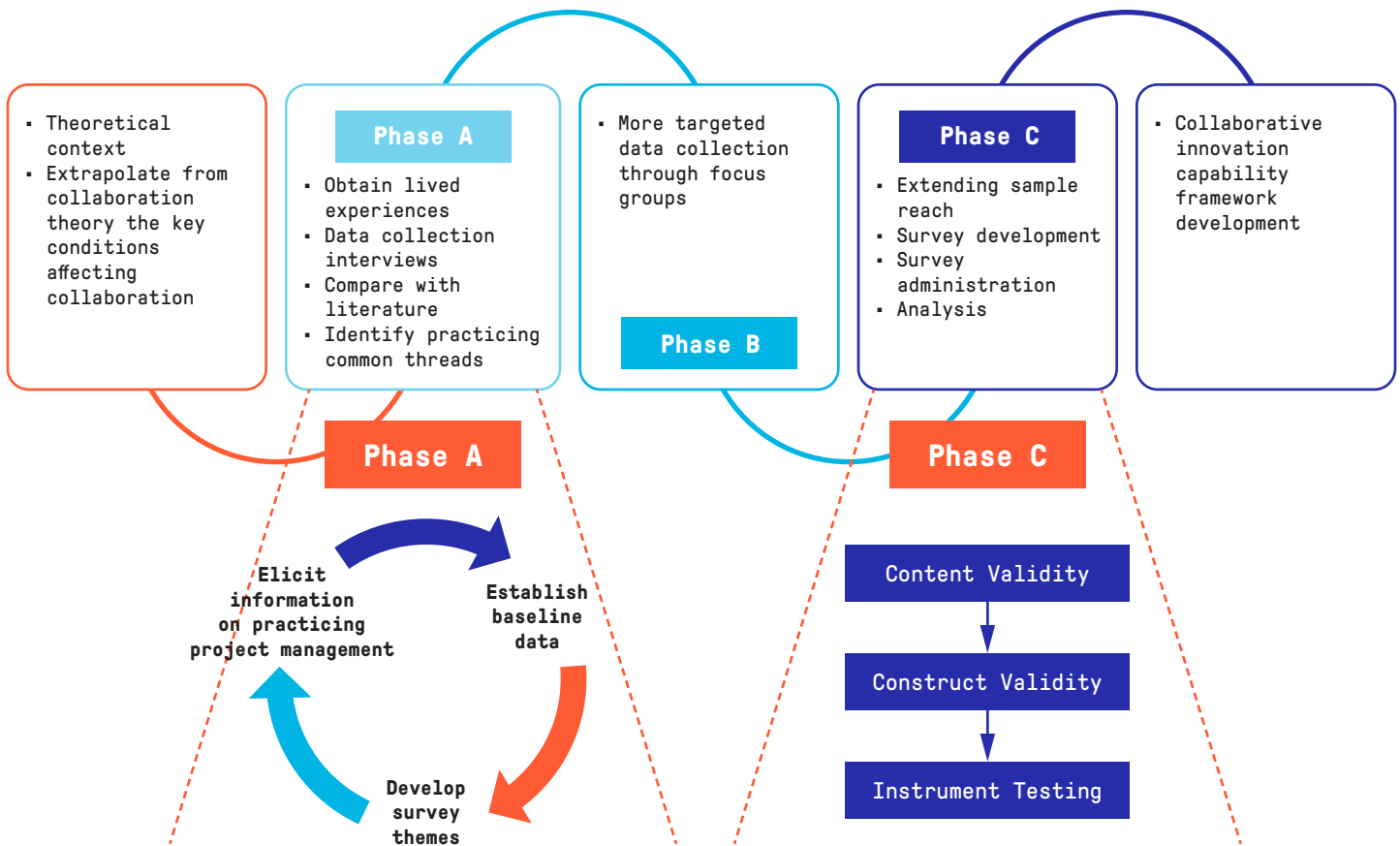
Figure 2. Research design.

Specifically, the interviews sought narratives from project managers on their attitudes to the established project management practices, models, frameworks, and standards that they use to effectively and efficiently manage projects; the emergent characteristics of modern projects that present core challenges; and the ways collaboration impacts their projects.

We sent interview participation invitations to 300 practitioners and we ran interviews with 48 respondents using virtual communication platforms such as Skype. Interviews were time intensive and the project management practitioners in the sample were also working full time and studying, making their time availability limited. Interviews were structured to be between 45 and 60 minutes and revolved around three themes: project management as a practice,

collaboration in projects (intra- and interorganizational), and collaborative innovations. The following procedures were maintained during the interviews:

- A stratified sampling method was used to cover different industries, thus providing access to a rich and varied group of project management practitioners across many key sectors and countries of the global economy, such as banking, IT, construction, and oil and gas and across Europe, the Middle East, Africa, the Americas, and Asia

- Initial rapport building was developed by introducing the context and introducing the interviewer prior to conducting the interviews.

- Rapport was maintained by introducing the interviewer's background, highlighting the purpose of the study again, and assuring confidentiality.

- A clear schedule was maintained with both open ended and probing questions.
- No interruptions or judgments were made to the participants' responses; only follow-up questions were adopted to obtain clarity and accuracy in capturing the perspective maintained by the interviewee.

Priori themes were chosen based on the research questions and researched literature. These themes were used to structure the interview questions around the following strands:

- Project management as a practice;
- Collaboration as a practice—social interaction and relationality;
- Collaborative innovation in projects; and
- Linking project success and collaborative capability.

The interview questions were designed to give the respondents the opportunity to reflect on their past and present experiences and illustrate using real-life examples throughout their project management career using lessons learned and improvements in their project management practice. All interviews were recorded and transcribed verbatim. The interview schedule is included in Appendix A.

Phase A—Data Analysis: The qualitative data captured from practitioner interviews were analyzed using a computer-assisted qualitative analysis tool called NVivo. The justification for selecting NVivo for the qualitative analysis is that it is a useful qualitative data analysis software tool that has been used extensively to enhance qualitative research processes by quickly processing queries and providing a flexible means of expanding analytical avenues (Auld et al., 2007). NVivo helped us organize and manage large pieces of related information, explore information and identify themes, and visualize findings, thus allowing us to save time in the administrative areas of their projects (QSR, 2012). In general, computer-assisted qualitative data analysis tools facilitate a more accurate and transparent data analysis process and offer effective accessibility and references to the original data, thus providing a reliable picture of the data both on general emerging themes, as well as more specific issues (Morrison & Moir, 1998; Richards & Richards, 1991, 1994).

Thematic analysis based on pattern coding was also used to identify main themes and issues relating to collaborative innovation within the project management context (Miles & Huberman, 1994). A three-stage coding technique was used to generate inductive themes that were verified using triangulation (48 different participants) by calculating relative frequencies of each code. The qualitative data resulting from practitioners' interviews has been analyzed to identify commonality in practicing approaches and conditions to collaboration, and, coupled with the literature findings, helped us test our understanding from the extant collaboration theory.

4.1.2   Phase B: Qualitative—Focus Groups

Phase B was led by the principal investigators and Professor Adebanjo. This involved data collection from focus groups that further tested specific stories and explored the scope of common emerging factors acting as conditions affecting the scope for innovation through project collaboration. The questions specifically centered on the perceived challenges and opportunities of collaboration and innovation in projects. An interesting aspect of practitioner responses to disruption in projects and deviation from plans, as well as learning, was pursued. An invitation to the focus group was sent to the two largest clusters of project managers that were based in United Arab Emirates (UAE) and Nigeria.

The first focus group was conducted in Dubai on 5 March 2015 and consisted of five participants (four males and one female). The second and third focus groups in Lagos, Nigeria on 13 June 2015 (morning and afternoon) consisted of eight participants (six males and two females). The following procedures were maintained during both focus groups:

- Initial rapport building was developed by introducing the context and introducing the focus group coordinator prior to starting.
- Rapport was maintained by introducing the coordinator's background, highlighting the purpose of study again, and assuring confidentiality.
- A clear schedule was maintained with both open ended and probing questions.
- No interruptions or judgments were made to the participants' responses, only follow-up questions were maintained.

A clear agenda was introduced prior to starting the workshop, highlighting the main discussion themes as follows:

- Challenges faced as project managers;
- Project management practice: insights developed from practicing project managing;
- Collaboration in projects: collaborations (inter- and intraorganizational) as contributors to the complexity and dynamic nature of projects; and
- The scope for innovation: What is the innovation impact of the projects managed?

Each focus group was divided into four sessions (with a duration of 45 to 60 minutes for sessions 1 and 2, then 20 to 30 minutes for sessions 3 and 4). The list of questions deployed to facilitate the discussion during the focus group workshops are listed in Appendix B.

Focus group workshops were recorded and transcribed verbatim. Inductive coding (Miles & Huberman, 1994) was utilized by examining the transcribed data as part of the qualitative data thematic analysis (see Figure 3).

Open coding was first generated, following a more exhaustive analysis to create groupings of the different theoretical categories underlying the first order codes. Axial and selective codes were based on the identified patterns and themes relative to PMI practices and the discussed literature. As part of ensuring the research's validity, low-inference descriptors were used by capturing direct quotations from participants. Participant feedback was also maintained to check the consistency and validity of the interviewer's interpretations of all the responses.

4.1.3 Phase C: Quantitative

Phase C involved the development of a survey instrument. The survey themes were extrapolated from the insights for the literature, as well as the common threads found from the practitioner interviews (Phase A).

Survey Development

In this study, a confirmatory survey research was adopted, as the phenomenon has already been articulated in a theoretical form using well-defined

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Data Reduction

- Transcribing interview data
- Priori themes
- Inductive coding

Data Display

- Hierarchal categories
- Thematic analysis

Conclusion and Verification

- Low-inference descriptors
- Triangulation
- Direct quotes
- Participants' feedback
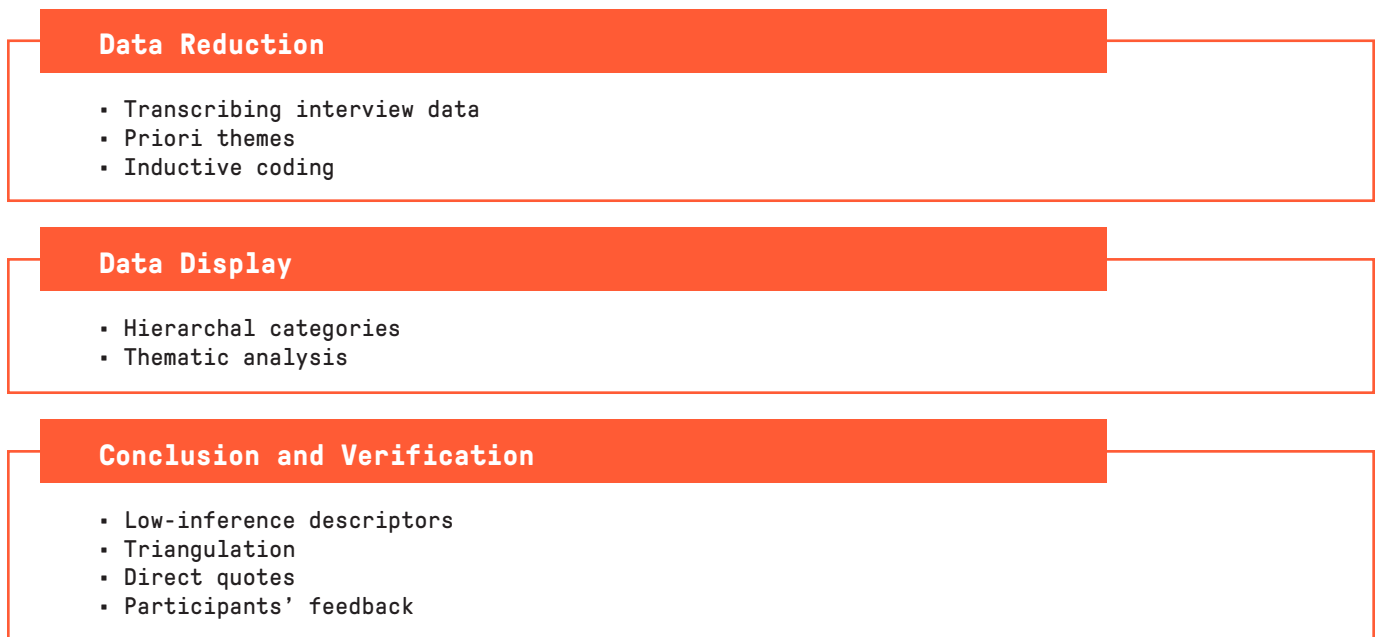
Figure 3. Qualitative data analysis procedure based on Miles and Huberman's (1994) framework.

concepts, models, and propositions (Forza, 2002). The purpose of the survey was to test the adequacy of concepts developed through interviews and theory in relation to the project managing, looking at hypothesized linkages between concepts as well as validity and boundaries of the concepts (Forza, 2002). The survey development process used here was as shown in Figure 4.

The survey incorporated antecedents associated with two types of context at different levels of analysis (project and project team), all of which have played a central role in the extant literature. For each project manager participant, the survey instrument collected data on six categories, including some descriptive data:

1. Project characteristics: Size; Industry; Priority; Complexity: 1.1. – structural > size, variety, breadth of scope, 1.2. – sociopolitical: importance, people, political, players, 1.3. – emergent: uncertainty, change, lack of experience; Dynamicity; Stakeholders

2. Project management practice: Skills/Dynamic Capabilities; Processes; Purpose; Principles; Diversity of Team Members

```
Link to theoretical model
Practicing project management as a self-organizing, collaborative environment of endogenous
and exogenous micropractices (12 Ps and complexity—see Figure 1)
    → Constructs (operational definitions—focus on what)
    → Propositions (discussion of the role of constructs—dependent, independent, moderating
      hypotheses: direction of linkages)
    → Boundary conditions (definition of conditions, unit of analysis [team/project],
      population)
```

```
Design
        → Macroconstraints
        → Specify information needs
        → Define target sample
        → Identify data collection method
        → Instrument measurement (how)
```

```
Pilot
    → Test administrative processes
    → Test processes for nonrespondents, missing data, and data cleaning
    → Assess measurement quality in an exploratory way
```

```
Collect data
```

```
Analyze data
```

Figure 4. Survey development process (adapted from Forza, 2002).

3. Dynamics of social complexity in projects (endogenous/exogenous): Collaborative Enablers; Collaborative Barriers; Collaboration Motivation; Culture; Complexity Structure

4. Dynamics in the ecosystem

5. Project success: Measures (traditional performance); Customer focused; Who sets the success criteria; Impact

6. Project collaborative innovation: Culture; Inhibitors; Challenges; Embeddedness (absorptive capacity); Drivers; Benefits (participation in creative process); Learning; Profit (benefit from innovation)

The self-administered survey questionnaire was developed using the online survey software Qualtrics. In order to test administrative processes, and to test processes for nonrespondents, missing data, and data cleaning, as well as assess measurement quality in an exploratory way and avoid research biases, a pilot study of the questionnaire was conducted. The pilot itself adopted a pluralistic approach, including structured discussions of questionnaire items as well as self-administered completion of the survey form with a subsequent feedback discussion. The survey was piloted from August 2015 to October 2015 and led to a number of survey modifications, resulting in the final format of the survey questionnaire.

We sent survey participation invitations to 800 practitioners, and the survey was available online from January 2016 to March 2016. A total of 289 respondents attempted to complete the survey questionnaire. However, due to a substantial noncompletion rate and a number of unusable responses, the final number of usable responses collected was 218, all of which were analyzed and evaluated.

Data Analysis: Analysis of the questionnaire was carried out using Statistical Package for the Social Sciences (SPSS) software. For the binary questions, a chi-squared test was used to compare differences between developed and developing countries and between subject matter experts (SMEs) and large organizations. The ordinal questions were analyzed using the Mann-Whitney U test (Kohlmann & Moock, 2009).

4.2. Reflexivity in Project Management Research

As seasoned scholars, we recognize that despite our best efforts to undertake a comprehensive program of research, which we feel remains central to what we have accomplished, we also acknowledge the inherent limitations in research. One of the challenges we faced in a two-year study that combined such a varied and multiphased research strategy was the volume of data we had to work with. This undoubtedly provided us with the scope to reach a much larger sample of informants and obtain insights from practitioners on a whole range of project management experiences, across sectors and across countries. This richness, however, cannot mitigate against the challenge of engaging with multiple realities and the finer aspects of context specificity that define how project managing is practiced. And mindful that we are interested in arresting such practicing, we recognize that despite the rigor of our methods and the sensitivity to social, p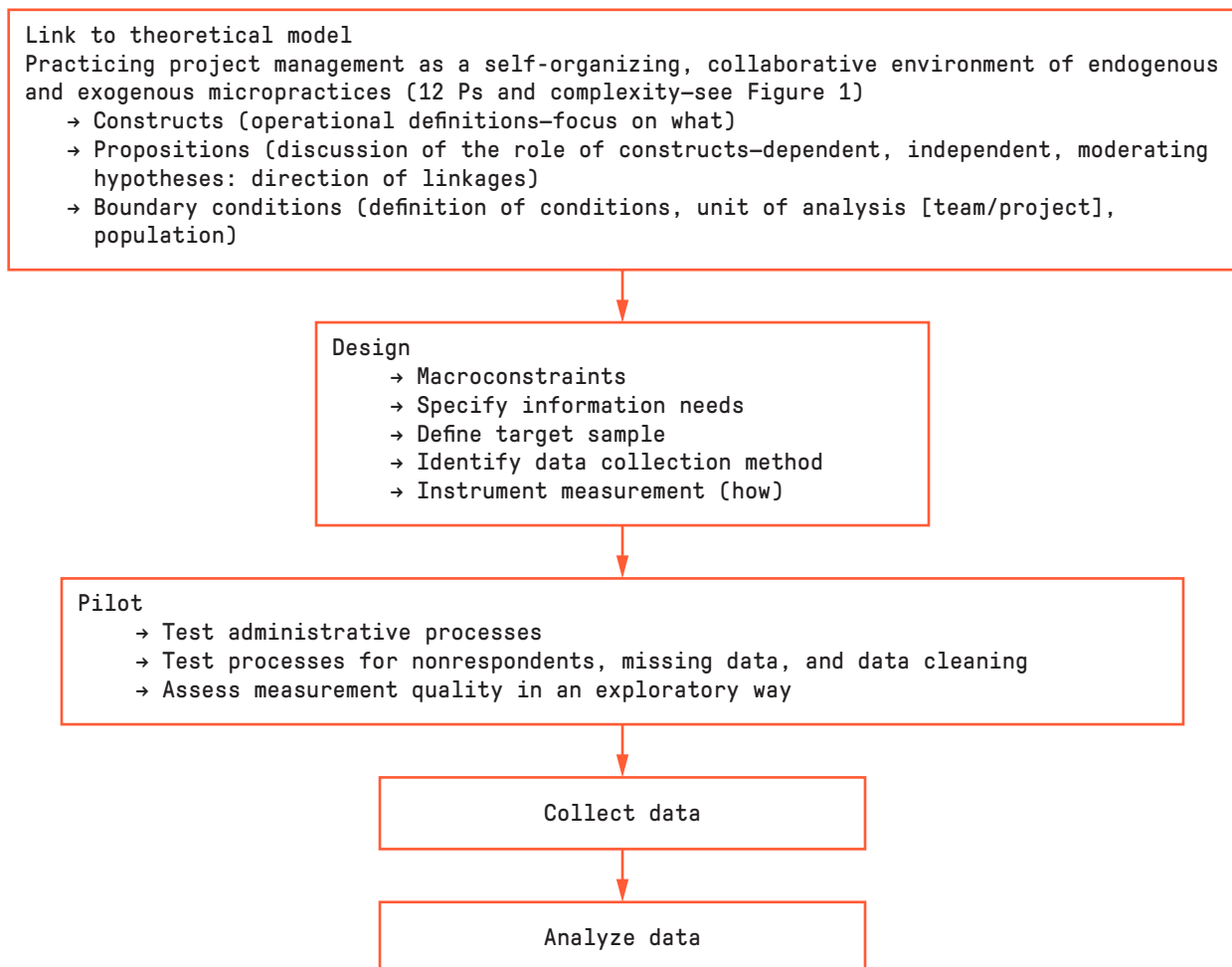olitical, cultural, and other conditions fueling project complexity, arresting such complexity demands a more ethnographic approach than the snapshot approach that the methods we deployed to collect data permit. That said, we recognize that we made choices in "managing our research project" that we stand by as the right ones given all other considerations of time, budget, and so forth.

We are confident, despite potential critique, that our multimethod approach provides a rich account of lived experiences of project managing. We are confident that our commitment to realize the impact of our research, although not possible to testify to with evidence yet, will be positive in inviting further deliberation and debate and act as a foundation for further pragmatic steps in improving project management practice. One area that goes beyond the scope of our current project, but which this study would offer a firm foundation for, is the approach that PMI may support continuous professional development of project management practitioners. We feel that our analysis of project management practice—and the opportunity to account for the tensions in different aspects of project management as a practice—provides a valuable practical step in formulating educational programs in addressing such tensions and cultivating the level of professional judgment so critical in project managing under multiple layers and levels of complexity.

5. Findings

The following section focuses on the analysis of the data obtained through the empirical research's qualitative and quantitative efforts. Dr. Neil Turner and Dr. Omar Al Tabaa were key contributors to the qualitative analysis of this work. The findings are reported in a format that mirrors the two main research threads—project management as a practice and collaborative innovation in project management—that traverse this research study. Section 5 commences with an evaluation of the research concept of project management as a practice and concludes with evaluation of collaborative innovation in projects.

5.1 The Process of Managing Projects: The Complexities Experienced in Practice

In the interviews, we uncovered all three forms of complexity previously identified in the literature. Typical example quotes are given in Table 4.

This overview of project complexities provides support to the typology presented by Maylor and Turner (2017). It suggests that despite the variety of characteristics that shape projects, their complexity exhibits a degree of consistency. Similar consistency can also be identified in the typical response examples within the three categories of Maylor and Turner (2017) (planning and control, relational, and flexibility). We capture illustrative examples of complexity responses in Table 5.

One of the key findings from the research, though, was the paradox of balancing the structure required for organizational functions, together with the flexibility necessary to deal with the practical day-to-day realities of coexisting complexities. This came through clearly in terms of how the managers used their judgment in deciding the best way forward in particular circumstances. This sometimes involved overriding or bypassing standard procedures:

We also have an in-house methodology which I've used before, which is—it kind of sucks—but it's good for small projects; it doesn't work for big projects like this. [44]

This could be situational and based on their experience as to what would work best. "One-size-fits-all" was not deemed appropriate:

Now, if I am managing a project, let's say in the oil industry in Nigeria, the way I manage it will be quite different from the way I would manage it in, let's say, Scotland, because of community issues. So, the project management style has to work specifically with where you find yourself. There are the professional inputs which are basic in project management—we must know about planning, executing projects—but if we don't have an accommodating environment, it becomes an uphill task. [30]

The relation-building aspect was critical to bringing about a successful outcome. Working with multiple stakeholders with different agendas is an ongoing challenge, and the human dynamics are an integral part of any project. Collaboration was identified as a key to success—hard to instigate, though easy to derail.

I would start off with a collaborative approach, although I do like the power of the project manager. I like to engender collaboration, also teamwork, trust, honesty, ethics. [3]

Building a social environment that is conducive to successful knowledge integration is important. Managers developed their own techniques over time. As one succinctly put it: *"I've used cake"* [44]. Trust and collaboration take time to develop, yet these can be invaluable in building a team that can be utilized on future projects also. As one respondent noted:

I keep a very short paper in my wallet, which is a short list of people called 'my heroes,' and I use them on the absolutely impossible things to do. [24]

The practical judgment necessary in this context is central to operating under conditions of complexity. This was recognized in the discussions and, through reflection, some of the participants identified the essence of what their role meant in these terms.

Complex projects increase your level of thinking because they are a catalog of problems flowing through your style of managing projects. So, today,

Table 4. Examples of Project Complexity

Structural complexity	*"Definitely, it's difficult to be in Angola, and we know also that we don't have all the support if we are in another country, also some stupid issue like not having internet or the phone for a few days can happen often . . . If I am in Europe doing that, then it's 10 times easier."* [4]
	"In Nigeria, we have outages, power cuts that also will affect the pace. We have issues in transportation, you find that there are many cancellations in flights and so on so that also is a problem." [17]
	"When you have a few major suppliers, but if you go one level behind them you may see that they have a myriad of small businesses as supply chain and you have to, you know, you have to anticipate whether these observe quality, whether these people you know can provide material on time. OK, I mean you are outsourcing this problem to someone else, but it is your problem at the end of the day as well." [24]
Sociopolitical complexity	*"So we have the end users pushing for something which they feel is very important for them and the sponsors think otherwise. As project manager you need to decide how to bring the sponsor and end users together in order to have some level of agreement in order to proceed."* [6]
	"Building the team, the main thing that I have tried to achieve in my project especially reducing the conflict and the misunderstanding between the different cultures in order to have a proper communication between the different departments." [1]
	"Just because a project is on time and on budget does not mean that it's successful. Other things are forgotten about. Sometimes they forget stakeholders, and those stakeholders go on and cause issues. Maybe they might strike or go and burn the place, or riot or something. So eventually the project ends up not being successful because it didn't take stakeholder issues into account." [8]
Emergent complexity	*"It's a software project so you don't start with a known, you know, broadly how it's going to look at the end, but, of course, the day-to-day detail emerges as you find out more."* [44]
	"Yes, you have to be very aware of things external that are going to hit you whether it's organization changes or strategy changes, or competitor changes. Whereas I think a traditional view of project management is quite insular, you get a brief and you perform to that brief. That doesn't work." [44]
	"Something is always new; you have to expect the unexpected and you have to be prepared for those things that you cannot be prepared for, so I think that's also part of it: adventure." [35]

Table 5. Examples of Complexity Responses

Planning and control	"I have to have a policy. I have to have a checklist: a monthly or weekly meeting; feedback from the lower levels, those in the field; commitment, good communication." [2] "A particular organization will write their own procedures, so you will have a procurement procedure, a certification procedure, quality assurance procedures. A lot of them are fairly standard in the industry; it's making sure they're applied and how they are applied is the key." [3]
Relational	"Agreement between the key players is not realistic, but the project manager should be able to manage this issue by discussion and remove any misunderstanding between the key players." [2] "The first thing is to gain the client's trust and to work honestly for the client." [1]
Flexibility	"Things happen, mistakes happen. Let's see not who's to blame, but let's see how we can fix it." [9] "As you're working with people, even if they follow the procedures as they are, there's always improvement or a better way to do that, and you have to be flexible enough to understand that people can find the proper way of working and working a better way." [7]

I am meeting this challenge. You have to sit down, think, find a way out. So, that act of trying to solve problems successfully each and every day will elevate you to another level. You won't be like a person who meets a problem today and then runs away from it. You never run away from them, you just tackle them one by one and make sure that all of them are solved. So, solving different types of problems of quality makes you better by a million miles. [31]

In summary, project managers' experiences and perceptions of the complexity of project managing is not only a recognition of multiple types of project complexity. Perhaps more fundamental is their recognition that their responses—as they navigate project complexity—hold the key to project success. This means that the way of engaging and responding to project complexities calls for recognizing and working with the emerging paradoxes and tensions project complexities create. It is precisely these emerging paradoxes and tensions that, in turn, also provoke and develop practical judgments in identifying the "right" response under the circumstances. This process of forming judgments is also further explicated in the way project managers practice project managing.

5.2 Practicing Project Managing

Our analysis of the lived experiences of project complexity was extended to capture the way project managers perceive the dynamism of project managing. We feel that central to complexity, in general, and project complexity, in particular, are the forces that create the conditions for complexity as opposed to the types of complexity alone. These forces are multiple and cross a number of levels and units of analysis, creating a dynamic that catalyzes the need for responses and practical judgment. To arrest these dynamics, we invited project managers to rate the perceived dynamism of project management practice on a Likert scale of 1 to 5 (1 = stable; 5 = very dynamic). We noted, as expected, that project management was perceived by the majority (84%) of project managers in our sample as dynamic. What surprised us was that they rated project management dynamism with an average score of 3.6 (on the Likert scale). Further in-depth analysis revealed that the perceived dynamism included a relative balance between stability and change. On closer examination, the explanations managers provided to account for the perceived dynamism revealed that dynamism reflected the ongoing adaptations and adjustments during the life of a project that were the norm given the need for flexibility, agility, and resilience that were critical in engaging with project complexity. Table 6 provides

Table 6. Dynamism is Endemic to Project Managing

We always have changes in construction; for sure, yes, it's just a daily life of our project. The changes because of the clients, because of subcontractors, because of a technical aspect that was not foreseen at the beginning and we need to adapt all the time. We need to adapt our schedule . . . [4]

We have a forecast and everything; everything always can change. So, I think this is a good picture of the reality of this industry. For instance, for drilling, you can have a map saying you'll find oil or you'll find gas at that reservoir, and you can drill a well and find nothing, you know. There's always something that you cannot predict. So, I would say 4, because we try the best to not change anything, but change is always an issue on this area, in this industry. [7]

. . . project management is very, very dynamic, like dynamic is the way that there have been changes, changes for the better . . . that's why we have to be able to accommodate changes for the better, that's why; in future, the way forward is being very, very dynamic. [14]

Yes, that's constantly moving right, but you've also, you don't . . . I think it's a software project, so you don't start with a known, you know, broadly how it's going to look at the end, but of course the day-to-day detail emerges as you find out more. [18]

We are not stable. So, we have to switch every time, depending on the priorities which are fluctuating throughout the project, and then depending on the subcontractors, and the suppliers, and other contractors involved within a project, because they all are interlinked. So, that's why I would say project management cannot be stable, they are dynamic, but not very dynamic. But they are still, to a certain extent, every . . . [20]

There are a lot of adjustments . . . you have to submit drawings, to make a lot of decisions, contacting the client/consultant . . . project management is dynamic for each task, for all the project. [26]

For me, dynamism in project management is being able to adapt to the changes that may appear on the project in the schedule of, in the priming, or the design itself of the project. For example, if the client requests something else to do in the project you need to be flexible and react properly to this situation. Not, you know, not affecting the project itself. [29]

It is not very dynamic right now in Ecuador, the way the project management is performed because it is still only starting to be applied as a way of organizing work and it's not fully developed so that it can be sufficiently dynamic to be adapted to different circumstances. [29]

So, we can adjust ourselves—today you are using maybe a . . . system, tomorrow another technology, or control software for lighting, so we have no problem with that—we are very dynamic and like complex situations because they make us better, they make us competent. [31]

But if you ran away from the challenge because it was a new series of places and we need more training, sometimes you have to persevere as much as you can. The other challenge is from the balancing act—the types of projects where there is a correlation between costs, time, resources. This is another challenge which makes us better because I remember in projects where we were not so organized, we made some losses, but come the second project, we did not make the same mistakes—we improved in planning of resources and balance of time. It couldn't have been better if we hadn't met the challenge of making a loss in the last project. [31]

(continued)

Table 6. Dynamism is Endemic to Project Managing *(continued)*

So, really dynamism here, for you, is about having the experience to understand how to incorporate a degree of planning and projection of how things need to evolve in the project, and that's what makes it dynamic as opposed to just being reactive to issues that arise on a day-to-day basis. [32]

It's difficult to change things when many other changes happen at the same time, and I think the end user—it's the problem and you have to be dynamic on one hand, but you cannot actually afford to be very dynamic because you might actually create the opposite result and the people, they won't accept the new system at all. [9]

I can say that, I would say 2, because we try as we practice. We have a PMO, and we do things, you know, professionally, so, and, so we don't really . . . We try to manage whatever change that comes on maybe during the projects, and . . . but I can say 2, we don't really change . . . [33]

I think it is neither stable nor dynamic at the moment. We are only, to a very small degree, the drivers of the development, development in project management. Dynamic, to me, means we are the drivers; static means we are not driving but things are not changing, but I think we are not driving and things are changing a lot. I think many projects, one reason why I became a trainer in project management was that I saw project managers suffer. I saw them really suffer and I thought this is a position where I may be in a position to help them. I was very naive at that time, yes. [35]

I won't say it's . . . I won't say it's dynamic, nor would I say it's stable, but just coming to terms with it. The thing is that most times, projects don't go according to plan. And then we try as much as possible to minimize the change. If there's going to be a change, then it must be really necessary, so that's why I said that we are, is still on 3. Then I have to it rate 3. [36]

indicative quotations capturing project managers' perspectives on dynamism as the coexistence of stability and change.

The findings also show that dynamism is not only embedded in the practice of project managing. It is also shaped by a number of endogenous and exogenous forces. Among the most frequently identified forces underpinning the perceived dynamism of projects we noted included unforeseen changes and continuous amendments both caused by external forces. Moreover, among the internal forces of dynamism, we identified the following: competing priorities, technical difficulty, and maintaining competitiveness. Appendix C provides further elaboration and indicative quotations.

The forces underpinning the dynamism of project managing also signal the tensions that project managers experience as they navigate through various types of complexity. We would argue that our findings extend beyond the three categories previously recognized in the literature as reflective of project complexity. As we have shown in the earlier section, project managers in our study recognize and engage with structural, sociopolitical, and emergent complexity in managing projects. However, we do not find evidence of seeking either to eliminate, simplify, or avoid complexity. On the contrary, what is rather powerful in our findings is the perceived embeddedness of complexity as endemic to projects across sectors and countries. This was not only evident in the perceived dynamism that characterizes project managing consistently shown across sectors in our countries (see Table 7 for a sector-specific overview). What we draw attention to is not just the perceived dynamism as a common feature of project managing across contexts. Instead, we want to emphasize how this dynamism holds the key in understanding how project managers navigate through project complexity when this dynamism reflects the simultaneity of multiple forms of complexity.

This finding marks an important contribution to our understanding of complexity, generally, and project complexity, in particular. The dynamism of project managing reflects the simultaneity of more than one

Table 7. How Each Industry Rates the Dynamic of Project Management Practice

INDUSTRY	NUMBER OF INFORMANTS FROM THE SAME INDUSTRY	TOTAL SCORE (SUM)	AVERAGE
Construction	14	46.0	3.3
Oil & Gas	11	40.3	3.7
Service	13	50.0	3.8
Total	**38***	**136.3**	**3.6**

Five of the informants did not provide a specific rating.

type of complexity, and offers an extension to previous conceptualizations of the responses to complexity. We are able to recognize that "managing" complexity is not a matter of simplifying issues to identify a more manageable course of action. Instead, it reveals the paradoxes and tensions that guide the responses, which, in themselves, also mark a balancing act between following procedures and established standards, at the same time as responding flexibly and demonstrating creativity and innovation in the way connections are made. We illustrate diagrammatically the process of "managing" projects we are formulating from our analysis in Figure 5. We feel that this flow of connections may appear linear, but this is not our intention. We seek to show that projects unfold as part of the complex process of "managing." Our treatment of the latter is not merely processual and temporal but also relational. It draws attention to the connections that are often

hidden and not always fully exploited. We illustrate the relational character of "managing" through a closer analysis of the practice of project managing.

The Practice of Project Managing

The endemic complexity and unavoidable tensions and paradoxes these create are powerfully evident in our analysis of project managers' accounts of the practice of project managing. We approached this issue building on social practice theory and its application in analyzing other management practices (e.g., leadership, strategy, etc.). We did not, however, opt to limit ourselves to either the practice, practitioners, or praxis (Whittington, 2006), nor limit the discussion to modes of social interaction and associated modes of knowing (Gherardi, 2006). We adopted, instead, an open-ended
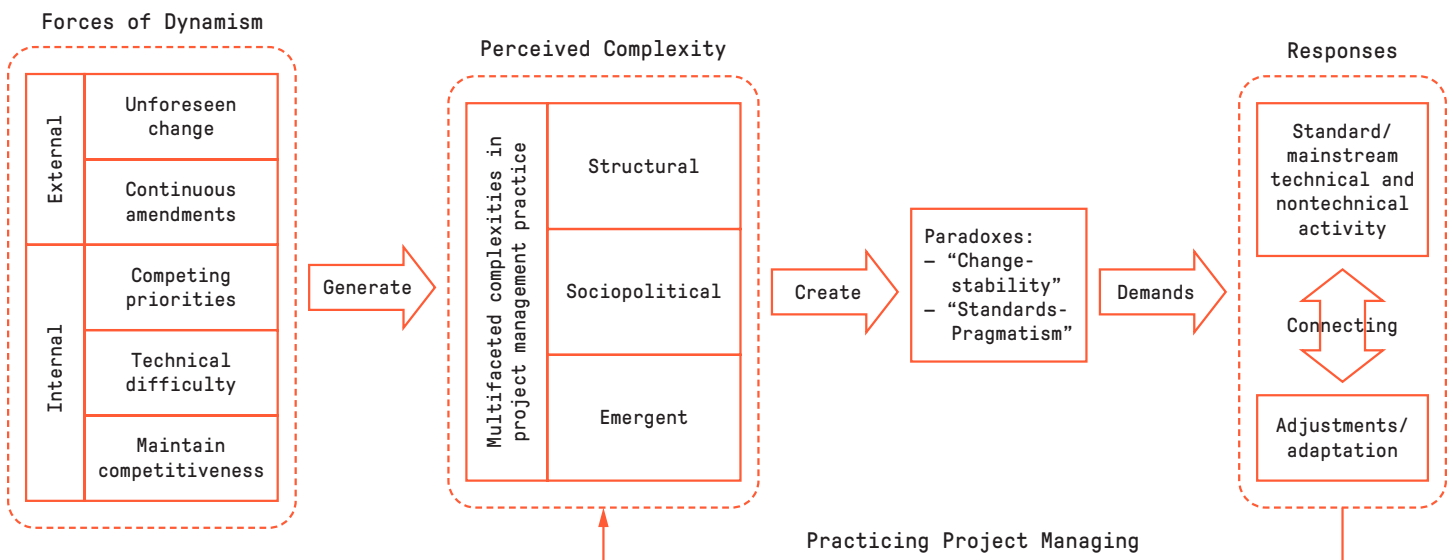

FIGURE 5. Practicing project managing.

attempt to capture managers' lived experiences of project managing by inviting them to offer practical examples from their own approach to managing projects. We sought to capture thick descriptions, even if not via ethnographic methods, of what managers do when they project manage, how they manage projects, and why they do project managing in the ways they do, to remain consistent with our focus on practicing project managing (Antonacopoulou, 2008).

In the first instance, we wanted to ascertain what project managers understand as their practice. By inviting them to address different aspects of project management practice guided by the 12 Ps framework, we are in a position to better explicate that the project complexity is also shaped by the connections project managers make of different aspects of project managing. We detail the main accounts project managers provided us with in relation to the *purpose, principles, procedures, pace,* and *place* in which project managing occurs in Appendix D. We focus on this analysis to draw more attention to the way project practitioners understand their practice and the practical judgments that guide their choices on how to act, especially in addressing complexity. Moreover, by focusing on these issues, we show a new dimension that project managers draw out attention to as critical to project managing—the key *players*. The latter provides a basis of extending the original 12 Ps framework to a new 13 Ps framework, which we will elaborate on in the discussion section.

We were considerably challenged by the difficulty project managers expressed in offering such descriptions of their practice. The analysis shows that a significant proportion (40% or 17 out of 43) of project managers in our sample were struggling to adequately describe their project management practice, were unable to provide a clear explanation or description of what they do, and were concerned that they did not have a comprehensive response and may be omitting key considerations in how they would be "expected" to manage projects such that the approach was deemed "successful." Indicative of this difficulty in articulating what, how, and why the practice of project managing is performed is illustrated with the following quotation:

> *What do I do when I manage projects? I do all the way from the planning, from the contract award, the bidding stage, contract award, monitoring. So, all that, that's what I do . . . How do I do it? Most of*

> *the time, I use electronic means. Email, phone—email and phone most of the time; there are procedures, company-provided . . . they cover my desk. [8]*

Attempts to provide a response and description of the practice of project managing tend to account either for established project management frameworks and models, such as PMI's *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Sixth Edition (PMI, 2017) or Prince II, or for characteristics/components that reflect general standards. Moreover, a much smaller proportion of respondents in this category use the opportunity to account for ethical standards, materiality (how they use tools to support their project management practice), or their approach to handling the issues encountered.

Table 8 provides indicative examples of the descriptions projects managers present when describing what they do when they "manage" projects.

The general sense across all interviews, but especially due to an expressed lack of clarity, is the lack of reflexivity in accounting for what they do. When presented with the 12 Ps framework, project managers in the sample, overall, recognize the various aspects (12 Ps) and find it helpful as a framework to recognize aspects of project managing that they otherwise would have held in broad categories, such as Planning and scheduling (72%), People management (42%), Change management (35%), Communication (33%), Cost management (26%), Monitoring and controlling resources (21%), Project scoping (21%), Quality standards (21%), Competence and expertise (21%), Delivery and execution of projects (19%), Time management (19%), Risk management (16%), and Stakeholder management (14%).

Overall, project managers in our sample rely on personal experiences, the guidelines from PMI, or related perceived standards in the profession, and adopt an approach to performing their project management practice that is focusing on balancing/adjusting: people issues (within the project team); relationship issues—including conflict and competing interests with other project stakeholders (clients, contractors); and task issues—multiple activities that require coordination.

Further triangulation of our data across interviews, focus groups, and surveys provides a broadly common pattern in the way project managing is practiced, drawing on three key groups of processes: 1) planning, scoping, scheduling, monitoring, controlling, and

Table 8. Lived Experiences of the Practice of Project Managing

I cannot say that I am following the book the way that I am managing my projects because of . . . there are a lot of senior management requirements and support that it is giving to the project managers on their task. The tools that have been given to me, I am just using it but I am trying to build the team several times . . . the building the team, the main thing that I have tried to achieve in my project, especially reducing the conflict and the misunderstanding between the different cultures in order to have a proper communication between the different departments. The second thing was the selecting criteria, although I am not fully authorized to select the material and the contractor that is going to work on my project, but I tried to concentrate more on the qualification side of them instead of concentrating on the financial aspect. For example, I have success in one and failed on the other one and . . . the selecting the contractor, there were two contractors, one has offered us US$25 million and the other one offered US$19 million. I have selected the US$25 million, although that is US$6 million more, but that contractor was a really reliable contractor and it was proved that he has completed the project and they have completed the scope. Although there were some financial issues between us and the second one, there was a . . . contractor who was going to work with us there were two offers again; one is US$3.6 million the other one is US$1.7 million. I have been forced to select the US$1.7 million because it's cheaper and it's within the budget. We ended up doing the work three times. [1]

In my last job, I got involved with project managers . . . I think we had nearly 180 project managers I was responsible for. I guess the way I saw that role was from a distance, not particularly hands on, but my view of the way the project manager was, was very much to do with going through the various steps of the various milestones through the project life cycle, from inception through to commissioning. I don't know how I did it now; I must have done it as an automaton. If someone said to me, "explain what you did," I guess the first thing I did was, as a client's project manager, I would be awarded the project then obviously there would be a period of time for determining the requirements of the customer, then procurement of the professional design team, then the design and definition, then the procurement of the contractor and the management of change and management of commissioning and completion. I did all that as a project manager through a series of standard benchmark processes, which were quality assured. Overall, I would think that there would be characteristics in that role which, if I was selecting a project manager, I would look for. Most project managers in my industry would have to know what the various processes are, and the processes are not rocket science; the difficulty is the determination and application of strategy, and, of course, the application of leadership. You can pick up any project management book tomorrow and it will tell you all the steps. The PMP manual tells you everything. It's not what you do, it's how you do it. [3]

So yes, we have a lot of techniques and practice, but I think . . . there's no (x) recipe, you have to find the best way to work, because as you're working with people, even if they follow the procedures as they are, there's always improvement or a better way to do that, and you have to be flexible enough to understand that people can find the proper way of working and working a better way. [7]

I break down every element/task/activity. I give it time; I estimate time, the needed labor, the needed materials/equipment. I go with what I have and check if I have any diversity and then that's it. Following the work breakdown for all the tasks I can manage to combine everything together, and manage the problem on-site. [15]

. . . we talk of all the rudiments as I said, from initiation, planning, monitor and control, and then now, according to the specific project that you are doing. There are many projects that we are doing that are run of the mill. They might not count as projects in the UK but here they are projects because they are complex activities that are sequential and they have all the intricacies of projects. [17]

(continued)

Table 8. Lived Experiences of the Practice of Project Managing *(continued)*

. . . I go on-site, I check what we are doing, I talk to people, what are they doing, what do they think is going to happen, if they have any problems, trying to figure out if there is something I can do to help. A lot of what is out here is that they don't plan very well, the local contractors, so you really have to . . . we have taken over all kinds of supply to them, so we supply material. So I have taken control over that process so that I buy and I define when things are arriving based on their input. And thereby I protect my project from, you know, from delays and cost as well, you need to speak to your engineers, what are we doing, do we have any issues, the same, really, like checking up on every aspect of the project pretty much on a daily basis. Which relates to, in our case, we mainly focus on safety, quality, time, and costs, I would say. [19]

We try to follow some PRINCE2 principles, and we try to . . . communication, that we always involve people, the right people at right times. We understand the context of the organization, we don't overcome the strategy of the organization, we have to understand their context also. And many times we came across, and we are still coming across, culture differences because we are working in an environment, and people are from different countries in the world, so we always face, sometimes many problems . . . The official language of projects is English, but still people communicate in Dutch, and then we miss sometimes communication for people who don't know Dutch. And then I wonder what else can I think . . . preparation of the planning, we do it . . . there is the biggest thing with realistic planning, not like on paper, which would be feasible, and it should be implemented. That is also one of the concerns always there, because most of the activities are being dependent on each other. And then tracking the project within the scope triangle, that's . . . but I think is one of the top priorities. And then last, but not the least, change management. Again, every time I talk about change because we always . . . many times we pay from our pockets and we struggle to get them back from the clients. [20]

I do it that way because of having experience and intuitiveness, things which you cannot be taught but you know or can predict them (e.g., when I am running a project with a government agency, of course my way of doing projects will be different to the way I do it with private organizations, factories or industries). Working with factories or industries you have to be very formal, follow the procedures, and make sure you execute your job quickly with perfection. But dealing with government is difficult because you can follow the procedures but they don't pay on time, or appear at on-site meetings, don't discuss problems, don't want to solve the problem, delay making decisions. So, they make your practice difficult. Practicing of project management depends on the client, on the type of project: Is it long or short? Is it private or government? So, you approach projects depending on the nature of the project, the client, or the scenario (e.g., a project like overhead line construction from a private customer will start following giving a quotation, you accept the project, you will proceed with planning of your team, how you can plan your team to execute a project, planning of materials, assigning resources, and from there on the kickoff, then you continue to get the weekly reports, you can see if you're on schedule). That's it until you finish the project. If the problem comes, you communicate as usual and then you can find a consensus and solution for that problem. But the main problem we are facing in project management is that decision making of most stakeholders is very difficult. Most clients delay to decide or don't decide at all or are worried to decide. But I have to decide. I don't care if I don't get 10/10. But at the end of the day, you have to make a decision so things can move on. We are faced with delays in most projects because of poor decision making or indecision. [31]

(continued)

Table 8. Lived Experiences of the Practice of Project Managing *(continued)*

So we do . . . so we select the contractor that would execute the project, and I would do the scheduling that will be agreed by all the project stakeholders, then the monitoring . . . yeah, the monitoring after the project has commenced, I try to, you know, to confirm or affirm that the work that the contractors are doing is based or strictly in line with the agreed specifications that were stated on the contract. So, monitoring, then, yeah . . . So, monitoring and . . . sometimes we do evaluating, too. Evaluating the job the contractor has done so far, because there are some projects that the payments are then based on the work that the contractor has actually done, not . . . yeah, actually performed. So, we try to, you know, evaluate the job being done to, you know, to raise, to give them payment. [33]

First of all, I am managing the cost of the project; I am managing the budget, the quality of the project, because all these quality issues are coming in front of us, and managing the health and safety of the project. I am, as a project manager, the one who is responsible for the health and safety of all the project. In my current project, at my site I have 6,000 workers, and all those workers are the responsibility of the project manager . . . safe working environment. This is the most basic part of my project. You have to manage these health and safety issues. As project manager, you have to communicate with the client, with the contractor, and all these negotiations you have to follow up. There are so many items that I can describe but the main one is quality, health and safety, cost, and communications. [34]

I would say that in the project management, there is not much structure here, and we do have some kind of checklist, so how will I define the . . . presented as a best practice that it has to be done like that, but things hardly go as planned. So, it's more like, kind of a time-oriented approach, and we really should think of something that may not stand with time, you know, to change your strategy. And there are other things, in case of project failure, to be able to get things done which are more necessary at that stage. So, it's more of an ad hoc, if I may say, but of course, based on proper understanding of the structure, but definitely it doesn't go as planned . . . I think there's a tension field between two extremes, one extreme is the long-term planning; it's the planning with a long planning horizon, extreme examples for that are bridges, bridges need a long-term planning horizon. I also saw projects like that in the chemical industry especially in plant manufacturing. When you build a chemical plant, there aren't many changes there, the business case is not changing, chemistry is not changing during that time. You may have some changes with laws or so but they come very slowly, they do not come quickly. So, there are some projects where you have a very long-term planning horizon and there are others where you have a very short planning horizon, which I said that's the projects where the ways are made by walking. By the way, that's part of a Spanish poem by Antonio Mercado who wrote, "where you follow there is no way, the way is made by walking." I love this very much. It describes a very specific situation that we have. [35]

We are practicing a profession. For example, I am practicing an architecture profession but in the meantime I am integrating these project management activities to my profession. What can I say? "Grandma, I will build that building, and when I am building that building I will use so many workers, so many engineers, architects, and I will have a client and I have responsibility to the end user of this building." In handling project management, I have to consider all these people, and at the end this building will be constructed on this paper, and all these people have an effect on the end product. Every moment they are pulling from their side: The client wants to add something, contractor wants to reduce something, workers want to do something. Every stakeholder has an effect on that end product so you have to manage all these people and you have to deliver the product as whatever is written on the paper at the beginning. [37]

executing; 2) managing change, risk, cost, time, and communication; 3) people and relationship management and levels of competence and expertise. These processes form some of the key "aspects" of project managing as described by project managers in our study.

Our reference to aspects as opposed to tasks, activities, and actions is in line with Antonacopoulou's (2008) analysis of the 12 Ps aspects of practice. We specifically asked project managers to account for the key aspects of project management practice where we found the same issues being considered as essential aspects/components in managing projects. The key issue that we note when inviting project managers to account for the key aspects of project managing and compare these aspects with their descriptions of project managing is that the latter reflect an orientation toward the perceived standards and rules of project management. On the other hand, we note that when invited to account for the aspects of project managing practice, they express more openly and lucidly the unfolding choices made and judgments formed. This finding is reflected in the typical descriptions project managers provided to account for their project management practice (see Table 8).

On further analysis, when managers are invited to account for the key aspects of project management practice, we can begin to recognize that a key characteristic their accounts reveal includes the finer capacity to make connections. These connections can be recognized as "capabilities," but they are fundamentally more than merely competences to undertake project managing. They reflect the unique qualities different players bring to the act of project managing collaboratively. Table 9 outlines key findings in relation to key aspects underpinning project management practice that project managers in our sample accounted for.

It can be argued that project managers' perceptions of what they do when they project manage is reflecting the ways they work to engage with project complexity drawing on technical ability, relationships with other project stakeholders, and managing the unknown. Indeed, we would argue that when unpacking the aspects of project management practice, we can reveal that the capacity to use technical capabilities can serve working better with structural complexity, while the capability to build and maintain relationships with other stakeholders supports working better with sociopolitical complexity. Finally, we can

argue that the capacity to navigate the unknown reflects the way uncertainty and change are worked with in emergent complexity. In Table 10, we present the initial associations we distill from our analysis to show how moving beyond descriptions of project management practice to also capture the perceived aspects of project managing opens up the possibility to recognizing the connections project managers make when practicing project managing and, in doing so, the capacity they develop to work with different project complexities. Indeed, the aspects highlighted above shed light on the nature of complexities embedded in project management practice. In particular, the three aspects mirror the three types of complexities that are facing practitioners, including: structural, sociopolitical, and emergent complexities (Maylor & Turner, 2017). See Table 10.

These complexities, as we already explained, express the tensions and paradoxes that project managers are compelled to work with in engaging with different complexities, particularly when they are experienced simultaneously. Our analysis revealed two paradoxes as central to project managing: "change stability" and "standards pragmatism," as explicated in Table 11. Interestingly, the analysis shows that project managers respond to these multiple complexities using a mix of technical and nontechnical activities, as demonstrated in our findings in Table 12.

Responding to the paradox of structure and flexibility, adherence to standards while remaining pragmatic in dealing with the uncertainty reflecting their context-specific reality, explains the imperative role of judgment that project practitioners are perforce to demonstrate. Similar to technical, relational, and resilience capacities, practical judgment is also a capacity to serve the common good. In the case of project management, the common good is not merely delivering a project on budget, on time, and in high quality. It is also a reflection of how tensions embedded in paradoxes become extensions by focusing on the impact of the project to the wider ecosystem. This appreciation adds to our understanding of project complexity, not merely the need to engage with the tensions experienced by deciding how to balance competing priorities, but also how to exercise good choices in the practical judgments they form. Exploring project managers' choices and judgments, we begin to unveil the way project complexity is not only worked with, but also a central aspect of the lived experience of project managing.

Table 9. Key Aspects Underpinning Project Management Practice

ASPECTS	SUPPORTING QUOTES
Technical Capacity Technical procedures in project management (e.g., planning, which involves understanding clients' needs, costing, control, which includes the prediction and managing of change, and procurement)	▪ *The aspects would be, first of all, an endeavor to systematically plan and execute and manage a series of activities. The second one is to, again, in a systematic way, to incorporate materials, people resources, tasks, will and requirements, and behavioral aspects in one gigantic plan if that is feasible. [24]* ▪ *The top aspects to be successful with project management here are about frequent control of the projects. As I, that is the main aspect of me right now . . . I have perceived that there are a lot of problems with monitoring and taking or making the right decision at the right time. So, we need to control, on an almost daily basis, especially in the sector where I'm working right now, because the time is very critical for the fruition of the company. [29]* ▪ *Also, the point that I mentioned about knowledge management, so the way you deploy your project, including what are the information, or all the knowledge for you to, to execute the work, so that point also is very important. Where people . . . you find the correct information for them . . . to execute the work in the most feasible way. [23]* ▪ *During the execution and the monitoring, we have to look for warning signs of any possible risk that might be involved in order to mitigate it while monitoring also our work: Is the quality okay? There are several warnings that can be given from the review that will help. [13]*
Relational Capacity Relationship Management (both internally and externally) Establishing and maintaining communication channels within the project management team and with external stakeholders (e.g., suppliers)	▪ *[In] project management, some aspects relate to, to personal relationships, so need to have clear communication with customers in order to . . . have a clear scope of work . . . so that we reduce the changes during the project implementation. But also the communication with internal team members for them to know exactly what needs to be done. So, in that point comes to the human resources management . . . people skills and also people needs. People tasks have to have a, you know, to use the correct skills: people, people skills, or human resources. [23]* ▪ *[Another] aspect is the communication. You need to be involved in all the communication with the client, with your internal stakeholders, and all the people that are involved in the project . . . that is sometimes the government and some environmental part of some environmental entities. Communication is critical here. [29]* ▪ *The most important aspect of project management, in this day and age, with the way we do things in my industry, would be procurement. The procurement strategy dictates everything in project management construction. We have motivation, people, and leadership issues. The leadership traits of a project manager are absolutely essential. There has to be a corporate awareness. The best project managers are those who are very good at detail, who understand the technical side of the project. It is essential that if we have a project manager who is leading the construction of a cantilever bridge, that he or she has to understand the technical challenges of that construction. So, technical ability is important, leadership is important, as is procurement management/strategy. [3]*

(continued)

Table 9. Key Aspects Underpinning Project Management Practice *(continued)*

ASPECTS	SUPPORTING QUOTES
	▪ *We used to have teams that were cohesive, teams that can work with less construction and, here, I am considering the project manager the leadership that's provided. I am also looking at organizational support, if that's lacking on the project, you will find the project manager fairly incapacitated because he is . . . like a leader without authority, so he needs a lot of the organizational support—the support of management, and I'd say that was very important. [11]*
Resilience Capacity The ability to be flexible and adaptable in response to change and uncertainty in project management	▪ *Change will happen, but the changes should be approved beforehand. Those who approve the plan and the budget should hold responsibility for the result of the project. Another point: Completing the project does not mean that it is a successful project if it does not meet the approved and accepted criteria . . . My point is, when I have a plan/schedule/budget, I have a commitment to finish it, but also with the accepted criteria—acceptable for the customer, not myself. [2]* ▪ *We have the risk involved; we already have a risk plan prepared before the execution of the project with the mitigation plan for this risk. [13]* ▪ *There is no (x) receipt, you have to find the best way to work, because as you're working with people, even if they follow the procedures as they are, there's always improvement or a better way to do that, and you have to be flexible enough to understand that people can find the proper way of working and working a better way. [7]*

Table 10. Multifaceted Complexity in Project Management

DIMENSIONS OF COMPLEXITY	ASPECTS IDENTIFIED IN PROJECT MANAGEMENT PRACTICE
Structural: Reflects the difficulty of managing projects due to the multilevels of actions, requirements, standards, procedures (e.g., control), and activities that are interrelated (dependent in many cases) and necessary for project execution	Technical capacity
Sociopolitical: Managing projects demands the skills and capacity to coordinate diverse types of stakeholders (holding various demands and expectations) who affect and are affected by the progress in projects	Relational capacity
Emergent: This type of complexity emerges due to the fact that each project is unique. It also evolves due to uncertainties, human errors, and internal/external unexpected change, all of which demands modification or adjustment to the working plan	Resilience capacity

Table 11. Analysis of Paradoxes in Project Management Practice

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
Paradox 1: "Change-stability" dilemma: The paradox would come from two opposing views: Practitioners seek fixed routines to follow (e.g., plans, standards, control systems, etc.) that can enable them to fulfill project objectives set by clients within the predefined constraints of cost, quality, and time. Simultaneously, they face change forces internally and externally that destabilize the established plans and routines, thus require adaption. In other words, practitioners need to change at a pace that matches or exceeds the rate of change in their project environment.	The paradox evolves because practitioners are subject to two tensions: need to change and need for stability: a) Structural-emergent tension: The need to have a plan and procedure to follow (i.e., stability), even though it addresses multiple levels (i.e., structural complexity); on the other hand, they need to change and be adaptive (due to emergent pressure).	• *It's difficult to change things when many other changes happen at the same time, and I think the end user . . . it's the problem and you have to be dynamic on one hand but you cannot actually afford to be very dynamic because you might actually create the opposite result and the people, they won't accept the new system at all. [9]* • *To have an approved plan, approved budget commitment toward the plan and the budget . . . Change will happen, but the changes should be approved beforehand. Those who approve the plan and the budget should hold responsibility for the result of the project. Another point: Completing the project does not mean that it is a successful project if it does not meet the approved and accepted criteria. So, it is not enough that I build a house and finish it in 4 to 6 months and, when rain comes, I find that my roof is wet or there is a crack in the wall. Or when I am running a hotel, I can offer a room to you for $x hundred per night, but when you come and open the fridge or ask for laundry or reception, you don't get an answer for 10 to 15 minutes. This is not hospitality. My point is, when I have a plan/schedule/budget, I have a commitment to finish it but also with the accepted criteria—acceptable for the customer, not myself. [2]* • *The issue of cost; the issue of time. Then you need to have a plan at least. When you have a plan, you ensure that you keep within time. The project management plan, you try to communicate with the stakeholders, so that they also understand where you are standing. And then ensure that whatever you have changed is something that is very important. And the issue of time also has a corresponding effect on the cost. But if the problem is achieving the time, that will have an effect on the quality. [5]*

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
		• *This is a way (i.e., to have a procedure) to keep the project on the line, you know, as planned. So yes, we have a lot of techniques and practices, but I think . . . there's no receipt, you have to find the best way to work, because as you're working with people, even if they follow the procedures as they are, there's always improvement or a better way to do that, and you have to be flexible enough to understand that people can find the proper way of working and working a better way. [7]* • *I would say that in the project management, there is not much structure here, and we do have some kind of checklist, so how will I define the . . . presented as a best practice that it has to be done like that, but things hardly go as planned. So, it's more like, kind of a time-oriented approach, and we really should think of something that may not stand with time, you know, to change your strategy. And there are other things, in case of project failure, to be able to get things done which are more necessary at that stage. So, it's more of an ad hoc, if I may say, but of course, based on proper understanding of the structure, but definitely it doesn't go as planned. [38]*

(continued)

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
	b) Sociopolitical-emergent tension: Pressure from emergent forces would disturb the existing sociopolitical system (e.g., current human resource configuration, relationship with clients) (trust, etc.)	▪ *Trying to keep everyone happy in the way you tend to do, most of my time, goes into keeping everyone in a kind of balance. I think that's the most difficult part from my boss who actually gets really upset with everything to the people of the security that they don't like the new system or that the network . . . that they think the system is too slow or the users, that they think the system is too difficult to learn and the devices doesn't work and the people that are doing a certain way of things . . . and you have to convince them that you have to do it in a different way and that's the way that I'm showing to you. It's much easier than it used to be. [9]* ▪ *Then how you . . . resource management. How you do resource in your project? Because every time, within what we are doing nowadays, within I'm talking about my experience, that we switch over sometimes . . . some people within the project due to priorities of other projects. And we tell them, "No, today you have to do this because today the demand on that site is much more." So, we switch them, and somebody new comes in, and we don't manage the resources, then the person who starts new, they have to restart or reboot themselves to begin. So, resource management is very important . . . [for] change management, [w]e go further by having proactive actions sometimes, and we say "Let's do it because we think it's better," But later on, the client says, "No, I don't approve it." Then we pay it from our costs, or from our pocket. And then we don't have an approval on the change. And that's why, I would say, scope creep. We try to avoid creep in our project by identification of risks often and telling them on time with good communication management. And then we try to resolve, or we should try to resolve the issues ASAP, not waiting for someone till the alarm rings. So, these are the points which I think are . . . they are more, I would say, best practices to follow. [20]*

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
		• *So, let's assume I am talking to the apprentice who is with me and is trying to learn. He or she has to know that we are starting this project to satisfy certain deliverables . . . Why are we going to do this project? What are the steps we are going to take in this project? These are things that I will be able to explain . . . I will be able to explain to you the steps we will take to achieve our deliverables, the plan, the process, the activities, tasks, how we will take them step by step, the structure. The structure . . . so you will know the steps we will take to handle most of the issues that will arise in the project . . . there is a crucial process . . . Definitely there is bound to be risk, as we are doing a manmade activity. It could be in cost, in human resources, in equipment, a lot of things are involved in a project. Finally, we will talk about the conclusion, which is very vital because the project owner will have to be satisfied with the activities that are done, with what we have tried to achieve, and it has to be acceptable to everybody, such that when we are closing the process, those that are concerned have to be there. So, the trainee has to know all these things. [30]* • *Aspects can come in a different way. You can mention stakeholders: The type of stakeholders you have will change the way you manage your project. Which type of stakeholders do you have? Are they supportive? How are they viewing that project? Is it important to them? [31]*

(continued)

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
		• *Basically, what I do is people planning . . . my experience has been in the position of construction projects. So, basically, I'd say I've been involved in a number of projects. And you know, you have to manage changes because it's really hard to know: How do you manage them? Managing costs, managing people who are working on that project, managing time, or the schedule of project . . . coordination, management of quality, that is very important in a contract . . . Reporting, also very, very important, you know, either weekly, monthly, or quarterly. Preparation of payment certificates . . . that is also a part of reporting. Having monthly meetings is also part of reporting and the communication. Basically, those are the issues I would come up with. [43]*
Paradox 2: "Standards-pragmatism" dilemma: This paradox results from the friction between PMI logics (or other institutional standards adopted by project actors) and actual practice of practitioners. The difference between what practitioners should do and what they actually do (pragmatically) would create a paradox, because stakeholders would not always share the same view about how the different complexity aspects should be managed.		• *The role of the project manager is to coordinate. A project manager has to plan and coordinate at each step. From inception, with the initial business case, determining what has to be done, to the design process, through to costing and estimating. There is a standard process. The last time I was a project manager was as project director for a number of airport projects, but I actually was a hands-on project manager a long time ago. In my last job—my current role—I get involved with project managers. But one particular job, I think we had nearly 180 project managers I was responsible for. I guess the way I saw that role was from a distance, not particularly hands on, but my view of the way the project manager was, was very much to do with going through the various steps of the various milestones through the project life cycle, from inception through to commissioning. I don't know how I did it now; I must have done it as an automaton. [3]*

Table 11. Analysis of Paradoxes in Project Management Practice *(continued)*

PARADOX	DYNAMIC	EXEMPLARY EVIDENCE
		• *[when asked about top aspect in project management] Somebody could say integrity is number one. You could start with maybe a code of conduct and integrity because in a project there has to be transparency within the project team and stakeholders. When you are trying to do something, you have to do it with transparency and ethics, but the first one should be maybe technology or planning. [31]* • *We try to follow some PRINCE2 principles, and we try to . . . communication, that we always involve people, the right people at the right times. We understand the context of the organization. We don't overcome the strategy of the organization; we have to understand their context also. And many times, we came across, and we are still coming across, culture differences, because we are working in an environment, and people are from different countries in the world, so we always face, sometimes many problems. And like no . . . we are, usually people speak Dutch. And the official language of projects is English, but still people communicate in Dutch, and then we miss sometimes communication for people who don't know Dutch. [20]* • *In the classical sense of it, the principles do not matter unless the project manager himself decides to go by them, apart from the ethical standards . . . there isn't much emphasis on principles. It is dependent on the project manager. So, I don't see that as being . . . But yes, the purpose has a direct impact on the customer's satisfaction. The procedures are more or less like the principles. It does not really have to be followed systematically or sequentially, like the code of ethics has to be applied. [10]*

Table 12. Response to Multifaceted Complexity in Project Management)

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
Technical activity (i.e., to follow mainstream standards): *This type encompasses different categories that describe the technical side of project management practice (i.e., what managers technically do). As explained by the interviewees, the aim of this activity is to fulfill project objectives.*	• Planning (that involves understanding clients' needs, costing, and control) (includes the prediction and managing of change)	• *The role of the project manager is to coordinate. A project manager has to plan and coordinate at each step. From inception—with the initial business case, determining what has to be done—to the design process, through to costing and estimating. There is a standard process. [3]* • *Project management entails a framework for a project to be carried out—setting parameters in which a project can be carried out, looking at what the particular project involves and requires, and setting a framework within which that the project can be carried out . . . also establishing whether that project is possible to be carried out or not. [42]* • *I break down every element/task/activity. I estimate its time, the needed labor, the needed materials/equipment. I go with what I have and check if I have any diversity and then that's it. Following the work breakdown for all the tasks I can manage to combine everything together, and manage the problem on-site. [15]* • *Preparation of the planning, we do it . . . there is the biggest thing with realistic planning, not like on paper, which would be feasible, and it should be implemented. It shouldn't be like, "Okay, we do it because the project demands." No, it is . . . whether it is feasible or not. That is also one of the concerns always there, because most of the activities are being dependent on each other. And then tracking the project within the scope triangle, that's . . . but I think is one of the top priorities. And then last, but not the least, change management. Again, every time I talk about change, because we always . . . many times we pay from our pockets and we struggle to get them back from the clients. [20]*

Table 12. Response to Multifaceted Complexity in Project Management *(continued)*

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
		• *You do the project management principles like what the book of what project management says about having the project, setting the project scope, and so on. So, you need to be systematic and . . . [do] a lot of thinking to your project management before you even begin in the first place. You have to have an in-depth knowledge, what I say, an in-depth knowledge about what you want to do or why you want to do it. Then you are able to do what you are doing and it will be stress free, but you have to do it. [14]*
	• Selecting subcontractors and suppliers (requires balancing between cost and quality), and ensuring that they match clients' requirements	• *The second thing was the selecting criteria . . . I try to concentrate more on the qualification side of subcontractors instead of the financial aspect. For example, I had a situation that we have two contractors; the first offered us US$25 million and the second offered US$19 million. I selected the first, although that is US$6 million more, but that contractor was a really reliable contractor. It was proved that he has completed the project and they have completed the scope. In another example, we had two offers again for some activities; the first is US$3.6 million the second was US$1.7 million. However, this time I was forced to select the US$1.7 million because it is cheaper and within the budget. We ended up doing the work three times. [1]*

(continued)

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
		▪ *Most times, we do engineering projects, so we engage the services of contractors or vendors. So . . . I do invite . . . a minimum of three contractors to bid for whatever project that we are doing. So that's why, making their bets, they will base their cost, or their bids on . . . strictly based on the scope given to them. And then, after that, we now determine which of these vendors that will eventually do the job, basing our judgment on the expertise of the contractor, then the financial capacity of the contractor, because we don't give them 100% up front, so we break down payments into three, we give them mobilization, we give them . . . most times we do 50%, we give them 50% mobilization, and then maybe 20%, 25% progress, and remaining 25% will be after completion of a project. [33]* ▪ *If someone said, "explain what you did" (i.e., in relation to project management practice), I guess the first thing I did was, as a client's project manager, I would be awarded the project. Then, obviously, there would be a period of time for determining the requirements of the customer, then procurement of the professional design team, then the design and definition. Then the procurement of the contractor and the management of change and management of commissioning and completion. I did all that as a project manager through a series of standard, benchmark processes, which were quality assured. [3]*

(continued)

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
Non-technical (political) activity: Describes the social side of practicing project managing that addresses relationships between key players.	• Team building, and cultural and leadership skills • Establishing and maintaining communication within and involvement of the project's various stakeholders • Also includes knowledge sharing within the team	• *The tools that have been given to me, I am just using it, but I am trying to build the team several times, the building the team, the main thing that I have tried to achieve in my project, especially reducing the conflict and the misunderstanding between the different cultures in order to have a proper communication between the different departments. [1]* • *I will collect my team. I have to have good resources (e.g., financial manager, human resources, or engineers), and most of them should have a leadership personality. Without that commitment to leadership, I cannot have a team. This sense of leadership will encourage them to follow the job or the activities, not just throw it over the wall, as they say. So, I will collect the team, which I need to manage financial and human resource and planning issues. They will be the core team. Also, I will ask them to hire people based on their knowledge about the business and which kind of staff they are comfortable to deal with. I will select my staff and I will let them select their staff. At the end of the day, if the business progresses well. It's good. Otherwise, I will ask them, it is your team, why did you not manage it properly? [2]*

(continued)

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
		▪ *Basically you . . . You drive everybody forward in the direction of the project. So, you need to communicate, share information, collaborate, constantly keep an overview of things and look ahead, protect your project . . . [should ask within the team] Are we doing what we are supposed to be doing? Is something we are doing not making sense? But in our case, generally, when we get into doing something, it does make sense, so we don't really look. Once we get the go-ahead, it's kind of a . . . then it is not dynamic anymore. The only reason, then, is to do a complete stop. So yeah, it's all about checking up that everybody is working in the right direction and we all have the right information to make sure that we are making the right decisions. [19]* ▪ *Of course, all that comes down to the project execution and here we are looking at the knowledge that we are acquiring in the process, knowledge in dealing with stakeholders, the knowledge we are acquiring for dealing with the management, dealing with suppliers, and dealing with team members. And so, we have someone also who keeps a record of some of these both from fitters, meetings, so that we are able to tell them what we did and perhaps what we could do differently in the future and, of course, we, this was not very important until recently. [11]*

(continued)

TYPE OF RESPONSE	MAIN FEATURES	EXEMPLARY EVIDENCE
		▪ *We try to communicate . . . that we always involve people, the right people at the right times. We understand the context of the organization. We don't overcome the strategy of the organization. We have to understand their context also. And many times, we came across, and we are still coming across, culture differences, because we are working in an environment, and people are from different countries in the world, so we always face many problems. For example, the official language of projects is English, but still people communicate in Dutch, and then we miss sometimes communication for people who don't know Dutch.* [20]

We asked project managers in our study to recount key incidents where their choices and judgments affected their project management practice. We were able, through these findings, to better appreciate the relational character of project managing, particularly in appreciating the intricacies of not only balancing competing priorities and interests, or tensions and paradoxes. Instead, the practical judgments project managers account for reveal the ethos that underpins the relationships they form with different stakeholders and the ways they seek to transform their projects from merely "projects" to be delivered on time and budget (the two most prominent measures of success) to *platforms for impact* that serve the common good such that the wider ecosystem is served. The latter is evident, especially among projects that demand the engagement of the community. Table 13 summarizes some of the key issues that inform choices and practical judgments when practicing project managing.

What emerges as an important determinant of the practical judgments project managers make in the course of managing projects are the key players they recognize as baring a direct or indirect influence on the project itself. This brings to the fore the relational orientation we have recognized in our analysis of project management practice that extends beyond a mere focus on social interactions between project stakeholders. The relationships formed between project players are varied but they are governed as much by negotiation in addressing individual interests as they are shaped by the emerging trust that extends the potential tensions of self-interest into a pursuit of the common good. The latter is reflected in the way project managers account for the key players in project managing. Table 14 summarizes the key players identified by project managers in our sample.

Table 13. Practical Judgments in Project Managing

This is so important, and why do I say the key players should have leadership common sense? Because it happens (e.g., now I am in the third stage of my project and there are five stages). It happens that some change will be requested by the client. Okay, we will make that change, but the change needs an additional report from the legal department to follow this issue with local government. At that time, he will try to manage this issue. Conflict will happen between legal and financial departments where the financial manager will not approve the additional cost because he was not informed. So, he has the leadership common sense, and because he has this responsibility, he will separate his personal feelings from the objective of the business. Agreement between the key players is not realistic, but the project manager should be able to manage this issue by discussion and remove any misunderstanding between the key players. [2]

I think that every project has a schedule of stakeholders. Usually, we would include every participant in the project and some would have different levels of authority. I think that what the project manager has to do is consider the views of the stakeholders. For instance, what the project manager can't do is be drawn into politics in the sense that one particular stakeholder or participant may wish to take advantage of the position or to use the position for leverage to more advantage to them. The project manager certainly has to balance the wishes of the stakeholders and it goes back to ethical choices again—it is part of it. If, for example, your sponsor is a ruthless sponsor who is only interested in exploitation, then the project manager has a responsibility to bring that to the attention of the sponsor and provide him with the possible results of that. The same with people who make choices, say, for instance, the environmental stakeholders, who may be a stakeholder in a project, whether the client wishes them to be or not, they have a voice and an opinion and the project manager has to listen and to provide information to those stakeholders. They have to do that in a way which is honest and unbiased. The difficulty with project management is that, as a client project manager, it is probably one of the most onerous roles there is. I looked after a project and we spent £4.5million per week, and we spent that amount of money for 18 months, so the amount of time required to listen and become involved with the key players/stakeholders is limited, but there has to be a role for all the different project managers in those major projects to actually act as honest brokers. The PI insurance for the project managers on these projects are the highest insurance premiums in the world. That tells you how onerous those positions are. [3]

Let me give you a clear example: There was a case where one person was dedicated to the project. Along the line, management felt that they needed this person to drive certain aspects of the business, and to them it was more important to have him in the mainstream business than to give us a different person. So, this is sometimes some of the conflicts you could have. You have someone who is very experienced, who understands what the project seeks to achieve, and is able to perform the tasks within the agreed time, but management thinks they need him for something much better. Additionally, you could have conflict of roles because if you are told you have someone in the project and you are supposed to manage him in the project, his manager also has an oversight responsibility for him in the organization. So, sometimes there can be conflicting instructions and these need to be resolved. Also, with the sponsors, sometimes requests from the end users are very strong, and they have a strong argument why they need to have it, but sponsors feel that this is not necessary or very fitting with the cash strategy, or they feel it is a very insignificant request. So, we have the end users pushing for something which they feel is very important for them and the sponsors think otherwise. As project manager, you need to decide how to bring the sponsor and end users together in order to have some level of agreement in order to proceed. [6]

(continued)

Table 13. Practical Judgments in Project Managing *(continued)*

We had a project in Poland when the market collapsed, when we actually had invested for a complete new factory, and we had to just kind of shut it down and just decide what to build and what not to build, you know, in order to . . . the project was terminated, basically, and where do you stop then? So, the whole thing changed from being driven by the schedule to be driven by cost. And you could say the same here. At the moment, I have a project where they are starting to be a bit unsure if we want to continue to go ahead or should we stop, where we—where you don't go in and yeah, trying, you know, the cost to complete and value of completing it versus stopping. So commercial, like financial, decisions really impact the way you can manage, basically.

Other aspects . . . if you do have, like, a safety incident, obviously, your management strategy becomes, you know, a complete stop, and you need to reassess everything to make sure that everything was done correctly and that this was an accident and not something that can happen again, before you then continue . . . Like, success, the overall success of the project, if there is any kind of major safety incident, that the whole project becomes unsuccessful no matter how much, how good you do the other ones, other parameters. On quality, we can take a smaller hit as long as we deliver to the right time, so the schedule is the most important after safety. And cost as well, you can spend a little bit more if you are faster, we can somehow find an arrangement within, in that, so safety and schedule is the most important for the most projects . . . In Qatar, during the World Cup, safety doesn't appear to be a big issue down there . . . Judging by the media . . . the workforce would have the opinion, yeah, I see what you are saying, I could fall down, but that will never happen to me, because I'm not that guy. But, yeah, it doesn't really work like that. [19]

A project manager can handle a lot of projects with different fields, but you have to have some basic knowledge in the field you work, because that impacts some changes you do, where you cause incidents in the project that you need to have, you know . . . You need to know a little bit more about the area you work for, or you have to have some technical guy that helps you, because, you know, it's very complex. Project management is complex. So, if you reduce time, then you, you . . . you know, the cost will be higher, so that's the way I see the change . . . you do cause incidents in a project. So, you have to balance different areas, in that way you have a, you know . . . you can have a lot or you can reduce incidents and risks for your project, so that's the point. But basically that, so. . . there is no way for you to change one point and the project not be affected by other points, so almost everything is connected, so that's where you need to have somebody with knowledge for when you have to do some changes, you need to know how you will be affected and try to reduce risks or incidents. [23]

There was a decision in a particular project in one company in the oil industry here in Nigeria, a company I know. They made a decision of carrying out a road project. When they made this decision, they had finished a lot of preparations to enter the site. I traveled to the site last week. The community came out to say, you are running this road through our land, we do not have food and you are taking all this expanse of land—how do we succeed/survive when you have taken all these things. If we have no compensation, we will become beggars. A woman from the community lay down on the route for the project and stopped the job. So, a key consideration in project management is considering the community. [30]

(continued)

Table 13. Practical Judgments in Project Managing *(continued)*

For example, I am supposed to build a 5-km overhead line going to some place, but that line is crossing through some people's farms, which means you need to have interaction with local leaders and with the utility company because all the overhead lines you are building belong to the utility company. So, the utility company needs to communicate with those people who are supposed to issue what we call the "way live" together with the local and, maybe, political leaders. So, if the company delays to do those processes, then the project is delayed. It means the resources will be on-site but you are not doing any work because there are some issues which need to be sorted out. That is one scenario. [31]

A while back, I was working on a stadium . . . the client didn't go ahead with the designs that we proposed, and they built it. Though we couldn't do much, we couldn't do more, because it's more like, my money, I want to do it like that, so build it. So, that kind of attitude. And we didn't fight it, but we knew there will be trouble, and when that stadium was in operation, we found there is a problem with the circulation, and it couldn't really handle that mass of people within the kind of area they wanted to build, so that was reworked after the stadium was opened to the public. Of course, we did, we rectified all the areas, but the point is, if we could agree for check-ups at the first instance, we could have avoided it . . . And, as I said, the contract is basically between the contractor and the client, so my work is to be a consultant, more like an arbitrator or sort of in-between, you know. Not much of control over this, but responsible to move things in the right direction. [38]

Table 14. The Key Players in Project Management Practice

CATEGORIES	EXEMPLARY EVIDENCE
External players Clients, owners, governments, local community, suppliers, contractors. Clients and government typically have the highest impact on project management.	*First of all, the client is a major player you have to manage very well. Second, is the contractor . . . also very important. Workers are the key players of the contractors; you don't directly deal with them. Local authorities are key players because anytime they can cancel your project, because they come and inspect your project, health and safety, and all these kind of things. If you are working under a developer, that developer is a key player. The designer is a key player and consultants are key players of the project. (37)* *The clients, because the clients are the ones who have the money, they can put the rule of the game as they want. The consultant, they don't have that much influence, or the designers, they don't have that much influence on the project manager because they will just follow what the client of the contractor would like to do or the senior managers. So, in the construction industry, the main two players are the main contractor and the client, followed by the subcontractor and the consultant at the end. [1]* *You've got two key main players, or two main stakeholders: You've got oil and gas companies [the project client/owner], and you've got government. So, you've got to ask yourself: What is it that oil and gas companies want? Of course, I don't think they are really interested in the oil, but they are interested in making return on investment, alright? What does government want? Primarily, government wants to add value or enhance the well-being of the people. [40]*
Internal players **(within project boundaries)** These include typical project players, including the project management team, which comprises the project manager, technical engineers, procurement managers, etc. However, it was evident in all respondents that the project manager is perceived as the most critical player in this cluster as they can balance the relationship between all players.	*The procurement manager is very important to the project because if he doesn't procure as he hopes to, when he hopes to do that, then the project will be delayed. He must be able to make his schedule in such a way that the material is procurement, the procurement needed comes in as when due. So, it is very essential to have the procurement manager in one of the top priorities because his procurement processes affect directly the delivery. [34]* *The project manager is the one who has to balance all the requirements of all these stakeholders because I am always in the middle and try to balance the client's requirements, the contractor's requirements. In my experience, the project manager is always in the middle of all these stakeholders and has to manage all these stakeholders. [37]*

(continued)

Table 14. The Key Players in Project Management Practice *(continued)*

CATEGORIES	EXEMPLARY EVIDENCE
Internal players (beyond project boundaries) In addition to the above two clusters, other players are identified that can significantly affect the practice of project management but are not necessarily part of the project management team. This includes top management teams, executives, and financial controllers. The level of senior management involvement correlates with the importance of the project to the organization.	*You also have the administrative unit, the head office . . . the bank manager, and then the executive director. Those are the key players. [8]* *There will always be a senior management sponsor or executive . . . and then it depends on the level of the project . . . what level that sponsor is at in the organization. The more strategic the project, the higher up you'll have a sponsor and then we have a strategic project department. [18]*

The multiple players that define the character of project management practice are not only many and varied, they are also greatly interdependent in delivering the project itself. Recognizing the individual contribution of different players to project complexity and success is one thing. Mobilizing effectively the interdependencies between key players is the more critical priority. This enables us to provide a more thorough appreciation of the importance of collaboration in project managing.

5.4 Collaboration in Project Managing

Our analysis of collaboration in project managing across the various data collected via interviews, focus groups, and surveys sought to account for the meaning of collaboration and the way collaborative practice unfolds in projects. We organize the main findings by presenting some of the qualitative findings first, followed by the quantitative findings. We adopted this approach to make more explicit the finer aspects of collaboration in project managing to better explicate the role of innovation therein.

5.4.1   Qualitative Findings

In the interviews and focus groups, it was evident that project managers had an acute awareness of collaborations within their projects as they recognized that projects require specialist resources from within and outside organizational boundaries. Under the broad term "collaborators," project managers referred to both internal players and external players such as clients, suppliers, contractors, governments, and the local community as detailed in Table 14.

What our study shows is that the majority of participants perceived collaboration as highly valued in project management and, in particular, that collaborations were useful in solving a problem by sharing information, knowledge, and skills, and this is an impetus for collaboration in project management practice (see Table 15). In other words, exploiting knowledge synergies and accessing knowledge wherever located within the organization is a clearly understood driver for project collaborations.

Table 15. Collaboration in Project Managing

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
Collaboration drivers	• Knowledge motives • Project performance motives • Business governance	• Gain external skill sets [11] • Knowledge and information sharing [10] • Achieve project objectives, successfully fulfill tasks [5] • Problem solving [4] • Coordination to fulfill project tasks by different parties [4]	• *A lot of collaboration . . . they realized the value in sharing knowledge. [5]* • *Well the construction is a multidisciplinary industry and there are a lot of disciplines that we would rather not have in house for cost reasons and for reasons of excellence. We prefer to outsource them to other organizations who can provide better competencies in those areas. [11]* • *Collaboration, basically . . . maybe advice seeking, basically advice seeking. [16]* • *Yes, I do collaborate with my team inside, and also with our partners, and also with the customer. Examples . . . Okay, we tried to do, you know, knowledge sharing, tried to move people from places, from different parts for them to know what other work the other guys are doing or trying to show the whole company, or other sectors for people to understand, to have a better knowledge about other areas so they can understand what other people are doing. I, myself, I try to share information as much as I can to people that work in my . . . so they know what are the meaning for the part of the work we are doing, so what that . . . what are . . . the significance of the whole picture, of the action . . . [23]* *The contract is basically between the contractor and the client, so my work, is to be a consultant, more like an arbitrator or sort of in-between, you know. Not much control over this, but responsible to move things in the right direction. [38]*

(continued)

Table 15. Collaboration in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
Key influencing factors on the ways project managers collaborate	• Technology • Organizational process governance • People	• Communication channels/skills [26] • Organizational culture/politics [14] • Building relationships/ develop social relationships [9] • Trust [9] • Religion, work behavior, background [8] • Leadership [8] • Human relationships [8] • Mutual understanding of project aims [4] • Language skills [5] • Lack of knowledge [4] • Information sharing [3]	• *. . . the availability of a proper medium for communication because if you do not have the right platform for communication, this can make collaboration difficult, especially when you do not have the possibility to be physically together with team members all the time. [6]* • *. . . I think the work environment or, as you can say, the office environment and between the site team, and the construction work will affect the relations with others, which will affect the collaboration process. [29]* • *I think if you can have the right environment in terms of human relations, if people find themselves comfortable to work with you, this is something that makes it much easier. Sometimes, these human factors can be a hindrance in terms of attitude. It can really affect collaboration because people may not be willing to share, to communicate in a clear language.[6]* • *. . . Inside a company, a condition for collaboration is that we are bound to receive knowledge/to know how we are going to handle issues and these issues must circulate among the top management.[31]* • *Silo organizations, people who wish to control and take power, people whose egos get in the way, people who want to do things differently than the plan, particularly after the plan was agreed, who say I'm not collaborating in that and I want to do something different now. When changes occur, what's been agreed. [3]*

(continued)

Table 15. Collaboration in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			▪ *. . . Trust—you have to work on building up relationships.[4]* ▪ *. . . Trust. Trust. Trust—mutual trust and then commitment too. Commitment as well. When there is no trust, collaboration is not going to be successful, because everybody, they're not sure, whatever the person says . . . you can't really take their word for it. [9]* ▪ *Different religions and backgrounds . . . for example, in the UAE, it's quite common that the people stay after working hours . . . So, I think things like that, clarifying the different cultures or the different attitudes or different behaviors. That it is not meant to insult anyone or to harm, it's just that it's a new culture that is being introduced to them. This is one of the main challenges that we are facing. [1]* ▪ *I think they need a good, inspired leader who can establish a well environment with well processes and show the advantage of trying to explain to them what the advantage of the collaboration is. He has to create an innovation environment and try to reteach the people a new culture to make them involved in these things. [28]*

Table 15. Collaboration in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n = FREQUENCIES]	EXEMPLARY EVIDENCE
			• *I have realized that when you have good relations with people and you act professionally, you are able to achieve a lot within a short time because the atmosphere is very accommodating and everybody is relaxed and less stressed, and can think much better. They are also motivated to contribute to get a project moving. This enhances this collaboration. But when people have the wrong attitude, maybe they are not interested in the project or the complexities make it difficult to collaborate . . . [4]* • *People are always a challenge. People have different views on how they can collaborate with each other. So, I think this is one challenge to convince people that, how can you collaborate, you'll be helpful for what they want. So, sometimes this is a communicational, maybe, challenge. [7]* • *First of all is technical capability, because for you to communicate, to collaborate effectively with the other person, you need to be of the same technical . . . to understand the same technical things. That is one. So, technical capability. So, the other one is . . . I mean . . . social, maybe social. Because one has to be social to collaborate with others. The other one is the element of teamwork. Team cohesiveness, that is. The other one is maybe language. (x) should be able to understand the same language. [44]*

(continued)

Table 15. Collaboration in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n = FREQUENCIES]	EXEMPLARY EVIDENCE
			▪ . . . language, although most of the people are speaking English, but they are having a different level of understanding things and a lot of people are confusing or getting confused with the expressions and the way that things have been said. [1] ▪ . . . and the most important in my view is information sharing and communication. Without that, you cannot have any collaboration any time that is successful. [21]
Collaborative routines in projects	▪ Formal ▪ Informal ▪ Virtual	▪ Formal scheduled meetings [20] ▪ Formal face-to-face meetings [20] ▪ Documented emails and memos [10] ▪ Informal impromptu discussions [9] ▪ Impromptu phone calls [4] ▪ Virtual meetings [4]	▪ At the kickoff meeting, all the tasks and activities are all laid out, planned, and everything . . . specific people are assigned to, specific people with specific skills are assigned to tasks that need those skills, and so on and so forth. They set up a plan of how they are going to go about doing this, sequentially or in parallel, and they have regular meetings to follow up on progress, right? And they do that throughout the life cycle until they meet the objectives, something like that. [41] ▪ . . . We maintain minutes of meetings for circulation but, in addition to minutes, we do separate highlights to each party of what concerns them most. And that is useful for me—a particular section for what each person should do. [43] ▪ I am very much face to face. I do like Skype. I like talking to people. I like to meet people. I know that is difficult now with resources and people being so far afield, but I think that collaboration is something that is a key part of a project manager's role. I am quite happy to do it virtually, but if I have a preference, I like to see people face to face. [3]

(continued)

Table 15. Collaboration in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST-ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			▪ *Sometimes we have scheduled meetings with the clients or other parties who work outside the organization . . . [27]* ▪ *. . . most of the time, outside . . . we will be using official letters or emails. When it is required, we might have a meeting. [3]* ▪ *I have a procedure. I have an organization chart which shows me who I have to follow or, actually, who I have to contact and things going through procedures so you know if there's been, sometimes, some other parties from inside or outside . . . how his acceptance for this collaboration. I will tell you one example for this. Sometimes, when you are in . . . you can say, assistant level, and when you contact with some people at management level, he, sometimes, he will not be very cooperative with you. [28]* ▪ *. . . I can call to find out what has been done on a certain activity. Or someone can call me to find out how best to go about setting things and they are stuck and need to decide on whether to choose option A or B. So, sometimes you have regular collaboration over the phone or email or online ticketing system, Gemini. [7]* ▪ *We have to use Skype, but we do some aspects of such collaboration online: to document the process, and to reduce the need to have to travel, and to gather people together, and I think, as technology enables us to do that more and more, that's perhaps the direction which project management must go being in my country. [12]*

This is clear in the following quote:

Of course, all that comes down to the project execution and here we are looking at the knowledge that we are acquiring in the process: knowledge in dealing with stakeholders, the knowledge we are acquiring for dealing with the management, dealing with suppliers, and dealing with team members, and so we have someone also who keeps a record of some of these both from fitters, meetings, so that we are able to tell them what we did and, perhaps, what we could do differently in the future . . . this was not very important until recently. [11]

As the discussions unfolded, the project managers also reflected that working with multiple collaborators *simultaneously* with differing and often conflicting aims, different work values, and different work ethics was an ongoing challenge for their practice, and they saw this as increasing project complexity. These challenges are succinctly identified in the quote below:

The main challenges in collaboration in projects . . . I'm trying to get a proper word . . . conflict of interest, that's the word. Conflict of interest. When somebody . . . everybody is committed to the real goal of the project. Like, a lot of times, I find my colleagues are actually after trying to get bribes from the contractor. So, on the face of it, when we are talking, they act as if they actually are committed toward getting the job done and all that, but at the back of it, behind me, they try to sabotage me. Such as they cannot (x) when they can go back to status quo, but before that they used to demand bribes from contractors and so on, so . . . conflict of interest. [9]

Extending the relational orientation recognized in our analysis of project management practice, first, we sought to identify the key influencing factors that shaped the way project managers were collaborating with their teams (internal and external).

When seeking to unravel the key influencing factors on how project managers collaborate, a significant portion (59%) identified that establishing good

communications channels and skills is significant. On the organizational level, project managers identified that supporting organizations have embedded collaboration culture and created structures and processes to enable collaborations to become seamless and relationships to become meaningful and flourish. On the individual/team/group level, project managers reflected that communications skills, language skills, work attitude and behaviors, trust, and common work ethics resulted in a project-team cohesion, a team that has a mutual understanding of the project aims—thus, making the relationships between collaborators stronger, thus, influencing their relational value.

Findings detailing the drivers for project collaboration and the key influencing factors on the way project managers are collaborating are listed in Table 15. The table also includes the routines used by the project managers to collaborate with their partners.

From the findings, it became evident that when project managers were accounting for their collaboration practice, there was the sense of collaborator/stakeholder uncertainty that was repeated as the participants acknowledged the influence these have on their projects. This recurring concern is evident throughout the interviews and focus groups, and prompted us to look deeper to find out how project managers build their relationship capacity.

We wanted to explore how project managers make choices and decisions when they are dealing with relational complexities within their practice, as well as understand what their practical judgments are as they form relationships with the multiple collaborators in their projects. This way, we could appreciate the collaborative capacity project managers need to foster as they learn and develop relationships with their collaborators, building a collaborative integrative project environment beyond self-interests that would result in knowledge integration. Table 16 summarizes the key considerations that underpinned the choices and practical judgments when choosing project collaborators.

Table 16. Practical Judgments Made When Choosing/Working with Collaborators

Resource technical capacity, experience:
- *What we look at is resource capability, financial status, and previous experience. [17]*
- *I think I look at experience, what are their years of experience, what are the projects they've done before . . . you understand, in the terms of experience. [35]*

Same values:
- *Qualities like the same common goals and objectives. A collaborating partner should have the same way of seeing things. If what you want to achieve is not the same, you cannot collaborate. [32]*
- *The same set of qualities I am supposed to have, but for them also to be responsible . . . But, at least, they need to be responsible and very reactive and open-minded and have the ability to relate to one and other. Once they have this, it is much easier for everybody to collaborate. [7]*

Resilience:
- *I look for skill. I look for quick decisions. There are many people that are unable to make quick decisions in things, and that will affect the projects. I see this as something that is vitally important, the ability to make quick decisions; look at an emergency and say, okay, since this was not possible, let's do this. But there are so many people that can waiver, that are unable to take decisions, and that affects projects, so I think that is a factor in collaborating, the ability to take quick decisions. Sometimes, even taking a wrong decision, even if a bad one, might not be as bad as not making a decision. [18]*
- *. . . How they deal with unexpected events. The reactions . . . his vision through the process. [27]*

Reliability:
- *Past performance is number one . . . I want to have records that they have proven efficient before. This is number one; reputation in the industry. [25]*
- *I think I look at experience, what are their years of experience, what are the projects they've done before, you understand, in the terms of experience. The environment they worked in and the people, the crews, they've used . . . and then, again, I want to say: Do they have integrity and how do they communicate to others? [35]*

Negotiate for the common good:
- *. . . Mutual respect, interdependence, when the other parties also understand that they are important in the game and they are working as objectively as possibly. Of course, when they come up to the line, we don't act shy: We tell it as it is, because ultimately, we are looking at giving the client the best, you know, yes . . . [12]*
- *My credibility is the most important thing to me and if I can have a successful team who wants to work together, who wants to do the best and bring in contractors, plant hire companies, you know, third parties that think in the same like-minded way, then your project is always going to go better and if you do need something in two weeks that would normally take a month, you will get it because they are happy to collaborate. It's not because they have to because you are withholding money, it's because they see the value of becoming your partner. [Focus Group 1–2]*

(continued)

Table 16. Practical Judgments Made When Choosing/Working with Collaborators *(continued)*

Trust:

I think, over time, collaboration improves. It improves those you work with; it improves your project delivery. They begin to trust one another more. You know, if I work with Mr. XXX on this project and we've worked well, it helped me in our collaboration. If in a venture in two or three years' time and I need them on the same project, then I will be willing to trust them again and trust their decision, do you understand that? So, it helps. It helps collaboration and you want to trust them. You want to trust their opinion because, you know, it's like a trust in you. They've helped the projects before, and in the delivery. It's natural that you warm up to them and if you meet them on another project in the future, yes, because you worked together before. [35]

- *Trust. Trust—mutual trust and then commitment too. Commitment as well. When there is no trust, collaboration is not going to be successful, because everybody, they're not sure, whatever the person says, you can't really take their word for it. [9]*

Ethics:

- *Competitiveness, knowledge, resources, financial good, not like all the liquidation damages I knew, not like that. Sometimes, we face these problems. People say no, because we don't have money. Yeah, then you can't collaborate, sorry. Then there should be ethics in the work . . . [21]*
- *Ethics in the sense that they are actually going to have behaviors that are ethical. They are not going to actually, you know, try to take advantage of or be fraudulent in some way. So, ethics is very important to create a relationship of trust. [10]*

Sustainable collaborations extend beyond one project:

- *Sometimes projects have power games within them (laughs) and, depending on the sponsor, sometimes there is a shift of power basis within a project and that affects the way people collaborate. That would be my immediate take. Depending on how that change in the power dynamics is handled, it can actually improve on the next collaboration, knowing how to handle a power shift in a project. If you handle it in an advantageous way to the project, it is more likely that the group, at the end of that collaboration, may seek to collaborate again on the next one. Yes, it may. The way that is handled means that maybe on the next project somebody doesn't want to collaborate with that person who collaborated in a negative way with the powers that were given to him. [43]*
- *Some of the conditions that make collaboration, well, first of all, is the relationship. Most of the time, we work with the same company, we have a long-term relationship with suppliers, a longtime relationship with other companies, that we work together in certain projects. [30]*

It is evident that there are circumstances in some project environments when project managers do not choose their collaborators, as these decisions have been made by organizational partnering agreements usually signed by procurement experts. For example:

Actually, to be honest, I haven't gotten a chance to choose my team members or the vendor partners. It's a big organization . . . so it does not—it has a list of vendors with all the terms and conditions defined. So, but given a chance, I will be looking for an organization or a member who is willing to listen and willing to learn. [40]

What emerges as an important determinant is that they acknowledge the influence collaborators have on the success of their projects. The relational dealings with multiple collaborators with diverging aims and interests is seen by our sample as contributing to project complexity. And their response to this relational complexity is to build their own relational capacity by looking for collaborators that would mitigate the potential tensions of self-interest. So their response is to look for collaborators that are: resilient and able to deal with crisis, have technical expertise and possess the skills needed to work on the project, are trustworthy and have integrity in their dealings with suppliers and customers, are reliable with a strong previous project record and good reputation, and have similar attitudes to work so they can work without conflicts. By making these judgments when choosing their collaborators, project managers are building a project ecosystem, a project network where the pursuit of the project "good" is embedded from the beginning and the anticipated tensions between conflicting interests that often dominate project collaborations are extended and mitigated at the source of their selection.

A substantial finding here, therefore, is that it is not just the responses of the project managers that are critical in navigating all aspects of project complexity. It is the project collaborators' responses as well that influence project success, and these responses account for the whole project ecosystem, extending the complexity and responses matrix by Maylor and Turner (2017). Therefore, what the project managers are doing, unconsciously, is building their own relational capacity by seeking collaborators that themselves demonstrate technical, relational, and resilience capacity (see Table 17).

It is not just the case that project managers select their collaborators with the sole purpose being the success of their projects. From our collaboration findings, another important point is that project managers value connections with collaborators that enhance learning, idea co-creation, knowledge recombination, and innovation. This can be seen from the quotes below:

. . . For instance, the scheduler working close to dock control . . . and during the project, they interact with each other and, one starts learning the other activity. So, this collaboration helps. For instance, dock control can give feedback to the scheduler about the documents, how the documents are . . . goes for comments, for instance, how fast they can go back and if their prediction is accurate or not. And they start interaction with each other, and they start learning the other activities. And it improves their own activity a lot, I'd say. [2]

. . . Yes, you learn a lot. And beyond the learning is also you have someone to rely upon. I mean, it's difficult to be on your own. I don't like the attitude of "I am telling you what you are going to do." I believe a lot in deciding together. Provided, unless there is a crisis, unless there is something like, okay 50,000 statements, car statements, went out wrong and we don't have the answer if we need to fix that. Again, that situation, you need to make a decision and you have to act fast and you don't ask for anyone's opinion on that. You just ask the person that is actually an expert. But on the rest, you need to have the insight of each and every member who actually has knowledge to give you the insight of something. You have to listen. [10]

Yes, because every project you are implementing and doing in a different way, and, after the project, if you are creating your learning documents, you can find, in this project, this was newly implemented, so in our next project we will use or not use. You can decide this. For example, I have two tower projects at the same time. One is in construction and the other is at the design stage. And, in the design stage, whatever I did in the construction stage, I am now improving this. Innovation is something that is not created in one time. It is knowledge gained over time. [37]

Table 17. Multifaceted Complexity and Project Management Practical Judgments in Project Management Collaboration Practice

DIMENSIONS OF RELATIONAL COMPLEXITY	PROJECT MANAGEMENT PRACTICE	PRACTICAL JUDGMENTS MITIGATING COLLABORATOR UNCERTAINTY	EXEMPLARY EVIDENCE
Structural: This reflects the difficulty of managing and collaborating in projects due to the multilevels of actions, requirements, standards, procedures (e.g., control), and activities that are interrelated (dependent in many cases) and necessary for project execution.	Technical capacity	Choose collaborators who exhibit technical capacity	*When we are collaborating, it means that we are getting the people with the right know-how, who have done something over a long period of time, so they have the experience. If you bring this person into your environment, because he is specialized at what he does, he is able to let you know you should have done this; or, if we do a, b, c, it will improve the project. So, they bring their knowledge to bear on the project. [11]*
Sociopolitical: Managing projects demands skills and the capacity to work with diverse types of collaborators (hold various demands and expectations) who affect and are affected by the progress in projects.	Relational capacity	Choose collaborators who exhibit relational capacity	*Their openness; openness is quite important, then the effective communication, too, is quite important, either verbally or nonverbally, especially . . . Yeah, effective communication. Openness is quite important . . . I'd say, emotional intelligence. Emotional intelligence. Then accountability is quite important too, because if you are open and accountable, people will believe you, so they will believe whatever you say, so . . . I'll say accountability, too, is quite important. Openness, accountability, emotional intelligence, effective communication . . . And . . . I think social awareness, too, is quite important, especially as we are working in a multicultural setting. So social awareness, because there are some things that are proper; in particular, cultural context that, if you, in another cultural context, are wrong. So social awareness, I would say. [34]*

(continued)

Table 17. Multifaceted Complexity and Project Management Practical Judgments in Project Management Collaboration Practice *(continued)*

DIMENSIONS OF RELATIONAL COMPLEXITY	PROJECT MANAGEMENT PRACTICE	PRACTICAL JUDGMENTS MITIGATING COLLABORATOR UNCERTAINTY	EXEMPLARY EVIDENCE
Emergent: This type of complexity emerges due to the fact that each project is unique. Also, it evolves due to uncertainties, human errors, and internal/external unexpected changes, all of which demand modification or adjustment to the working plan.	Resilience capacity	Choose collaborators who exhibit resilience capacity	• *I look for skill. I look for quick decisions. There are many people who are unable to make quick decisions in things, and that will affect the projects. I see this as something that is vitally important, the ability to make quick decisions, to look at an emergency and say, okay, since this was not possible, let's do this. But there are so many people that can waiver, that are unable to take decisions, and that affects projects, so I think that is a factor in collaborating, the ability to take quick decisions. Sometimes, even taking a wrong decision, even if a bad one, might not be as bad as not making a decision. [18]*

Interestingly, when learning does not occur within projects teams, this is seen as contributing to project failure as is succinctly quoted here:

> . . . *The problem is most people don't learn now and that's why we have so many failed projects, because people aren't learning from them.* [Focus Group 2–1]

From the findings, it can be argued that project managers value their connections with partners who enhance learning within their projects. And they use their relational capacity through their practical judgments to purposely select which connections with collaborators are valued to extend these—from mere interactions to achieve immediate project delivery goals into extensive, longer term engagement with learning and cocreation—irrespective of whether these collaborations are temporal or more formal partnerships.

This orientation toward learning is underpinned by a focus on exploring and exploiting the potential for innovation that is integral and, more often than not, remains dormant in projects. It is this vital aspect of learning that gives way to the possibility of innovation becoming more centrally embedded in project managing. We seek to understand and support the development of this as a key capability that can impact project success.

This section brings to the fore that the relationships formed between project collaborators are varied and are governed by negotiation, of which relationship types can be performance driven, focused mainly on delivering project goals and which can be co-learning focused. It is the project manager who sits in the midst of this dilemma, and it is this relational capacity and practical judgment that they need to develop to mobilize the connections.

5.4.2 *Quantitative Findings—Collaboration in Projects*

This section commences with an evaluation of the data quality, as well as a preliminary analysis based on descriptive statistics. All the detailed analytical statistical tables can be found in Appendices E and F.

Univariate Analysis (Descriptive Statistics)

Clearly, complexity increased when collaborative relationships were reported (73.4%). And the response to this relational complexity by the majority of project managers was the adoption of project management standards such as *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Sixth Edition (PMI, 2017) (67.9%), and firm proprietary methodologies (62.3%). This indicates a "plan and control" approach to collaborative partnering supported by the finding that collaborative relational interdependencies are mainly made through formal alliances (39.9%). When we looked deeper at the nature of these interdependencies, the stronger correlations were with project clients when finding project solutions (87.2%), other companies in project teams (58.6%), or even their competitors (26.7%). The analytical frequency distribution on collaboration typology is explicated in Appendix F11.

Extending the relational orientation in our qualitative analysis of collaboration practice, we sought to identify the key influencing factors that shaped the way project managers were collaborating with their teams. Good communication between the team collaborators was the strongest factor (97.2%), closely followed by trust (95.4%), then the organizational commitment and satisfaction with partnership (89.9%), the clear definition of power distribution and responsibilities (87.5%), and the shared direction for the project (85.3%). The similar competence levels are rated by only 67.9% of the participants as being important to very important. The detailed findings on project collaboration's critical dimensions are explicated in Appendix F13.

The challenges faced in collaboration *across project teams* were mostly about trust between collaborators (93.2%), cultural diversity of the project team with language difficulties (39%), conflicting team dynamics and continuity (36.7%), and the diverse and varying capabilities/skills to execute and lead projects by the project/collaborative team (35.3%). The analytical frequency distribution on project collaboration

challenges is found in Appendix F. Also, the main *drivers for collaboration,* the methods of collaboration in projects, are reported in Appendix F12.

There is consistency in the findings (when looking at the *benefits of collaborative projects* from the cross-industry and cross-region sample) that shows working in collaboration improves brainstorming and problem solving with the supply of new ideas (95.5%), promotes fresh ideas (95.5%), improves collective learning (94.5%), improves coordinating skills (89.9%), and contributes to a continuous flow of ideas (88.6%). Indeed, a consistent pattern emerges that indicates working in collaboration facilitates faster development of individual skills, organizational learning, and acquisition of new, critical capabilities or skills from collaborative project partners. What is evidenced quite strongly is that even in relational temporality, collaborative partners developed long-term relationships with collaborative project partners, even in project situations that are characterized as being traditionally unmanaged, complex, highly fragmented with a short-term focus, and adversarial. The analytical frequency distribution on project collaboration benefits is found in Appendix F15.

Collaborative projects perform better in meeting cost (64.3%), time (38.8%), scope (75.7%), and quality targets (74.3%), as well as in leading innovative solutions (71.1%) and managing risks (69.6%). When looking in depth at the financial performance of collaborative projects, most collaborative projects (51% to 75%) are financially successful. The analytical frequency distribution on collaboration project performance is found in Appendices F16 and F17.

Bivariate Analysis (Inferential Statistics)

The screening procedure followed to prepare the data for the bivariate analysis, according to Field (2013), is found in Appendix G.

After the univariate analysis of the data and the data screening, the relationships were investigated in more detail. For this purpose, the strength of the relationship between two variables was measured with the Pearson's correlation coefficient. It is a standardized measure that can take any value from −1 (one variable changes, and the other changes in the opposite direction by the same amount) through 0 (as one variable changes, the

other doesn't change at all) to +1 (one variable changes, and the other changes in the same direction by the same amount) (Field, 2013). The findings that emerge from this study are summarized below.

Years of project management experience: The more experienced project managers are more aware of the benefits (0.163) and challenges (0.168) of collaboration. They also employ different ways of collaborating (from $r = 0.280$ to $r = 0.160$). The more experienced project managers also tend to work on more complex projects with many interdependencies ($r = 0.309$) and tend to use more standard project management tools, techniques and methodologies (such as the *PMBOK® Guide*, agile, proprietary methodology) ($r = 0.194$, $r = 0.175$, $r = 0.178$). All significant relationships between the experienced and less experienced project managers (in terms of years of practice) with respect to project complexity, collaboration in projects, innovation are shown in Appendix H1.

Position in the organization: The more senior project managers (in terms of seniority within the organizational hierarchy) have a more advanced capacity to identify collaboration challenges such as diverse priorities ($r = 0.291$) and behavior issues of low effort ($r = 0.242$). All significant relationships between the more senior and less senior project managers (in terms of seniority in the organization) with respect to project complexity, collaboration in projects, and innovation are shown in Appendix H2.

Continuous flow of ideas in collaborative projects: There is a strong indication that the more complex projects (in terms of pace, decision-making influence, uncertainty, product/process novelty) strongly demonstrate a continuous flow of ideas from the collaborative partners ($r = 0.178$, $r = 0.155$, $r = 0.170$, $r = 0.174$). More importantly, our findings show that collaborative partners exhibit the capacity to co-create and co-innovate within projects that demonstrate uncertainty and turbulence (i.e., to overcome project uncertainty, complexity, and high risk) ($r = 0.512$). In complex projects that evidence emergent turbulence, collaborative partners also use robust risk management procedures and risk mitigation actions ($r = 0.209$), reactive scheduling procedures ($r = 0.250$), instinctive reactions ($r = 0.213$), or they refer back to the project board ($r = 0.259$). In this section of the analysis, we are seeking to unravel the notion of relational connections with suppliers, customers, and collaborators.

Interestingly, the analysis brings to the fore the individual contribution of each of the project collaborative partners responding to multiple complexities and the strength of these interdependent relational connections in the generation of continuous flow of ideas. All significant relationships between the "collaborative partners' contributions to a continuous flow of ideas" and various variables referring to project management with respect to project complexity, collaboration in projects, and innovation are shown in Appendix H3.

Size of organization: The test of difference, also called the t-test, was used to test whether the differences between two means are significantly different from zero. For the research at hand, this was investigated for the size of the organization. Various t-tests are conducted to compare the means of the two groups (Group 1: number of staff employed $\leq$ 250, Group 2: number of staff employed $>$ 250). The findings are summarized in Appendix H4.

5.5 Collaborative Innovation

Our analysis of collaborative innovation in project managing across the various data collected via interviews, focus groups, and surveys sought to understand how the meaning of collaborative innovation is conceived and the way it unfolds in the projects. We organize the main findings by presenting some of the qualitative findings first, followed by the quantitative findings. We adopted this approach to make more explicit the finer aspects of collaboration in project managing to better explicate the role of innovation therein.

5.5.1   *Qualitative Analysis*
The project managers who participated in our study recounted their personal experiences, and regularly framed these around the PMI guidelines or related professional standards when talking about controlling, monitoring, balancing, and adjusting project relationship and task issues—multiple activities that require coordination. Therefore, they were at ease when they were accounting their project managing practice using standard project management terminology. However, when they were asked to describe how they conceive collaborative innovation, they were finding this difficult (nine of 44 did not answer this interview section at all).

Characteristically, one participant said:

I think recognizing innovation is a big problem.

Even though collaboration does not always lead to collaboration (Greer & Lei, 2012), it significantly improves the likelihood of innovation (Yu et al., 2013), and 83% of our participants reported that they believe that innovation is an outcome of project management practice. Senior management support, social interaction between project teams, and the capability to innovate and share knowledge are acknowledged as interlinked forces that help innovation in projects. When prompted to provide examples of the kinds of innovations emanating from projects, the project managers focused on the human resource aspects of teams, linking individual knowledge and skill sets to team knowledge synergies and cohesion when it comes to substantial innovation. For example:

I can give some examples, some of these innovations are coming . . . every party has their contribution to the innovations. Some of them are coming from the supplier, the chip manufacturers, for example, they have their own plan and the chips etc., and they will be providing a chip circuit with some certain specifications and this leads to making some innovative products but limited by the chip. This kind of innovation is coming with the chip manufacturers. On the other hand, because you are developing software onto these chips, the development company, the manufacturing company, is also producing some innovations as I have for the UK market . . . [22]

Innovation barriers can be based on vested interests; the rejection of outsiders; incompatibility of innovation with the organizational structure; lack of top-level support; project-based working patterns; lack of technology; lack of time, resources, and expert staff; and lack of cohesion in common goals.

From literature, we know that perceptive organizations that recognize these barriers create structures for innovation to overcome them and allow meaningful conversation, reflection, and debate to flourish as a mechanism to encourage performance improvements at the individual and team or group level, and hence, to the overall performance of the organization (Camarinha-Matos & Afsarmanesh, 2005).

Characteristically, one participant said:

Firstly, that people are willing to listen, and that people are not afraid of asking stupid questions, so to speak. And that people are allowed and capable of answering the question or recognizing that, "I'm not capable of answering this question, I need help." So, it's a lot about being open about yourself, your strengths, and weaknesses, and also show it to others. "I don't know anything about that. Help me out." It's not about hierarchy and I am (x), and you are the worker and stuff like that, that won't work. So, it's as much as trying to be, you know, that the meeting becomes a flat structure; that people know when they are in there for that collaboration meeting, they are in here to find a solution, and their input is as valuable as anybody else's. No matter pay grade or, you know, what the sign on the door says. [20]

It is clear from the findings that organizational innovation culture has an antecedent effect of innovation. These findings provide support to previous studies that organizations exhibiting an innovation culture have the ability to create an interactive ecosystem, a platform in which project teams and their members can debate, have meaningful conversations, and pursue innovative solutions or uncertain projects. It is this open collaboration, interactive space where knowledge from the diverse skills and expertise of partners is recombined within a project and it is in this space that project managers try to establish to balance control procedures and established performance standards, with dynamic, flexible, and creative approaches that mobilize diverse participants in the innovation process.

What is rather powerful in our findings, is the perceived embeddedness of collaborative innovation in projects across sectors and countries. This is not only evident in the collaborations that characterize project managing, but also in the balancing act required by a project manager with a resilient capacity that extends beyond execution and control into what is open, unknown, and uncertain. For example:

It was excellent to have some brainstorm because it was an open discussion—you can present your opinion, try to formulate the opinion from other people, so things like that, yes. I think that I was

saying one of the good practices of this project, it was because we had some section of brainstorming that everyone can present an opinion and try to have a way for this opinion if they are correct or not. What a good session—trying to hear different opinions, and we try to follow one of them after the meeting, so I think that this was a good practice. We decided that we would collaborate with our clients and become partners with them rather than adversaries, and we found that to be a massive benefit. [23]

Interestingly, the remaining (17%) participants who stated they were not involved in innovative activities in their projects blamed organizational lack of support for innovation, thus reinforcing the importance of innovation even though they are not involved in any. Although the majority indicated that innovation is a direct project outcome, the reported innovation type varied significantly (Table 18). Mindful of the varying industries and countries of our project manager sample, we looked deeper into our data, and were able to extract a pattern from the articulated experiences that could be attributed to sectoral forces that affect their perspectives. Bearing in mind that exploratory innovations are about radical innovations (March, 1991) interpreted as new designs, new products, new market sectors, new routes to market (Benner & Tushman, 2003), and exploitative innovations to improve existing product designs, extend existing knowledge and skills, or improve existing routes to market (Benner & Tushman, 2003; Jansen et al., 2006), respondents from construction or oil and gas sectors concentrated on explorative innovation, while project participants from services mentioned exploitative innovations.

In summary, the key issue we noted when we invited practitioners to account for the innovations that have come from their projects, there is a general agreement that closed and highly vertical innovation based on self-reliance is generally slow or costly to help an organization maintain competitiveness. Therefore, Table 18 provides a summary of the typical descriptions that our project managers postulated to account for their kinds of innovation from collaboration.

In summary, when reflecting on these above factors affecting the nature of collaboration in projects/the role of innovation in collaborations, we can deduce that project managers need to foster as they learn to develop relationships of trust to "come up with solutions" serving the common good, not just stakeholder interests.

Although there was no explicit link mentioned between collaborative innovation and project success, participants reported three main areas that they believe define how a project is assessed: outcomes, constraints, and approval. Participants mentioned that successfully achieving the targets within the approved budget (41%), timeframe (37%), and quality by satisfying customers (34%) are the main indicators of project success. We capture illustrative examples of project success in Table 19.

Again, this shows the influence of project management standards on their responses, as they are aware of the deliverables and constraints. But this also highlights an important aspect of customer satisfaction, where lots of participants focused on, especially the agile nature, as they called it, of project delivery that requires collaboration from different stakeholders including the customers. These findings were also underpinned by the fact that more than 70% of the participants said that they are involved in open collaborative innovation activities, working with internal and external collaborators in order to achieve project targets. This can also be deduced from the responses indicating that the organization, project manager, client, and collaborators all work together as stakeholders in order to define and apply these measures of project success. This is reflected in the following quotation:

Your interaction with your team member's collaboration is a very key factor. Now you know that they are taken very seriously in project management. We are project managers, where projects are being managed. Really, collaboration is very important. So, for me, I think collaboration is now becoming number one. You need to collaborate with your member, every member of your team, so that's what makes your project successful at the end of the day. So, that's it. [Focus Group C-2]

Table 18. Collaborative Innovation in Project Managing

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n = FREQUENCIES]	EXEMPLARY EVIDENCE
Innovation capacity enablers	▪ Human resources ▪ Capabilities ▪ Organizational support	▪ Innovation culture [8] ▪ Top management support [7] ▪ People, team cohesion [6] ▪ Resource availability [5] ▪ Communications infrastructure [4] ▪ Information-sharing culture [4] ▪ Resources with knowledge and expertise [4]	▪ *One of the things here is that innovation should be a way of life; innovation should be [embedded] in the culture of any organization. It shouldn't be triggered by external factors of maybe, economic factors, and then you know, it should actually be a way of life that should be the way people in that organization, you know, think . . . the organization should be very, very careful in selecting individuals who lead. Because that is one theme I have drawn. I think you have really hit on that, the team lead is very key . . . So, organizations should make a very conscious effort to assess and make sure you know, at the head of any team, you put a square peg in a square hole. [Focus Group A–1]* ▪ *Management buy-in. Management buy-in, that's number one. If management doesn't buy in, it cannot help if you hinder, so management buy-in, that's number one . . . Trust. Yeah, you have, but this is suitable in this question as well, so of course, trust, okay. Helping in collaboration. . . you need to put round pegs in the round holes. It's very wise to put people who are actually qualified project managers in project management roles. You don't just get somebody who has no knowledge of project management and has just been working, then you put them in that role. Like, my . . . the people who had been on my desk before were not construction people. So, if the contractor tells them, Oh, this is just as good, they would listen. [8]*

Table 18. Collaborative Innovation in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			• *Yeah . . . if people are not given free hand to use them—initiative, no innovation will occur in that organization. So, people should have, should be able to express themselves, you know. I think there should be freedom for people to express and . . . imposition should be reduced as much as possible from, especially from the top. So . . . that would give, that leads to innovation. Like, collaboration, too, also can easily give better innovation, if people put their heads together to come up with solutions to some challenges, you know. Yeah, so collaboration. It leads to, to innovation. They are doing the right thing at the right time using the right information at the right time to doing things effectively. So that kind of leads to innovation. [43]* • *People don't tend to not speak up because another piece of innovation. Things we tend to do in workshops . . . and people are afraid that somebody might take their ideas and take credit for it . . . So, the time, if the innovation you are going to bring it in and then it makes you to finish at a record time, like you know, you have to finish before the scheduled time, then you know, it's . . . you know it will help you drive, you know, that and then if the quality of the output is going to increase . . . Do you understand? So, the quality can also help you drive as in it's a driver to help, you know, bring innovation in your projects. Yes, also time. [Focus Group B-7]*

(continued)

Table 18. Collaborative Innovation in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			• *. . . Actually, when we started that one, we and the subcontractor started to bring the material and the equipment's on the site because we are the main contractor. We insisted on having all the documents, and the construction method statements . . . a detailed one and we assigned. At that time, I was not the project manager. Yet, I was only the project engineer, so they have assigned one of the engineers to look after them and to really understand the process and how it works. The following project we did half of that, and after that we started doing it ourselves. So, it really, we learned from that. [2]* • *. . . Resource—how much you have, what relationships you have. Do you trust the people you work with? Will you promote an innovation if it lacks . . . ? . . . How are they going to think of that? Will you be left with the problem yourself? For me, if you have an organization where people trust each other and work together, then there's probably no better area than to think and develop ways to innovate. If you're collaborating on a good level, people will have their say. Then someone has to pick up the cost, and that will be the customer or sponsor. Depending on what they are like on their view of the innovation, they are key. You may come with a great innovative view . . . The person who makes that decision is important and I think that most of what we do is driven by resource and our sponsor's view on expending that resource. [3]*

Table 18. Collaborative Innovation in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			▪ *From my side, I think the difference—the first thing on the environment which the organization, your organization or your project manager, will have provided to you to be innovative. Or if we talk about the project manager, also the environment which provided for him to be innovative and the authorities. Also, yes, I am talking about the environment and the second factor for me is the about creativity of the person himself. His capabilities if he can do it or if he wants to do something or not. [28]* ▪ *Well, this innovation, basically, is created by knowledge sharing. In our company, for a subcontractor, for example, that is performing a piece of the design, they will be able to offer us, open to us, the knowledge of how they did it or the time that they did it, how many people were used, and that kind of stuff. Also, we will be able to determine the technology that was used, you know, the software, the defense software, or the budget software, and that is the factors that will help with improvements. [30]*

(continued)

Table 18. Collaborative Innovation in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n = FREQUENCIES]	EXEMPLARY EVIDENCE
Innovation types	• Process innovation • Procedural innovation • Product innovation	• Process innovation/ improvement [14] • Procedural innovation [9] • New product [7] • Project management new practice [6] • New technology [6]	• *I think innovation in project management is often around process . . . The big innovations that I can see in project management are the IT innovations. I remember in estimating having 10 estimators trying to estimate a project, working on it for three weeks or more. Now, you can do it with software in about three hours. I get swamped with innovations, through IT. There are better processes in terms of due diligence; those processes which have come up and we've worked on and said, "we can do better in terms of our procurement practices, in terms of our planning and concurrent working." We do things now which we wouldn't have done before because of software. We can look at concurrent working through three or four work [phases] whereas at one time we wouldn't dare do that because we wouldn't keep track of it or think it through. [3]* • *We've had loads of technical innovations and stuff, but they tend to not, they are implemented by the project; the idea doesn't come from the project. The idea will normally come before the project or after the project when you're done. Normally, we have that "oh, we could have also done this," or "could we expand the scope to also cover this," or, you know, "we've done this here in this country, could we also do it in this country?" But I don't think projects, in themselves, are where the ideas are born. Yes, but you're not, you would normally start by knowing what you were going to get to market right. [19]*

(continued)

Table 18. Collaborative Innovation in Project Managing *(continued)*

AGGREGATED DIMENSIONS	AXIAL CODES	FIRST ORDER CODES [n=FREQUENCIES]	EXEMPLARY EVIDENCE
			▪ *Well, we have started, for example, new best practice brochure, so we know what to do at a determinate kind of projects, and we have a standardized procedure to follow and this procedure is continuously upgraded according to projects and the different difficulties that may appear or the resources issues that we may have. So, every time that the project and the closing is executed, you can upgrade this best practice brochure that we hold, and this improves project management. [30]* ▪ *In an improved way of doing things . . . in the piping work, initially, we were using wagons but now we are using piping . . . Most of our schedules/activities/company works have been computerized, so management-wise, we have been able to access information faster, which has improved the way we do things and has reduced our time. [31]* ▪ *Working at . . . we collaborated with other . . . offices who manufacture different types of components which we can use to make our panels, so our collaboration was based on getting the new products/technology and it ends there. But when you are running projects that are not product related, such as buildings or factory works, you are dealing with fellow contracts and the client's team . . . e.g., nowadays you have intelligent installation—that is an innovation . . . We also collaborate with fellow professionals, engineers, whereby we get updates of new standards and laws. Yes, the way you ran projects five or six years ago is not the same as now, so there can be management innovation, technological innovation, even solutions innovations. The technology might be there but the range of solutions can be different. [32]*

Table 19. Examples of Project Success Responses

Project outcomes—achieving targets within approved budget	As a contractor, we are evaluating the project success if the project is completed within the budget . . . [3]
Project outcomes—achieving targets within timeframe	For myself, it's going to be the time, the time it took, you know, like, basically actual versus baseline, not necessarily only time. That I realized the plan I made, or was better than the plan that I made. For the organization, it is time. And for the end users, it must be the value of what they are getting. [20]
Approval—satisfying customers	First one would be stakeholder satisfaction, customer satisfaction, I should say. And the benefits to the organization actually performing the organization . . . Definitely, they do have some benefits like monetary, so for improving, reducing the operation costs, cycle time reduction, something like that. So, maximizing the benefits and, at the same time, being innovative in sustainable technology and implementing the sustainable technology, and at the same time, being innovative and be in the sustainable toward sustainable technology and implementing the sustainable technology. [40]

The importance of collaborative innovation from the participant's point of view was also clear when they indicated the phases that they think collaborative innovation takes place during a project. Although a few responses indicated variable phases such as execution and planning, most agreed on the importance and application of collaborative innovation throughout the whole project, starting from the initiation phase until closing. This is reflected through the following quote:

> So, we also have to work together at the time of problems throughout the phase of the project from planning until closeout [21]

5.5.2   Quantitative Findings
This section commences with an evaluation of the data quality, as well as a preliminary analysis based on descriptive statistics. All the detailed analytical statistical tables can be found in Appendix E.

Univariate Analysis (Descriptive Statistics)
A broad perspective of uncertainty emerged from our findings. Again, the relationship temporality seen as unpredictable geopolitical developments, new legislation, as well as organizational change on projects is rated predominantly medium to high. Interestingly, the change in the collaborator/supplier status and actions from competitors on projects in organizations are seen as having a low impact on their projects, pointing us to the conclusion that they have strong mitigation routines to these instances. The analytical frequency distribution on uncertainty in projects is found in Appendix F3.

The participants were able to *compare their innovative projects* against their competitors while citing that 51% to 75% of their own projects are more innovative compared to their competitors, and 33.9% agree to strongly agree that these are over 76%. Interestingly, here however, a particularly high number of missing responses, at around 30% for each item, is noticeable, thus accounting for the elusiveness of identifying and measuring innovation within projects.

A broad perspective of *innovation performance* emerged and was operationalized by the participants using the following metrics: development and/or adaption of new technologies (49.1%), new process innovation (47.2% fairly strong/strong growth), recombining technical knowledge to take advantage of existing products in new areas (46.3%), innovation in reaching new market segments and consequent business

growth (39.5%), innovation in using new materials (39.0%), innovation in product design (37.2%), new product innovation (31.7%), and development of new channels of distribution (29.4%). The analytical frequency distribution on innovation project performance is found in Appendix I2.

As for the *impact of innovative projects,* 66.5% of the participants cited employee satisfaction increases due to their involvement in innovative practices. In addition, 72% cited project innovation as exploration, focused on the initiation of idea generation, conceptualizing, data gathering, and planning stage, while 64.2% agree to strongly agree that project innovation performance is focused on the implementation stage that consists of actions and decisions involved in putting an innovation to use. Additionally, 71.1% agree to strongly agree that they have benefited from using an innovation, and only 31.2% agree to strongly agree that they have benefited financially by selling an innovation. The analytical frequency distribution on the impact of innovative projects is found in Appendix I3.

There is consistency in the findings that show that barriers and enablers of collaborative innovation in projects are similar: cross-industry and region. A strong pattern of behavioral, relational factors were highlighted as enablers, such as high levels of communication and interactions (49.5%), collaborative leadership (49.1%), and top management support and practices (48.6%). These are followed by resource availability (42.7% high impact), information sharing (39.9%), trusting relationships (37.2%), individual knowledge and skill sets (36.2%), missing and strategy (34.4%), organizational politics and culture (33.9%), available technologies (33.5%), individual needs and motives (31.7%), and organizational structure and size (26.6%). The analytical frequency distribution of *barriers and enablers of collaborative innovation in projects* is found in Appendix I4.

Bivariate Analysis (Inferential Statistics)

The screening procedure followed to prepare the data for the bivariate analysis, according to Field (2013) is found in Appendix G.

After the univariate analysis of the data and the data screening, the relationships were investigated in more detail. For this purpose, the strength of the relationship between two variables was measured with the Pearson's correlation coefficient. It is a standardized measure, which can take any value from -1 (one variable changes, and the other changes in the opposite direction by the same amount) through 0 (as one variable changes, the other doesn't change at all) to $+1$ (one variable changes, and the other changes in the same direction by the same amount) (Field, 2013). The findings that emerge from this study are summarized below.

Years of project management experience: Experienced project managers are more aware of the opportunities to find solutions offered by collaborative innovation within projects ($r = 0.180$). The difference between the experienced and less experienced project managers (in terms of years of practice) with respect to project innovation and the significant relationships are shown in Appendix H1.

Continuous flow of ideas: The analysis showed that there is a strong interdependency between collaborative partners having the capacity to contribute to a continuous flow of ideas and different aspects of "innovation performance," such as collaboration with clients to find project solutions ($r = 0.310$), to expand into a new industry by partnering with sector experts ($r = 0.270$), or to expand into new regions by partnering with a local agent ($r = 0.276$). The significant relationships are shown in Appendix H2.

Size of organization—Test of difference: The test of difference, also called the t-test, was used to test whether the differences between two means are significantly different from zero. For the research at hand, this shall be investigated for the size of the organization. Various t-tests are conducted to compare the means of the two groups (Group 1: number of staff employed ≤ 250; and Group 2: number of staff employed > 250). A closer analysis of the data showed that experienced project managers (based on years of experience and number of managed projects) had more awareness about the importance of collaborative innovation, especially within the given dynamic, uncertain environment. Specifically, the difference

regarding reason to collaborate in a project in order to expand into a new industry by partnering with sector experts between Group 1 and Group 2 is 0.61 (bivariate correlation [BCa]) 95%, CI [0.03, 1.19]), and significant $t(163) = 2.07$, $p = 0.040$.

The detailed findings are summarized in Appendix H4. to help indicate the difference between larger companies (with more than 250 staff) and smaller and medium enterprises with respect to project characteristics, as well as collaborative aspects in projects and project success factors.

6. Conclusions

This study set out to address one of the enduring challenges in project management: the lived experiences of project complexity and the ways project managers navigate through this in the way they engage in managing projects. Our analysis explicates that project managing is a complex practice, not just because of the variety of endogenous and exogenous forces that shape the variety of project complexity that characterizes projects. It is a complex practice also because of the simultaneity of multiple forms of complexity that need to be managed. This multifaceted nature of complexity itself explicates the need for technical, relational, and resilient capacities to respond, but also to "manage" projects. This is why, in our analysis of the practice of project managing, we reveal that "managing" exposes tensions and paradoxes like stability and change, standards, and pragmatism, which call for practical judgments that connect different aspects of project managing afresh. This process of connecting aspects of project managing reveals the centrality of practicing. Hence, this study proposes, as a new perspective in project management research and practice, a focus on the practicing of project managing.

Practicing project managing becomes an approach to "managing" that is focusing on the connections that can be nurtured in different aspects of the practice of project managing. We have highlighted in our analysis the need to appreciate and congregate all aspects of the practice of project managing in the *purpose; principles; procedures; place; past, present, and potential* future; *pace; patterns; promise; practitioners;* and *phronesis (practical judgments)* dynamically negotiated with other *players* (stakeholders) in project management practice. This means that project managers engage in project managing by embracing the dynamism of their practice as they recognize the need for both stability and change and standards being maintained, and yet, pragmatism guiding their choice of actions. This recognition is not given ex-ante and it is not defined by adherence to rules alone. Instead, it is developed in the course of practicing making connections between aspects of the practice guided by practical judgments. Such practical judgments in turn, are not predefined rules of "good" or "bad" decisions. Practical judgments are practical because they balance

competing priorities, engage with tensions, and identify through the connections fostered by new possibilities. This is where practicing has the potential to contribute to new and innovative modes of project managing.

Innovating in projects, therefore, is not just a matter of creating new processes and procedures of products. Innovating in projects is about transforming the tensions experienced into extensions when learning to collaborate and learning from collaboration. The latter point highlights two other important contributions in our analysis. First, it shows why collaboration is not merely a matter of exchange or interaction between inter- and intraorganizational project stakeholders. Collaboration is a mode of connecting with other key players in transforming project managing into a process that realizes the impact of the project to serve the common good. This means that collaboration explicates not only the contribution, power, and influence of the various key players engaged in the project. Instead, collaboration becomes a foundation for strengthening their connection by building trust and not only a common goal, but a common good sought to be co-created in the course of the collaboration. This implies that central to collaboration is the scope of learning and not only sharing knowledge. It is about building the technical, relational, and resilience capacity identified as central to practicing project managing in unison, not in isolation.

The second key contribution in acknowledging collaboration is that by adding key players as a critical aspect of project managing, we explicate the importance of practical judgment in carefully selecting collaborators. This choice of collaborators, as our findings show, is one of the key practical judgments guiding project managing. Selecting the wrong collaborator can have detrimental effects on the project and the collaboration. It can also stifle the scope for collaborative innovation. The latter, we identified as one of the key capabilities that remain unexplored in project management as a professional practice.

In short, this study contributed directly to advancing our understanding of complexity, in general, and project managing, in particular. It extends previous research on the social complexity of organizing and project managing (Antonacopoulou & Chiva, 2007; Maylor & Turner, 2017) by highlighting that relational temporality in projects, in particular, and the ways it affects other aspects of

the practice of managing taking shape. The key players engaged in any practice are not merely interacting. They are negotiating and collaborating; they are learning and innovating. Therefore, it is critical to support project managing in practice to cultivate practical judgments that can enable project managers to not merely respond to complexity, but to navigate the simultaneity of project complexity in ways that serve the common good.

This study also contributes to advancing our understanding of innovation through collaboration in projects by going beyond exploitation and exploration, triggering relevant complementary capabilities or mobilization of diverse participants over time, referring to the renewal of knowledge and skills of the participants in the innovation process (Davis & Eisenhardt, 2011). The transience of project players, as this study recounted, is beneficial to exchanging and developing creative ideas. If we acknowledge the power of collaboration among project players in co-creating ideas, we can begin to also advance new ways for fostering collaborative innovation as a key dimension and measure of project success. This study makes a compelling case for the perceived value of collaborative innovation in projects across regions and industries. However, there is a need for a stronger awareness of this among the more experienced and novice project managers. Project dynamism, as our analysis has shown, is not only a product of environmental changes, geopolitical instability, rapidly changing technologies, rapidly changing project requirements, and supplier reliability and resilience coupled with the availability of collaborative tools (online virtual collaborative tools, collaborative project management software, content management systems). Project dynamism is also embedded in the collaborative character of projects and the connections that practical judgments of project players form collectively as they serve the common good and not only narrow personal interests.

The tensions inherent in projects reflect difficulties of aligning competing priorities among collaborators, constraints in establishing a collaborative mindset, and lack of top management support—all points that are well made in the collaboration literature (Everett & Jamal, 2004; Huxham & Hibbert, 2008; Suprapto et al., 2015) as well as in the practice literature (Antonacopoulou, 2008).

What this study shows is that tensions can be transformed into extensions of strong relationships that are formed between collaborators with innovation performance as a common priority (Mishra et al., 2015). In other words, forms of partnering are associated with higher innovation, while weak collaborative forms of engagement with partners lead to poor innovation outcomes.

6.1 Implications for Project Management Research

In conclusion, this study marks the next chapter in project management research by introducing the *Practicing School* in project managing. This orientation has important implications in project managing research as it shifts the focus on the connections between different aspects of project management practice. This study has identified 13 aspects of project managing and has contributed a new framework: the 13 Ps that can guide efforts to capture project complexity and account for the dynamism of projects. Figure 6 presents this framework and marks the contribution in advancing project management research. The 13 Ps of project managing and the focus on practicing project managing offer an important foundation for new methodological innovations in the ways such connections between aspects of project managing can be arrested.

6.2 Implications for Project Management Practice

The *Practicing School* introduces a greater focus on how to practically work to address project complexity not by simplifying it, but by learning to make the powerful connections so central to project success. This study and the 13 Ps framework is also evidently helpful to project managers in recognizing the various aspects of their practice and actively seeking, through their practical judgments, to balance the tensions they might experience and do so collaboratively with other key players. The study invites project managers to engage with project complexity by learning to collaborate and learning from collaboration to create ideas that extend the possibilities of the project to serve the common good (a higher purpose, social well-being), and recognizing that project users also have a contribution to the long-term impacts of the project.
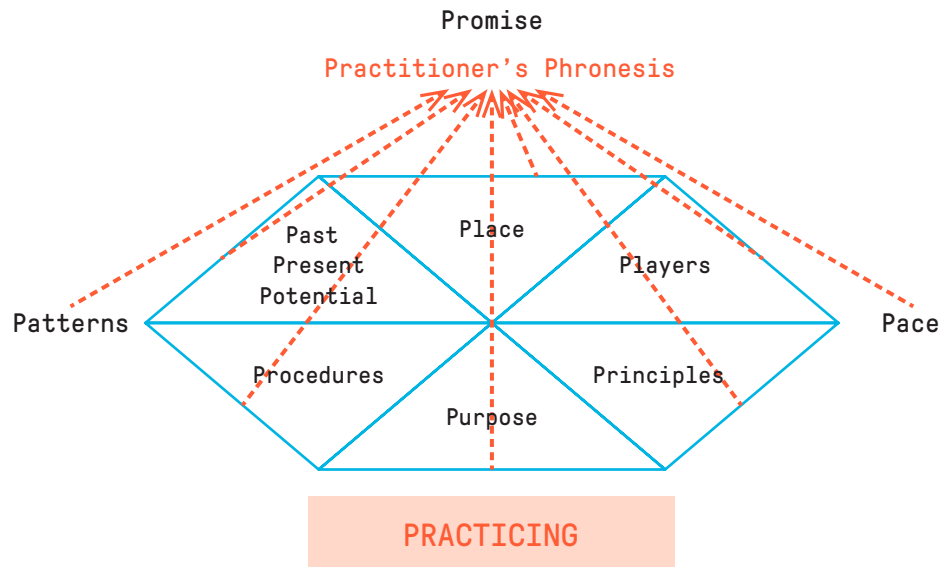
Figure 6. The 13 Ps when practicing project management.

6.3 Implications for Continuous Professional Development

This study draws attention to the importance of practical judgment that itself fosters not only the capacity for technical knowledge, but also relational and resilience capacity. Such capacities are not only central in engaging with project complexity, but they are also imperative in collaborating and innovating. Educating the future generations of project managers requires a transition from a focus on predefined rules and steps in project management toward cultivating practical judgment through practicing making connections, creating possibilities, and transforming tensions into practicing extensions. It is imperative that the Project Management Institute (PMI) actively and radically supports the way project managers are educated and qualified to "manage" projects. This study highlights the importance of practicing project managing as embedded in learning afresh to embed the unknown as central to project complexity.

7. Appendices

Appendix A: Interview Schedule

The questions were structured to discuss the following items:

A: Introductory Questions

1. What would you rate as the three most significant trends in project management currently? Why?

2. Critically reflect on how project management has evolved from the past to the present day and list the main changes.

3. In your view, how does project management need to evolve in the future?

4. What would you list as the three top priorities to improve the way project management is performed?

B: Project Management Practice

5. How dynamic would you rate the way project management is performed in practice from a level of 1 to 5? (1 = stable, 5 = very dynamic)

6. List the top aspects that make project management practice. Which would these be?

7. Who are the key players involved in project management?

8. How do key incidents where choices and decisions are made affect project management?

9. What are the key procedures followed (top 5) and why?

10. What are the main principles followed (top 5) and why?

11. Describe how the context (the location) in which project management is taking place affects how it is performed. Give examples.

12. Describe the pace that project management typically follows. What reasons would you provide to account for the different pace?

13. What tends to be the main purpose that project management seeks to fulfill?

14. What would you consider as the typical impacts (outcomes) of project management and why?

15. When are impacts likely to become evident? Why?

C: Collaboration as a Practice—Social Interaction

16. Do you collaborate with teams within your organization or outside your organization typically in your projects? Examples?

17. Describe collaboration with others typically in your projects.

18. What are some of the conditions that make collaborations work/successful in your projects?

19. What are the main challenges in collaborations in your projects and why?

20. What are the top five capabilities necessary to collaborate effectively in projects (both inter-/intraorganizational)?

21. How have you benefited from collaborating in your projects?

22. What are some of the qualities you look for in collaborating partners in your projects? Intraorganization? Interorganization?

23. How do collaborations change over the life of a project?

D: Collaborative Innovation in Projects

24. Previously, you indicated a number of impacts emanating from projects. Would you consider innovation as an outcome of project management practice? Please explain why.

25. Describe what kind of innovations your projects have resulted in.

26. What are the top five conditions that helped/hindered these innovations to materialize through the collaboration?

27. Were you able to recognize these collaborative innovations at distinctive phases of the project? If so, when and how? Please give examples and reflect on why this is happening.

E: Link Project Success and Collaborative Innovative Capability

28. What would you list as the top three measures of project success?

29. Who applies these measures of success? Why? Please explain.

30. As we draw this conversation to a close, would you like to offer any further comments or reflections about project management practice, the role of collaboration, and the scope for collaborative innovation?

Appendix B: The Focus Groups Schedule

Session 1: Project as a practice (*45–60 minutes*)
Briefing: In this plenary session, we want to capture the dynamic nature of projects as a practice.

- Do you all recognize project management in the way the Project Management Institute (PMI) describes it? What would you list as *the main characteristics* in describing what doing project management entails?

- If we were to invite you to understand project management practice in relation to these nine aspects (Ps: procedures, principles, purpose, place, past/present/potential future, practitioner, and phronesis), can you relate to these as another way of capturing what project management practice entails?

- Within groups (of two to five), use these *Ps to describe your practice*.

- *What makes project management practice unique?*

- What makes *project management practice dynamic?* Rate project management in terms of how dynamic you think it is, ranging from one to five.

Session 2: Collaboration (*45–60 minutes*)
Briefing: In this session, we want to look more closely at the nature of collaboration in projects.

- Share with your group partners, your stories of collaboration in the projects you managed.

- Collaboration in projects: Are the dynamics of the environment impacting this?

- Debrief and identify common and different factors across subgroups.

- What tools do you use to collaborate?

- Categorize the intra-/interorganizational perspective. How do conflicting interests exist in collaborative teams?

Session 3: Innovation (*30 minutes*)
Briefing: In this final session, we want to focus on innovation in projects.

- What *kinds of innovations* do you recognize from your experiences?

- Have you developed any innovative procedures in your project management practice?

- *Are they replicated across the organization?*

- Do these innovations emanate due to the collaboration or are they endemic to project management practice?

- What are the *levers and drivers of project innovation?*

- Innovation types (culture, inhibitors, challenges, embeddedness, drivers)

Session 4: Reflection (20 minutes)

- If you feel that the various aspects of project management practice we discussed are useful in thinking about what you need to do next time, *what would you choose to do differently next time?*

- What would you do to be more alert to your *collaborations next time you manage a project?*

- What would do to *enhance the scope for innovation* in the projects you do in the future?

Appendix C: Analyzing the Dynamism in Project Management Practice

FORCES OF DYNAMISM		HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
External	Unforeseen changes	Uncertainty in the macro environment, including economic instability/ volatility (i.e., the economy) and the weather (in marine projects, etc.) are exerting pressure for change during practicing project management. This also involves changes in government spending policies (where issues of power inequalities can be observed between companies and funding bodies), which imposes unexpected changes in project specifications (e.g., quantity of work, project utility).	• *We have a forecast and everything, everything always can change. So, I think this is a good picture of the reality of this industry. For instance, for drilling, you can have a map saying you'll find oil or you'll find gas at that reservoir, and you can drill a well and find nothing, you know. There's always something that you cannot predict. So, I would say project managing is dynamic, because we try the best to not change anything, but change is always an issue in this area, in this industry. [7]* • *The economy is not stable. And then we are still in a . . . when, we are still dependent, we import a lot of things. There are few things that are manufactured here. So, this importation causes delay, and so many other things. Cash flow, the liquid flow is not really there. The client could be expecting that the bank, his bank will sponsor, but, the project. And then policy changes too. All these things could affect the project. But we try as much as possible to, you know. We try as much as possible to minimize the effect on the project. [36]*

(continued)

FORCES OF DYNAMISM	HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
		• *I mean, for example, we had a project. We had a certain scope, which is in Australia. We had a project for a road, for a haul road, a quarry, and a sea bund. A certain amount of scope just to give you an idea of what we were supposed to do: 1 km of road and 5 kms of sea bund, and a quarry, and a certain size quarry within two months. This was a tendered design, within a week it expanded to 6 kms of sea bund, 7 kms of road, so you have to constantly juggle and, of course, the standards would change, and the requirements would change, and material use would change, and also then the client demands. So, you have to have a dynamic team and you have to have a flexible team to be able to adjust to deliver and at any point, not changing. [41]*
Continuous amendments	Given the nature of projects (that involves several assumptions and expectations), adjustments/modifications are regularly requested by project stakeholders including clients, subcontractors, regulators, and consultants.	• *We always have changes in construction, for sure. Yes, it's just a daily life of our project. The changes because of the clients, because of subcontractors, because of a technical aspect that was not foreseen at the beginning, and we need to adapt all the time. We need to adapt our schedule, we need to adapt to make a lot of change orders to the client, to change our continuation sometimes also. We have a difficult subject. Yes, for instance, we, in these projects, we face some problems with one of our main subcontractors, we implement a task force, and many new people just dedicated, like a kind of small project management inside of the project to take care of some difficult situations, and it finds people who are able to find the difficult situation and put it in the frame of the general project. [4]*

(continued)

FORCES OF DYNAMISM	HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
		▪ *For me, dynamism in project management is being able to adapt to the changes that may appear on the project, in the schedule of, in the pricing, or the design itself of the project. For example, if the client requests something else to do in the project, you need to be flexible and react properly to this situation. Not, you know, not affecting the project itself. [29]* ▪ *The issue here is environment: company policies, project department, and customer/ end user environment. They affect our way and time with deliveries we can use during the project life cycle. So, the limitation comes from customers and company policy as it affects what type of methodologies you can use during the project life cycle. [25]* ▪ *Project weekly meetings that involve the project personnel and people from the . . . and the staffs from the factory . . . So, in the meeting, we do get together and think or chart the way forward. So sometimes, better ideas do come during these meetings, and sometimes design, maybe a plant design, layout, might have to change and some other things do change along the lines. So that . . . In most cases, we still try to manage the changes that are caused, and we don't really allow it to affect our delivery, delivery time, but we do have change in designs. [33]*

FORCES OF DYNAMISM		HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
Internal	Competing priorities	Due to the competing priorities of inter- and intraproject stakeholders (e.g., suppliers, subcontractors, engineers, clients), changes are expected to work, plan to minimize conflicts, and enhance trust, thus maintaining the flow of project activity. As such, the dynamism of project management practice is triggered by the internal actors. Project technical difficulty requires the coordination of activity between project teams. In addition, project complexity requires the involvement of several parties (procurement, design, etc.) to address this complexity. Project technical difficulty (coordination of activity between project teams) and project complexity require the involvement of several parties (procurement, design, etc.). These issues also involve conflicts between intra-stakeholders (e.g., project manager and project team) and internal contradictions between intentions and actions (conflicting agendas).	• *We are not stable. So, we have to switch every time, depending on the priorities which are fluctuating throughout the project, and then depending on the subcontractors, and the suppliers, and other contractors involved within a project, because they all are interlinked. So, that's why I would say project management cannot be stable, they are dynamic. (20)* • *The dynamics of relationships are very important, aren't they? Those between the project manager who is (e.g., producing a model or a type of medicine being developed) will be completely different, probably, to the dynamics of the project manager running a construction project. [3]* • *We brief the communities, we tell them the implication; people will know that now they will have to lose their properties, they will have to plan alternative resettlement, they have to know the timeframe and all that. We advise them where they are relocating to, what resources will be required and all that. Sometimes it is even difficult for them to accept the fact that they will relocate. It takes them many meetings between the government and stakeholders to convince them on the need for the expansion and they begin to ask where will they go and all that. So, all these things, even though you have timeframes, there are things that, even within those timeframes, because of the sensitivity, you find that at the end of the day you are unable to really marshall and control all these issues within the timeframe that was allotted for it. So, these challenges, the project manager, and at the end of the day, the dynamism that will be required will be to make government and the public to see reasons. [17]*

(continued)

FORCES OF DYNAMISM		HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
	Technical difficulty	The ongoing status of change caused by the above drivers, coupled with project-inherent technical difficulty, requires a high level of coordination between the various actors/departments involved in the project (procurement, design, etc.) and increases project dynamism (to cope with enduring change).	▪ *Dynamism. It's to do with how, say for example, if there are any processes or procedures followed within the management process, project management, if they are not applicable for a particular project, the project manager should be able to convince and change it accordingly to meet the requirements of the project. [39]* ▪ *In consumer electronics, I will say a 5 (i.e., very dynamic) because project managers have to be involved in all of the details, have to be far more proactive, and very flexible against the company rules, but it depends on the competition of the industry as well. [21]*
	Maintain competitiveness	In order to maintain competitiveness in the market, some practitioners would seek continuous development (i.e., to remain in the status of continuous change) to optimize their resources to either match or outperform competitors.	▪ *So, we can adjust ourselves . . . Today you are using maybe a . . . system, tomorrow, another technology, or control software for lighting, so we have no problem with that. We are very dynamic and like complex situations because they make us better; they make us competent. [31]* ▪ *Dynamism on this management shows that we have continued to monitor and control the processes, to rotate the activities . . . We have tried to get . . . use them in different departments where they have the experience. So, we have been dynamic in utilizing people on the most probable areas they can fit in, while waiting also for others to come in other areas where they can also perform. [30]* ▪ *I think we have some dynamics. Okay, if you say on a scale of 1 to 5, I would say 3, somewhere in between. Somewhere in between, we are changing our . . . We are developing a lot, there's a lot of development going on like agile, for instance, like in Britain Prince II, and some other places. But I don't see that this is really driving practice. It's more driving how we perceive project managers by project management, but not so much how we do it. [35]*

FORCES OF DYNAMISM		HOW DYNAMISM EMERGES (ONGOING CHANGE)	EXEMPLARY EVIDENCE
			▪ *With most project managers, whether they are capable or not, you get a lot of movement, a lot of enthusiasm, a lot of interaction I always thought that the best, most dynamic project managers were those people who were selective about the use of other people's time, and I think that sometimes we can misjudge that term "dynamic" in that we see it as a project manager who is running about doing 15,000 things. But the project manager who achieves what was needed to be done without having 50 people in a meeting, without sending emails out to 100 people, they are the good project managers who are selective and stop at making their presence felt without that level of . . . [3]*

Appendix D: Findings in Relation to the Purpose, Principles, Procedures, Place, and Pace of Project Managing

We adopted the 12 Ps (*purpose; principles; procedures; place; past, present, and potential* future *pace; patterns; promise; practitioners;* and *phronesis*) framework proposed by Antonacopoulou (2008; 2015) to account for the project complexity emanating from the way all these aspects of project managing are connected.

We address here the findings in relation to the purpose, principles, procedures, place, and pace of project managing. The reason we focus on these aspects and present findings is because we feel that these provide a more directly relevant account of the issues our study sought to capture and the conditions that affect how project managing is performed. We did not specifically address the past, present, and potential future because we saw this as embedded in the focus on the dynamism of project managing. It was clear to us that project managing is a practice that is continuously being reconfigured, and while we could have provided an historical overview of the development of thinking and practice in this field, we did not have scope to adopt this approach. Equally, we did not explicitly solicit in our data collection project managers' views of the patterns in project managing because it was clear to us from other responses and references to other aspects of project management practice that there are some emerging patterns in the ways project planning, monitoring, controlling, and executing are taking place. However, such patterns are not characterized by consistent actions. Instead, there are consistent references to activities recognized as integral to project managing that are dictated by professional standards. These, however, do not appear to be systematically followed, not least because the lived experiences of project complexity demand a balancing act between structure and pragmatism as we have accounted in our analysis.

The tables in this appendix present findings in relation to other key aspects of project management practice including: purpose, principles, procedures, place, and pace of project managing.

Appendix D-1. Purpose Affecting Project Management Practice

THEME	CATEGORIES	EXEMPLARY EVIDENCE
Having a clear purpose affects several practice-related factors including players, procedures, and principles.	**Optimizing stakeholder satisfaction** Changing priorities during the practicing over the project lifetime	*The main purpose of the project management . . . is to satisfy the client because the main purpose of the project is to give the client or the end user what he really needs, not what he really wants. The second thing is for the contractor or the people who are working on the project to achieve their goal and targets by completing it on time, within the budget. [1]* *The way that you bring in the knowledge of how projects are run efficiently and bring the right players, set up a proper finance ground for the project taking into account the various stakeholder interests, so that you can merge all these to achieve a successful project. Not that every stakeholder will be satisfied, but at least optimize the satisfaction of the various stakeholders so that at the end of it, the project is seen as successful by both the stakeholder and the project manager and project implementation team. So, the purpose of the project manager is to bring all these together so that you bring about the likelihood of a successful project. [42]*
	Keeping the project within the scope of its boundaries (cost, time, quality) Indicates a significant impact of purpose on procedures, principles, and the relationships between practitioners	*First of all, if there is no project management all these stakeholders do everything by themselves. And in weak project management, you can see this. The client tries to manage the project, conflicts will start between client and contractor, or the contractor tries to manage the project. After that, quality issues will start. Or subcontractor or other consultants, such as the designer, tries to manage the project and, again, the design changes and everything will stop. So, the main purpose of the project manager is to finish the project on time in the defined budget and with the defined scope. Otherwise, scope will go one way, budget will go another way. [37]* *If you want to be successful . . . you need to have a proper plan and procedure, principles . . . In order to make an achievement in a project you need to have a proper plan, to execute the project depending on a set of principles and plans so that you can make a formal practice. If everyone manages projects his own way, there will not be any standards so it would be difficult to solve problems when they happen. The standards are a big help, to make sure that we achieve success. [31]*

Role of Principles in Project Management Practice

Principles comprise values, beliefs, and assumptions (i.e., core values) that are rooted in the organization's values system and held by practitioners, directing their practice. As informed by the analysis, these principles were essential in guiding the "why" in which project actors were practicing. Also, the principles influence the relationship between the internal (e.g., team members) and external actors (e.g., clients and suppliers) of projects. Importantly, the principles are useful in minimizing the issues of conflict by emphasizing information sharing, trust, and transparency. Several types of principles were captured in the data. However, these principles can be clustered into two themes: evolved internally and introduced externally.

Appendix D-2. Principles Affecting Project Management Practice

CLUSTERS OF PRINCIPLES	PRINCIPLES	EXEMPLARY EVIDENCE
Principles evolved internally These principles comprise the values and assumptions embraced by the project management team, which have developed through their interaction and accumulation of experience.	**Proactiveness** The analysis shows that practitioners of project management perceive proactiveness as a critical principle. Given the complexity and dynamism in projects, the players need proactiveness (the ability to predict or anticipate opportunities and threats) to underpin all of their activity. Proactiveness leads to problem avoidance.	*You need to have some kind of flexible structural approach to a project to make sure you don't forget something . . . It reassures me that I am in control of things although I can't see everything . . . It also provides you with an ability to kind of smell out a problem or catch it in the beginning. If you hear something in the meeting, and you speak to the people on-site and they say something different, you understand that there is something there that's not right, and you can go in and flush it out of the system. So, it's a lot of being proactive, and the only way to be proactive is to know what's going on. [19]* *You have to be proactive . . . that is a principle which is very much required in this industry. If you are sitting behind your desk not reacting on time, you are too late . . . You go there, you talk to them, instead of sending 20 emails a day. [20]*
	Communication The analysis shows that efficient communication within the team, as a principle, is essential to increasing common understanding. This also increases team consistency and commitment. Internal clarity and communication lead to understanding, coordination, and commitment.	*Making sure all the team members are well aware of the processes they are using within the project and strictly adhere to the processes . . . It's sort of like setting ground rules, saying that this is how it should be executed and having a common repository of knowledge so that any new members coming on board, it's easy for them to read through or go through the available knowledge of what happened in the project until then, so it's easy for them to follow. [39]* *Building good relations with the project team is very important and, honestly, I have felt its important during the crises that the organization has faced because the relation that I had with my colleagues and the people who are working with me has really proved to be useful to complete the project, even some of them were hoping after they have left the organization—we were asking them to do some small work in their free time and they were doing that. [1]*

(continued)

CLUSTERS OF PRINCIPLES	PRINCIPLES	EXEMPLARY EVIDENCE
		You have to be aware of the respect between the head of the department and the rest of the team . . . If you look at it from where I stand, no one will listen to the lower people, so it is hard to say there is a respect chain here. So, in this case, you lose the key element which is actually the coordination and self-motivation of all the people. [15]
	Ethics and transparency Ethics emerged as an important principle as they enhance the level of trust between all involved players in the project. Ethics-related principles lead to building trust between the different players of projects.	*. . . Main principle for me is ethics, because no matter if I'm working for this company or another company, my name, as project manager, is what I have that's most valuable. So, I try to stick with this ethics, means doing all . . . avoid any wrong things to be done. I always deviate from these, because we have a lot of, at least here in Brazil, a lot of other ways to do work, not ethically, so my main principle here is stick with that principle, doing the right thing, deliver what the customer pays . . . [23]* *The principle of ethical financial management is important to me. Then there is this issue of projects awarded to contractors—sometimes there is too much lobbying for a project in such a way that the contractors who eventually carry out the project are not necessarily the best, and therefore, the final product suffers as a result . . . We have had projects which were completed and things worked but only for a limited time. Beyond the guarantee period, there are defects, and the project begins to deteriorate. There are things that make it work and it passes the test, but a few years later it degrades and at that time we are outside the contractual situation, in which case it would be difficult to seek any redress from arbitration or courts. [42]*
Principles introduced externally In addition to the above principles, the interviewees stressed the relevance of principles imported from the standard project management practice (e.g., safety, efficiency, quality.).	**Standard project management principles** These are typical project management principles (mainly informed by the standard principles of PMI) that lead to minimizing impacts on cost and time.	*Most of the principles that underline a project in the real world are doing it safely, saving costs, and maintaining quality. These are the driving principles of industrial projects. [16]* *The financial and cost management . . . So, try to do everything as in the best, the best way possible, the best way, finish with a lower, lower cost and the right, the right schedule. [23]* *Then the project should be of a good quality. And should still be relatively cheap. So, when you are able to please one client, the client will bring more. But if you do a shabby job for a client, you have lost that client, and even more that he would have brought, that would have come from him. So, we try as much as possible to deliver on time, and quality work, and the cost to be effective too, and safely done. [36]*

Procedures Affecting Project Management Practice

The analysis shows that procedures constitute an important aspect of practitioners' project management practice. In this respect, it emerged that project management practitioners distinguish between two types of procedures: technical and administrative (as shown in Table D-3). Overall, these procedures underpin the systematic approach followed by these practitioners to manage and execute their project. However, the informants appreciate that these procedures are not static, but should be flexible and adaptive. Interestingly, our analysis shows that there are two factors that influence (or initiate, in some cases) the adaptation process: review episode and contextual impact, as elaborated in Table D-3.

Table D-3. Procedures Affecting Project Management Practice

Procedures dynamics This theme describes the change process that occurs in procedures. In other words, how procedures are adapted. The analysis revealed two issues under this aspect: review episodes and contextual impact (flexibility) on procedures.	Review episodes (internal) The adopted procedures were subjected to regular updates. Here, the role of accumulated experience in informing the revision process was clear.	[We should] ensure that our products comply with all the requirements and specifications sent by the client and, after that, we have a technical procedure, but that depends on the project . . . it depends on what type of specification we have. But we do not have established . . . a control and monitoring procedure . . . We follow what we think is right.[29]
		We are doing our review roughly every two months [as part of our] two-month planning cycle . . . For reporting, we are keeping quite low compared to what I've seen in other places, not doing too much upward reporting, more exception reporting. Our managers have enough going on, they don't want to hear it, every two months is sufficient, and the rest of the time we're left to ourselves. [18]
		You need to have the right procurement procedures . . . [as] you realize that if you have done [everything] right, you get the best outcome. [5]
		[Organizations] may have some rules and they may have some guidelines and some regulations [i.e., procedures] on how to run projects, but often they are not used and, often enough, you cannot use them . . . There are boards from consultancies that came from outside the organizations who do not know the business, who do not know the customer, who do not know the people inside the organization well enough to develop a good program for them and a good methodology for them. So, that's why they are often not used, because people cannot follow them. Otherwise, the projects would suffer and they are also inconsistent very often. And the other thing is that they don't have the mastership of tools and techniques to really follow these processes. Because these processes build on tools and techniques, and I can train them as a trainer, but, I can take a horse to the water, you know, but I cannot make it drink so . . . so I can tell them how to do it, but they will have to apply them to get really familiar with them and they have to do this repeatedly and I will not be there when they do that.[35]

(continued)

Table D-3. Procedures Affecting Project Management Practice *(continued)*

	Contextual impact (external) This category emphasizes that each project/country has its own characteristics that affect the adopted procedures. Thus, it indicates the importance of flexibility as each project is unique.	*We follow what we think is right in the control and monitoring procedures because we don't have anything in writing so this procedure has not been created yet in the company, and I would say that in most companies here in my country [Ecuador]. This procedure . . . is hard because by controlling and monitoring the people who execute the project, they feel they don't feel right. So, this causes a lot of problems [to their] efficiency . . . sometimes it improves, sometimes it decreases. It's not a real fact for the project if you control them following a procedure because they will react according to it and will not work on a daily basis. [29]* *My organization has its own project management procedures I have to follow. We have a J-flow system; we have to enter all our projects and all the reporting and everything. I have to follow my company's procedures. But, of course, it is my right to amend some changes on those procedures because all projects cannot manage according to the same procedures. On some projects, time management or quality management is more important, and on others, cost management is more important. [For example] I had one project that its budget was not specified, it is unlimited, and when I finished that project, you cannot believe how much we spent. It did not have a budget but it was [required to be finished at a certain time] . . . When you are following the procedures, it depends on the requirement of the project. You cannot say these are the five procedures of project management and I will follow them. No, each project has its own procedures. [37]* *[It depends] . . . for example, in Oman, we don't use [a type of technology used in design to coordinate between the engineers] . . . it helps a lot, but it's not there . . . [But] in Dubai, [where you have] international consultants, we started using it . . . [Also], we do have some kind of best practice, but they are more applicable to a sort of prototype project. For example, if I have done one hotel and if I want to build one more hotel, then I know their sequence, then I know which comes after what, and I may still prepare some kind of list, a structure that I should follow, but when I'm working at an airport after I've done the hotel, after I've done a housing project, it is very difficult to generalize those best practices. Of course, there will be a few which can be, which can be applied, but I think it's very contextual. [38]*

Place Affecting Project Management Practice

The analysis shows that the place can influence the practice of project management actors. Specifically, we identify three types of this influence that can have either a positive or negative effect, as elaborated in Table D-4.

Table D-4. Place Affecting Project Management Practice

PLACE EFFECT ON PROJECT MANAGEMENT PRACTICE	EXEMPLARY EVIDENCE
Moderate power Different places vary in their rules and assumptions that can change the power and relationship dynamic between actors involved in the practicing process.	*In our organization, most project managers are not employed as project managers; they are employed as ordinary staff of the organization, so they are not bound by any document to indicate that they have to wait until the project is over before they can leave. Unlike other institutions, where someone is given the title "project manager," where you have a signed contract for two years for a particular project. In my environment, you are first and foremost employed as part of the organization. If you are . . . of the organization, but have the scope in project management, you are now playing the role of project manager. But you have not signed any contract as a project manager apart from the project charter. But the project charter is mostly not signed by the CEO. So, the dynamics are different. So, a project manager in the public sector can leave, and that can be a big blow for the project. [10]* *In Ghana, the project manager's role is [multiple: a person can take multiple paths], but here [in the United Kingdom], it is distinctive [i.e., more specialized, plays one particular role] . . . In other words, a project manager in Ghana had to be responsible for multiple tasks and was probably more involved from the beginning until the end . . . Also, in the UK project managers have specific input, but may not see the project throughout its life . . . You, halfway through, you leave it or you may or may not, but the point is that it's done in different ways, the delegation of duties or responsibilities . . . [this can be explained as] here in order to dwell more on health and safety, whereas back home, although health and safety is a core component, it rests with the project manager. But here you have to have a dedicated person in charge of health and safety. [14]*
Affect efficiency and effectiveness The place can affect the procedures and principles of project management practice (e.g., communication, assumptions, organizational culture, resource-related issues, political stability).	*Location. Yes, it does affect projects, you know, because . . . if the project area is local, usually you don't have any issue with transportation, people accommodation . . . For instance, in Brazil here, I am managing a project in São Paulo state. It is a very developed place, so basically, I don't have any problem with transport, with logistics. It's nothing, no problem. But I, also, in the past, I was managing a project in the Amazon area. So, the Amazon area is very difficult and all the transportation takes like a whole week to arrive on-site. There are also issues with taxes, because Brazil has a lot of differences from state to state, so different taxes. So that affects the way I deploy the project, so the time was also difficult. And also, the people work in the area, so it's hard for me to find people to work in that area, they are not well-qualified or as qualified as people we have in other developed areas. So, basically, there's the difference. [23]*

(continued)

PLACE EFFECT ON PROJECT MANAGEMENT PRACTICE	EXEMPLARY EVIDENCE
	I am an English-speaking person, and we decided to have a project in a French-speaking environment. You have to deal with certain barriers in terms of language. Also, in a different location you have to deal with cultural differences. So, even though the project plan is very similar, and it is the same kind of project involving a similar institution with the same business model, because of the cultural context and the language context it requires an additional effort from the project manager to handle the cultural differences, because this affects communication, especially with the language. And also, how people react to certain things. One example is you could have an environment where people enjoy managers who are pushy, and for these people try to meet their target. You are going to set a cultural context, they prefer you talk slowly with them, and you are talking in a relaxed manner. You explain what the activities are and based on that, keep themselves organized and make things happen on time. So, sometimes this context of culture and language differences does affect the project manager. [6]
Affect scope of practitioners (purpose) The context of place is found to affect the focus (or purpose) of the project actors.	*I was doing a project management course with [a university], and we had one guy who works in the WHO, and his priority in terms of what had to be done, whereas I was thinking about the organization, procurement strategy, etc., this guy's view was that it was all to do with context and project management, in his view, was very much to do with how many lives he could save. He would work on the basis of, they had a fund of money coming in and they would know a year ahead about what their budgets would be, and what they could do is to very easily interpret that resource availability, the value they could get from that in saving lives. It was interesting the way he worked it out. In a part of eastern Africa, if they sunk 20 wells over a 200-square-foot-hectare, sparsely inhabited area that would have a benefit to saving human life and they could put numbers against it, and also when they would buy food at certain times of the year, for Ethiopia for instance, they could convert that into lives saved. So, the emphasis on what they were doing was much different from ours. We were looking for square footage of buildings built as quickly as possible, and this guy was applying his project management skills to how many lives could be saved by the better procurement or management of well drilling. [3]* *Also, the direction of the organization in which the project is being undertaken, because the direction of the strategic plan of the organization changes, then the validity of the project comes into play and there is an assessment of whether or not they need the project. [10]*

Table D-5. Past, Present, and Potential Future Pace Affecting Project Management Practice

THEMES	CATEGORIES	EXEMPLARY EVIDENCE
Pace is influenced by different factors. Specifically, the speed to project management practice is dependent on place, procedures, and purpose.	**Place (context)** The setting of a project has a critical impact on how project players practice in projects. The analysis shows evidence of the impact of different external aspects, including market demand, client requirements, availability of resources, compatibility, and suitability of logistics.	*In the UK, in construction projects certainly, they will follow a pace and usually that is driven by market or demand. We try to get ahead of demand; most people are trying to forecast a year or two years ahead. In IT projects, for example, people are working four or five years ahead, and they have to, as most of their projects are delayed by four or five years. So that is the pace. If we work in housing, we know that if the land is available there is a very simple equation that will tell you that you will build/design/have available 150 houses per year, which is the norm for contracts, or it might be 18 months. A school project, again, has a pace it will run at, which is all to do with the iteration of approvals from the education department and government departments. A lot of those government or public projects are driven by statutory requirements. We built Runway 2 at Manchester Airport and the gestation period for that, to get approval through public enquiry, was four-and-a-half years. We envisaged at the start that it would take 18 months. We always knew the design would take us 15 months, that construction would take two-and-a-half years [3]* *I really can't tell you that there's a standard pace; it all depends on the location . . . If it goes in Abuja, it is fast. Abuja is the capital city. If it's somewhere like Port Harcourt, it's not so fast because the qualified contractors are not so many in that location. So, they have to move from Lagos or the north, and before they will mobilize, so it's slow. So, it's a location-dependent thing. If it's in the northeast, it's nonexistent. If it's in the northwest, it's slow because the contractors have to mobilize from Abuja or Kaduna to build . . . so it depends on the location. [8]*
	Procedures The complexity of procedures emerged as seriously affecting the speed pattern of project management practice. Each stage has its own pattern, as it involves different requirements (i.e., the speed would vary across these stages).	*It is always difficult to initiate and close up a project. In the initiation phase, if you have a problem to enter the site or to negotiate with suppliers to find resources or have difficulties in such things, starting the project is always difficult. In the development part, it always moves smoothly because, for example, if you are delayed in one activity you can shift the resources to another activity and, later on, you can return to the other activity. In the mid-part, you can make schedule gains, you can play with the schedule and catch up your progress by balancing. So, the mid-part is more easy than the starting of the project. The end of the project is also difficult because usually the clients put their nose in the project at the end and they start saying, this part is not good/not bad/I want this, and at the end they start making these problems. Although they are involved from the beginning, at the end—usually the major payments are at the end—they always (in this region maybe) try to make the handing over delayed. They have also some reasons because when they take over the project, of course, the maintenance or other things will start, and sometimes this handing over can be problematic. [37]*

(continued)

THEMES	CATEGORIES	EXEMPLARY EVIDENCE
		The pace in construction industry project management, it depends on the client . . . For instance, in one project we started on a good footprint and then we had a good pace. . .A few months into the project we started having some issues from the client's side in terms of financing the project, which resulted in a delay in date, you know, because the client had an issue with the bank, you know, that affected the project and, you know, they ended up not being able to provide the necessary forms so we banned the project and that eventually changed the project. [12]
	Purpose The competing priorities as perceived by an organization's decision makers and/or project practitioners also emerged as an important issue that affects the configuration of project practices in regard to pace.	*I think the pace is easy to describe, too slow at the beginning, too fast at the end in most projects—because of time, the deadline is always really the killer. I hate the word, by the way, but that's exactly what it often is. So, at the beginning, you don't have enough priority. No, at the very beginning or normally as a project manager, you have a very high visibility because someone is expecting something from you. Your manager or your customer or whoever you work for expects something from you and expectation is so high that you have a lot of visibility. Then these people start the next project and they have to go on the next project, so often you lose a lot of visibility somewhere in the middle and it comes back when you're about to meet, to miss your deadline. [35]* *There are projects that may take longer than anticipated because at certain times corporations change their priorities and the priorities of the projects, and some of these investment banking ones due to change in the strategy, due to change in their leadership, due to change in their stakeholder, and all sorts of things. [24]*
Project Management Practice Pattern Typically, project management can follow a pace pattern that resembles an inverted u-shape, slow (at inception), fast (execution), and slow (submission). This can be explained as project purpose and procedures are not always clear at the beginning and when finalizing (with a lot of ambiguity and uncertainty), but practitioners become more confident and clearer during the execution (more focused on the systematic execution process comprising preplanned steps).		*What happens is, like, in the beginning everything is very slow and then you have the middle that you tend to have a situation that, in the middle of the implementation, during implementation, staff getting ahead and you manage to get your staff and then when you thought it's going to end, most of the time, it will take like three or four months more than you would expect it. So, I think the middle part is the part that actually goes according to schedule most of the time and is a bit normal, and the end is always the worst part. I mean there are certain situations in many occasions in many organizations . . . I mean I've worked for like five organizations, so that's five in the sense of being an employee, not a consultant, and you always had in the end of the project . . . something that remained unfinished—something that you never came around to do it, something that you didn't have enough budget, or you did not have the right people, or they left, or they've been dragged out from the team. [9]*

Table D-6. Key Players Affecting Project Management Practice

PLAYERS IN PROJECT MANAGEMENT PRACTICE	KEY PLAYERS	EXEMPLARY EVIDENCE
The analysis revealed three clusters of players that intersect with project management practice.	**External players** Clients, owners, governments, local communities, suppliers, contractors. Clients and government typically have the highest impact on project management.	*First of all, the client is a major player you have to manage very well. Second is the contractor, also very important. Workers are the key players of the contractors; you don't directly deal with them. Local authorities are key players because anytime they can cancel your project, because they come and inspect your project, health and safety, and all these kinds of things. If you are working under a developer, that developer is a key player. The designer is a key player and consultants are key players in the project. [37]* *The clients are the major players as they are the ones who have the money and they can set the rules of the game as they want. The consultants, they don't have that much influence, or the designers, they don't have that much influence on the project manager because they will just follow what the client of the contractor would like to do or the senior managers. So, in the construction industry, the main two players are the main contractor and the client, followed by the subcontractor and the consultant at the end. [1]* *You've got two key main players, or two main stakeholders—you've got oil and gas companies [the project client/owner], and you've got government, so you've got to ask yourself what is it that oil and gas companies want. Of course, I don't think they are really interested in the oil, but they are interested in making a return on investment, alright? What does government want? Primarily government wants to add value or enhance the well-being of the people. [40]*
	Internal player (within project boundaries) These include typical project players, including the project management team, such as project managers, technical engineers, procurement managers, etc. However, it was evident with all respondents that the project manager is perceived as the most critical player in this cluster as they can balance the relationships between all players.	*The procurement manager is very important to the project because if he doesn't procure as he hopes to, when he hopes to do that, then the project will be delayed. He must be able to make his schedule in such a way that the material is procurement, the procurement needed comes in as when due. So, it is very essential to have the procurement manager in one of the top priorities because his procurement processes affect directly the delivery. [34]* *The project manager is the one who has to balance all the requirements of all these stakeholders, because I am always in the middle and try to balance the client's requirements, the contractor's requirements. In my experience, the project manager is always in the middle of all these stakeholders and has to manage all these stakeholders. [37]*

(continued)

Table D-6. Key Players Affecting Project Management Practice *(continued)*

PLAYERS IN PROJECT MANAGEMENT PRACTICE	KEY PLAYERS	EXEMPLARY EVIDENCE
	Internal player (beyond project boundaries) In addition to the above two clusters, other players are identified that can significantly affect the practice of project management but are not necessarily part of the project management team. This includes top management teams, executives, and financial controllers. The level of senior management involvement correlates with the importance of the project to the organization.	*You also have the administrative unit, the head office . . . the bank manager, and then the executive director. Those are the key players. [8]* *There will always be a senior management sponsor or executive . . . and then it depends on the level of the project, what level that sponsor is at in the organization. The more strategic the project, the higher up you'll have a sponsor, and then we have a strategic project department. [18]*

Appendix E: Quantitative Findings—Demographic Descriptive Data

The frequency distribution would suggest that more than 60% of the participants are between 36 and 50 years old and almost a quarter of them are between 20 and 35 years old. In terms of the position within the organization, more than 50% of the participants were project managers or program managers/directors. This indicates that there is a high occupational qualification present in the sample.

The frequency distribution of the years of project management experience shows that 50% of the participants have 10 years or more of experience in the project management profession. This indicates, once more, the high level of skills present in the sample.

In terms of location, the participants' organizations were globally distributed, based mainly in Africa (34%), Europe (24%), and the Middle East (22%).

Almost a quarter of the participants are working in the construction industry, and nearly as many in the oil and gas sector, whereas many indicated that they work in another industry which was not specified. This shows that the results are not limited to one industry or sector, but are derived from a variety of sectors.

About half of the participants work in an organization with more than 250 employees, and about half work in an organization with less than 250 employees. This indicates that the results are generalizable over different sizes of organizations.

Table E-1. Age Profile

AGE	FREQUENCY	PERCENTAGE
20–35	49	22.5
36–50	132	60.6
51–65	35	16.1
66–80	1	0.5
81–above	0	0
Missing	1	0.5
TOTAL	**218**	**100.0**

Table E-2. Position Within the Organization

POSITION IN ORGANIZATION	FREQUENCY	PERCENTAGE
Team member	44	20.2
Project manager	75	34.4
Program manager/ director	51	23.4
Other	47	21.6
Missing	1	0.5
TOTAL	**218**	**100.0**

Table E-3. Years of Project Management Experience

YEARS OF PROJECT MANAGEMENT EXPERIENCE	FREQUENCY	PERCENTAGE
Less than 5	36	16.5
5–9 years	72	33
10–15 years	59	27.1
Over 15 years	50	22.9
Missing	1	0.5
TOTAL	**218**	**100.0**

How many years of project management experience do you have?
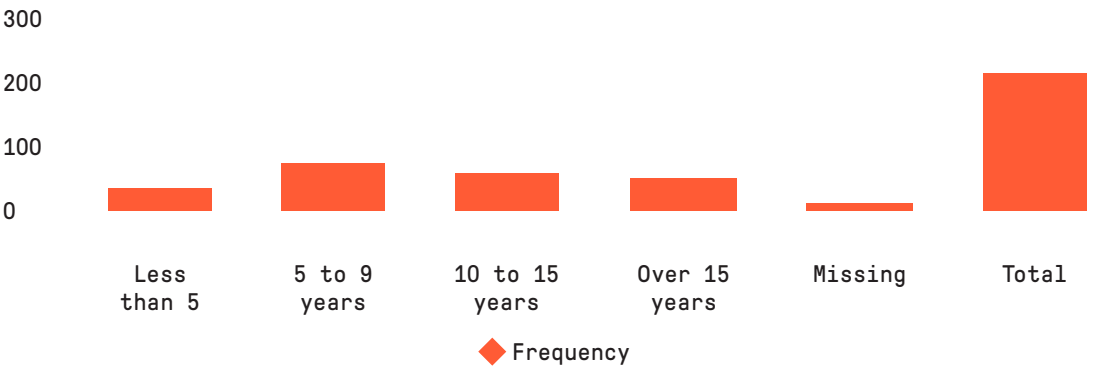
FIGURE E-1. Years of project management experience.

Table E-4. Organization Location

LOCATION OF ORGANIZATION	FREQUENCY	PERCENTAGE
Europe	49	22.5
Africa	74	33.9
U.S. and the Americas	29	13.3
Southeast Asia	15	6.9
India	1	0.5
Middle East	48	22.0
Missing	2	0.9
TOTAL	**218**	**100.0**

Table E-5. Industry or Sector

SECTOR	FREQUENCY	PERCENTAGE
Oil and gas	64	22.8
Humanitarian/NGO	10	3.6
Manufacturing and mechanical engineering	12	4.3
Construction	70	24.9
Information, computing, and communication services	19	6.8
Pharmaceutical and biomedical industry	4	1.4
Government, healthcare, and defense	15	5.3
Financial services	9	3.2
Education	7	2.5
Transport, storage, and logistics	6	2.1
Other	37	13.2
Missing	1	0.4
TOTAL	**281**	**100.0**

Table E-6. Organization Size

NUMBER OF STAFF	FREQUENCY	PERCENTAGE
<10	14	6.4
11–50	34	15.6
51–250	38	17.4
251–1,000	50	22.9
>1,001	81	37.2
Missing	1	0.5
TOTAL	**218**	**100.0**

Appendix F: Project Collaboration Frequency Statistics—Univariate Analysis

F1: Project Complexity—Structure and Composition of Projects

The frequency distributions for each individual variable of the questionnaire are displayed in Table F-1. The frequency distributions show the number of instances in which a variable takes each of its possible values.

Overall, the data show that the majority (>50%) of the participants agree or strongly agree that their projects tend to be complex in terms of decision-maker influence (75.7%), collaborators/stakeholders (73.4%), pace (68.3%), political issues/influence (62.8%), size (63.3%), technology issues (59.2%), uncertainty and unanticipated challenges (58.7%), and with many interdependencies (78%). Interestingly, respondents rated product/process novelty (44%) lower than anticipated as contributing to their project complexity.

Table F-1. Project Complexity–Structure and Composition of Projects

PROJECT CHARACTERISTICS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Projects in our organization tend to be complex in terms of size.	5	2.3	14	6.4	21	9.6	37	17.0	37	17.0	33	15.1	68	31.2	3	1.4	218	100
(2) Projects in our organization tend to be complex with many interdependencies.	4	1.8	5	2.3	16	7.3	21	9.6	26	11.9	58	26.6	86	39.4	2	0.9	218	100
(3) Projects in our organization tend to be complex in terms of pace.	9	4.1	12	5.5	19	8.7	24	11.0	39	17.9	51	23.4	59	27.1	5	2.3	218	100
(4) Projects in our organization tend to be complex in terms of technology issues.	10	4.6	18	8.3	23	10.6	34	15.6	41	18.8	38	17.4	50	22.9	4	1.8	218	100
(5) Projects in our organization tend to be complex in terms of stakeholder/collaboration.	7	3.2	18	8.3	10	4.6	21	9.6	31	14.2	48	22.0	81	37.2	2	0.9	218	100
(6) Projects in our organization tend to be complex in terms of decision-maker influence.	8	3.7	9	4.1	11	5.0	22	10.1	38	17.4	48	22.0	79	36.2	3	1.4	218	100
(7) Projects in our organization tend to be complex in terms of political issues/influence.	16	7.3	19	8.7	20	9.2	20	9.2	32	14.7	29	13.3	76	34.9	6	2.8	218	100
(8) Projects in our organization tend to be complex in terms of uncertainty.	13	6	17	7.8	13	6.0	42	19.3	42	19.3	41	18.8	45	20.6	5	2.3	218	100
(9) Projects in our organization tend to be complex as a result of product/process novelty.	17	7.8	31	14.2	25	11.5	33	15.1	36	16.5	34	15.6	26	11.9	16	7.3	218	100
(10) Projects in our organization tend to be complex in terms of unanticipated challenges.	6	2.8	18	8.3	23	10.6	30	13.8	44	20.2	42	19.3	50	22.9	5	2.3	218	100
(11) It is within our power to resolve most of these complexities.	8	3.7	16	7.3	19	8.7	23	10.6	39	17.9	52	23.9	58	26.6	3	1.4	218	100

Table F-2. Project Characteristics

PROJECT CHARACTERISTICS	NEVER		2		3		4		5		6		ALWAYS		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) How often is your project a stand-alone project?	12	5.5	21	9.6	37	17.0	46	21.1	41	18.8	38	17.4	23	10.6	0	0	218	100
(2) How often is your project part of a larger program of projects?	4	1.8	23	10.6	24	11.0	30	13.8	42	19.3	55	25.2	40	18.3	0	0	218	100
(3) How often in your experience have you had unpredictable events occurring in your projects?	2	0.9	10	4.6	15	6.9	35	16.1	64	29.4	49	22.5	41	18.8	2	0.9	218	100

F3: Uncertainty in Projects

The impact of new products, rapid technological changes and emerging technologies, change in the collaborator/supplier status, and actions from competitors on projects in organizations is seen as very mixed by the participants, as about half of them rated their impact as low to medium, and about half as medium to high, with a fairly equal distribution. In contrast to that, the impact of environmental/economic issues, rapidly changing customer requirements, unpredictable geopolitical developments, new legislation, and organizational change on projects is rated predominantly medium to high.

Table F-3. Uncertainty in Projects

PROJECT TURBULENCES	LOW IMPACT F	LOW IMPACT %	2 F	2 %	3 F	3 %	4 F	4 %	5 F	5 %	6 F	6 %	HIGH IMPACT F	HIGH IMPACT %	MISSING F	MISSING %	TOTAL F	TOTAL %
(1) New products are introduced that change the market and impact our projects.	24	11.0	34	15.6	27	12.4	21	9.6	34	15.6	31	14.2	20	9.2	27	12.4	218	100
(2) Impacts of environmental/economic issues on my projects.	7	3.2	16	7.3	14	6.4	27	12.4	30	13.8	44	20.2	73	33.5	7	3.2	218	100
(3) Rapid technological changes and emerging technologies have an impact on our projects in my organization.	20	9.2	32	14.7	31	14.2	35	16.1	47	21.6	21	9.6	24	11.0	8	3.7	218	100
(4) Rapid changing customer requirements impact our projects in my organization.	14	6.4	18	8.3	18	8.3	29	13.3	27	12.4	42	19.3	59	27.1	11	5.0	218	100
(5) Unpredictable geopolitical developments have an impact on our projects.	30	13.8	33	15.1	14	6.4	24	11.0	22	10.1	33	15.1	49	22.5	13	6.0	218	100
(6) New legislation has been introduced that impacts our projects.	21	9.6	33	15.1	23	10.6	26	11.9	29	13.3	41	18.8	41	18.8	4	1.8	218	100
(7) Change in our collaborator/supplier status impacts our projects.	22	10.1	25	11.5	32	14.7	29	13.3	36	16.5	33	15.1	31	14.2	10	4.6	218	100
(8) Actions from our competitors impacts our projects.	34	15.6	24	11.0	28	12.8	34	15.6	31	14.2	30	13.8	21	9.6	16	7.3	218	100
(9) Organizational change.	8	3.7	16	7.3	20	9.2	40	18.3	33	15.1	45	20.6	53	24.3	3	1.4	218	100

F4. Response to Disruptions

Regarding the reaction to disruptions in projects, the majority of the participants (>50%) agreed to strongly agreed that they practice robust risk management procedures and risk mitigation actions (65.6%), that they initiate a reactive scheduling procedure with an amended baseline schedule (60.1%), that they work with a protected baseline schedule (which they proactively protect as much as possible) (57.3%), that they refer back to the project sponsors/board to gain advice (65.1%), and that they react instinctively (52.8%).

Table F-4. Response to Disruptions

REACTION TO TURBULENCES	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) I practice robust risk management procedures and risk mitigation actions that have been agreed to during planning.	10	4.6	12	5.5	24	11.0	29	13.3	43	19.7	50	22.9	50	22.9	0	0	218	100
(2) I initiate a reactive scheduling procedure where the baseline schedule is amended.	8	3.7	18	8.3	20	9.2	41	18.8	45	20.6	48	22.0	38	17.4	0	0	218	100
(3) I have a protected baseline schedule, which I proactively protect as much as possible against the disruptions that may happen.	18	8.3	18	8.3	23	10.6	34	15.6	41	18.8	49	22.5	35	16.1	0	0	218	100
(4) I always refer back to the project sponsors/ project board if a disruption occurs that impacts on the baseline to gain advice.	12	5.5	19	8.7	17	7.8	28	12.8	27	12.4	55	25.2	60	27.5	0	0	218	100
(5) I react instinctively to disruptions as they happen.	21	9.6	24	11.0	22	10.1	36	16.5	39	17.9	37	17.0	39	17.9	0	0	218	100

PROJECT MANAGEMENT PRACTICE	WEAK SIGNIFICANCE F	%	2 F	%	3 F	%	4 F	%	5 F	%	6 F	%	STRONG SIGNIFICANCE F	%	MISSING F	%	TOTAL F	%
(1) Discovering/furthering new opportunities and prospects	4	1.8	5	2.3	7	3.2	18	8.3	33	15.1	62	28.4	80	36.7	9	4.1	218	100
(2) Rapidly assessing complex and changeable situations	2	0.9	1	0.5	1	0.5	18	8.3	37	17.0	73	33.5	81	37.2	5	2.3	218	100
(3) Selling project ideas to customers	9	4.1	5	2.3	12	5.5	30	13.8	34	15.6	55	25.2	49	22.5	24	11.0	218	100
(4) Applying technology know-how	1	0.5	4	1.8	8	3.7	23	10.6	43	19.7	60	27.5	67	30.7	12	5.5	218	100
(5) Applying knowledge from one task to another	2	0.9	0	0	3	1.4	11	5.0	29	13.3	77	35.3	94	43.1	2	0.9	218	100
(6) Absorbing knowledge from external sources	1	0.5	5	2.3	6	2.8	16	7.3	33	15.1	64	29.4	89	40.8	4	1.8	218	100
(7) Estimating financial costs	2	0.9	1	0.5	9	4.1	11	5.0	21	9.6	57	26.1	111	50.9	6	2.8	218	100
(8) Estimating schedules, timings, and completion	1	0.5	1	0.5	3	1.4	5	2.3	20	9.2	51	23.4	130	59.6	7	3.2	218	100
(9) Estimating project risks	1	0.5	6	2.8	4	1.8	4	1.8	25	11.5	56	25.7	117	53.7	5	2.3	218	100
(10) Planning for risk mitigation	1	0.5	5	2.3	5	2.3	11	5.0	26	11.9	55	25.2	108	49.5	7	3.2	218	100
(11) Leading project teams	2	0.9	2	0.9	4	1.8	5	2.3	20	9.2	50	22.9	126	57.8	9	4.1	218	100
(12) Adjusting team dynamics to address unforeseen issues	1	0.5	2	0.9	6	2.8	11	5.0	35	16.1	77	35.3	82	37.6	4	1.8	218	100
(13) Managing relationships with clients, suppliers, partners	1	0.5	2	0.9	5	2.3	5	2.3	21	9.6	50	22.9	130	59.6	4	1.8	218	100
(14) Resolving disputes and avoiding them	1	0.5	1	0.5	4	1.8	7	3.2	29	13.3	64	29.4	108	49.5	4	1.8	218	100
(15) Estimating partner subcontractor risk	6	2.8	5	2.3	12	5.5	27	12.4	38	17.4	52	23.9	70	32.1	8	3.7	218	100

F5. Awareness of Project Management Standards/Methodologies

Our researched showed that 91.3% of the participants are aware to very aware of PMI's *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* as a project management standard, whereas this is only applicable for 36.7% in awareness of PRINCE2, and 55.9% for agile approaches. In addition, 74.7% of participants are aware to very aware of their company's own methodology.

AWARENESS OF PROJECT MANAGEMENT STANDARDS/ METHODOLOGIES	VAGUELY AWARE		2		3		4		5		6		VERY AWARE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) *PMBOK® Guide*	1	0.5	1	0.5	3	1.4	8	3.7	22	10.1	44	20.2	133	61.0	6	2.8	218	100
(2) PRINCE2	30	13.8	32	14.7	25	11.5	27	12.4	30	13.8	21	9.6	29	13.3	24	11.0	218	100
(3) Agile	16	7.3	22	10.1	18	8.3	19	8.7	38	17.4	40	18.3	44	20.2	21	9.6	218	100
(4) Proprietary (your company's own methodology)	6	2.8	1	0.5	1	0.5	10	4.6	16	7.3	36	16.5	111	50.9	37	17.0	218	100

F6. Use and Adherence to Project Management Standards or Methodologies

Research showed that 37.2% of the participants' organizations always or nearly always adhere to the well-known project management standard, the *PMBOK® Guide*, whereas 39.5% and 34.4%, respectively, rarely or almost rarely adhere to PRINCE2 or agile approaches as a project management standard practice. The most widely adhered to standard, with 62.9% of participants' organizations using it, always or nearly always is the company's own methodology.

Table F-6. Use and Adherence to Project Management Standards or Methodologies

USE AND ADHERE TO PROJECT MANAGEMENT STANDARDS OR METHODOLOGIES	RARELY		2		3		4		5		6		ALWAYS		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) *PMBOK® Guide*	13	6.0	23	10.6	18	8.3	26	11.9	45	20.6	35	16.1	46	21.1	12	5.5	218	100
(2) PRINCE2	56	25.7	30	13.8	17	7.8	20	9.2	22	10.1	7	3.2	9	4.1	57	26.1	218	100
(3) Agile	50	22.9	25	11.5	21	9.6	19	8.7	18	8.3	19	8.7	19	8.7	47	21.6	218	100
(4) Proprietary (your company's own methodology)	7	3.2	3	1.4	3	1.4	14	6.4	22	10.1	37	17.0	100	45.9	32	14.7	218	100

F7. Project Standards Effectiveness in Improving Project Collaboration

The results indicated that 67.9% and 62.3% of the participants evaluate the *PMBOK® Guide* and the Project Management Institute's own framework, respectively, as an effective to very effective standard for improving project collaboration inter- and intraorganizationally, whereas only 21.5% and 32.6% evaluate PRINCE2 and agile approaches, respectively, as an effective to very effective standard. In addition, 22.6% and 19.7% even evaluate PRINCE2 and agile, respectively, as ineffective to very ineffective in improving project collaboration inter- and intraorganizationally.

EFFECTIVENESS OF PROJECT MANAGEMENT STANDARDS	VERY INEFFECTIVE		2		3		4		5		6		VERY EFFECTIVE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) *PMBOK® Guide*	9	4.1	5	2.3	9	4.1	29	13.3	38	17.4	42	19.3	68	31.2	18	8.3	218	100
(2) PRINCE2	23	10.6	18	8.3	8	3.7	42	19.3	24	11.0	14	6.4	9	4.1	80	36.7	218	100
(3) Agile	20	9.2	12	5.5	11	5.0	40	18.3	29	13.3	23	10.6	19	8.7	64	11.9	218	100
(4) Proprietary (your company's own methodology)	6	2.8	4	1.8	8	3.7	30	13.8	28	12.8	41	18.8	67	30.7	34	32.4	218	100

F8. Significance of Project Management Practice Aspects

The results showed that 61% of the participants rated the aspect "project members, their capabilities, knowledge, and ability to exercise good practical judgments" as a very significant aspect of project management, followed by "procedures" (45%—very significant), "place" (40.8%), "principles" (39.9%), and "purpose and intentions" (39.4%) very closely together. No aspect was rated by more than 2% of the participants as not significant.

Table F-7. Project Management Standards' Effectiveness in Improving Project Collaboration

ASPECTS OF PROJECT MANAGEMENT PRACTICE	NOT SIGNIFICANT		2		3		4		5		6		VERY SIGNIFICANT		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Project members, their capabilities, knowledge, and ability to exercise good practical judgments	1	0.5	1	0.5	2	0.9	14	6.4	19	8.7	46	21.1	133	61.0	2	0.9	218	100
(2) Procedures (rules, routines, resources, actions)	1	0.5	2	0.9	2	0.9	19	8.7	35	16.1	60	27.5	98	45.0	1	0.5	218	100
(3) Principles (values and assumptions)	1	0.5	1	0.5	5	2.3	19	8.7	42	19.3	59	27.1	87	39.9	4	1.8	218	100
(4) Purpose and intentions	1	0.5	1	0.5	8	3.7	14	6.4	35	16.1	71	32.6	86	39.4	2	0.9	218	100
(5) Place (context, cultural, and social conditions)	4	1.8	5	2.3	4	1.8	18	8.3	40	18.3	55	25.2	89	40.8	3	1.4	218	100

F8. Methods of Collaboration in a Project

The most used collaborative tool in projects according to the survey are email, phone, and interactive audio/video/whiteboards, which are always or nearly always used to collaborate with others, as stated by 95.8% of participants. The use of the other tools like content management software, collaborative authoring/design, collaborative project management systems, online virtual tools, and online social media are fairly equally distributed between never and always using them.

Table F-8. Methods of Collaboration in Projects

COLLABORATION TOOLS	NEVER		2		3		4		5		6		ALWAYS		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Email, phone, interactive audio/video/whiteboard	1	0.5	0	0	0	0	1	0.5	5	2.3	26	11.9	183	83.9	2	0.9	218	100
(2) Content management software like SharePoint	42	19.3	20	9.2	21	9.6	13	6.0	30	13.8	29	13.3	41	18.8	22	10.1	218	100
(3) Collaborative authoring/design	24	11.0	15	6.9	15	6.9	39	17.9	31	14.2	37	17.0	33	15.1	24	11.0	218	100
(4) Collaborative project management systems	23	10.6	16	7.3	10	4.6	29	13.3	36	16.5	37	17.0	42	19.3	25	11.5	218	100
(5) Online virtual tools (Skype)	28	12.8	19	8.7	23	10.6	24	11.0	30	13.8	34	15.6	47	21.6	13	6.0	218	100
(6) Online social media (blogs, LinkedIn)	57	26.1	32	14.7	20	9.2	17	7.8	18	8.3	26	11.9	22	10.1	26	11.9	218	100

F9. Collaboration Typology—*Partnering Scale and Partnering Scope*

The results showed that 39.9% of participants agree to strongly agree with the statement that they only collaborate through formal alliances; 40.3% agree to strongly agree that they only collaborate within their own organization; and 26.7% agree to strongly agree that they collaborate with competitors to find project solutions. Contrary to that, the majority of the participants agree to strongly agree that they collaborate with their clients to find project solutions (87.2%) and with other companies in project teams (58.6%).

Table F-9. Collaboration Typology–Partnering Scale and Partnering Scope

TYPES OF COLLABORATION	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) I only collaborate through formal alliances.	44	20.2	29	13.3	29	13.3	28	12.8	28	12.8	34	15.6	25	11.5	1	0.5	218	100
(2) I only collaborate within my organization (project teams).	54	24.8	26	11.9	22	10.1	28	12.8	28	12.8	22	10.1	38	17.4	0	0	218	100
(3) I collaborate with my clients to find project solutions.	5	2.3	2	0.9	6	2.8	15	6.9	30	13.8	60	27.5	100	45.9	0	0	218	100
(4) I collaborate with my competitors to find project solutions.	66	30.3	31	14.2	30	13.8	32	14.7	20	9.2	15	6.9	23	10.6	1	0.5	218	100
(5) I collaborate with other companies (project teams).	27	12.4	16	7.3	15	6.9	32	14.7	40	18.3	40	18.3	48	22.0	0	0	218	100

F10. Collaboration Drivers

The main *drivers for collaboration* in projects reported was regarding improvement of project performance (54.6%); followed by the overcoming of project uncertainty, complexity, and high risk (45.4%); cost saving (44.5%); informal collaboration with experts in their own professional network (39.0%) for knowledge flow; the availability of specialized skills in the organization (37.2%); improvement of competitiveness (32.6%); expanding into a new industry by partnering with sector experts (30.7%); organizational strategy to collaborate with partners formally (30.3%); and expanding into new regions by partnering with local agents (29.4%). Less than 10% of the participants strongly disagree with each of these statements.

Table F-10. Collaboration Motivators

COLLABORATION MOTIVATORS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) To improve competitiveness	16	7.3	9	4.1	10	4.6	19	8.7	31	14.2	42	19.3	71	32.6	20	9.2	218	100
(2) To save costs	6	2.8	5	2.3	6	2.8	15	6.9	32	14.7	45	20.6	97	44.5	12	5.5	218	100
(3) Specialized skills are not available	21	9.6	20	9.2	8	3.7	18	8.3	19	8.7	42	19.3	81	37.2	9	4.1	218	100
(4) To expand into a new industry by partnering with sector experts	14	6.4	10	4.6	15	6.9	13	6.0	31	14.2	44	20.2	67	30.7	24	11.0	218	100
(5) To expand into new regions by partnering with local agents	14	6.4	15	6.9	13	6.0	15	6.9	26	11.9	44	20.2	64	29.4	27	12.4	218	100
(6) To improve project performance	5	2.3	2	0.9	7	3.2	8	3.7	17	7.8	53	24.3	119	54.6	7	3.2	218	100
(7) To overcome project uncertainty, complexity, and high risk	3	1.4	6	2.8	5	2.3	12	5.5	29	13.3	55	25.2	99	45.4	9	4.1	218	100
(8) It is our organizational strategy to collaborate with certain partners formally	12	5.5	9	4.1	16	7.3	21	9.6	37	17.0	45	20.6	66	30.3	12	5.5	218	100
(9) I collaborate informally with project experts in my own professional networks for solving problems	14	6.4	12	5.5	7	3.2	15	6.9	26	11.9	51	23.4	85	39.0	8	3.7	218	100

F11. Critical Dimensions of Successful Collaborations in Projects

For successful collaboration in projects, good communication, which is evident within the team members/collaborators, is rated as important to highly important by 97.2% of participants. This is closely followed by trust between team members/collaborators and the beneficial view of collaboration (95.4% viewed them each as important to very important), then the organizational commitment and satisfaction with partnership (89.9%), the clear definition of power distribution and responsibilities (87.5%), and the shared direction for the project (85.3%). The similar competence levels are rated by only 67.9% of participants as important to very important. None of the statements is viewed by more than 2% of the participants as not important.

Table F-11. Critical Dimensions of Successful Collaboration in Projects

COLLABORATION SUCCESS	NOT IMPORTANT		2		3		4		5		6		VERY IMPORTANT		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Collaborators need to have shared direction for the project	4	1.8	1	0.5	7	3.2	19	8.7	33	15.1	60	27.5	93	42.7	1	0.5	218	100
(2) Similar competency levels should be evident in the collaborative teams	5	2.3	9	4.1	19	8.7	34	15.6	52	23.9	55	25.2	41	18.8	3	1.4	218	100
(3) Trust between team members/collaborators should be evident	1	0.5	1	0.5	1	0.5	6	2.8	17	7.8	63	28.9	128	58.7	1	0.5	218	100
(4) Power distribution between the collaborator members must be clearly defined from the outset with clear responsibilities	2	0.9	4	1.8	6	2.8	14	6.4	28	12.8	57	26.1	106	48.6	1	0.5	218	100
(5) Good communication should be evident among team members/collaborators	1	0.5	0	0	2	0.9	2	0.9	15	6.9	31	14.2	166	76.1	1	0.5	218	100
(6) The collaboration is seen as beneficial	1	0.5	0	0	1	0.5	7	3.2	27	12.4	62	28.4	119	54.6	1	0.5	218	100
(7) There is organizational commitment, satisfaction with partnership	1	0.5	1	0.5	5	2.3	13	6.0	42	19.3	65	29.8	89	40.8	2	0.9	218	100

F12. Challenges in Collaboration Across Project Teams

The majority of participants rated (93.2%) the impact of trust between the team members as medium to high, with 61.5% of them rating it as high, which indicates that this is seen as the most significant challenge in collaboration across project teams. The diverse priorities and interests of teams from different partners are rated by 44.5% of participants as high impact, equally to the challenge of project/collaborator team behavior, such as some showing low project effort or nonparticipation. The cultural diversity of the project team including language difficulties are rated by 39% of participants as high impact regarding its significance, followed by the team dynamics and continuity (36.7%), and the diverse and varying capabilities/skills to execute and lead projects by the project/collaborative team (35.3%).

COLLABORATION CHALLENGES	LOW IMPACT		2		3		4		5		6		HIGH IMPACT		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Project team is culturally diverse with language difficulties	9	4.1	9	4.1	15	6.9	15	6.9	31	14.2	48	22.0	85	39.0	6	2.8	218	100
(2) Collaborative teams from different partners have diverse priorities and interests	4	1.8	2	0.9	5	2.3	16	7.3	38	17.4	52	23.9	97	44.5	4	1.8	218	100
(3) Project/collaborators' team skills have diverse and varying capabilities/skills to execute and lead projects	2	0.9	7	3.2	5	2.3	24	11.0	30	13.8	71	32.6	77	35.3	2	0.9	218	100
(4) Project/collaborators team behavior issues such as some showing low project effort or nonparticipation	3	1.4	6	2.8	4	1.8	23	10.6	31	14.2	49	22.5	97	44.5	5	2.3	218	100
(5) Team dynamics and continuity: team members are transiently engaged and rotate throughout project phases	2	0.9	7	3.2	11	5.0	21	9.6	35	16.1	57	26.1	80	36.7	5	2.3	218	100
(6) Trust between team members (collaborators)	2	0.9	1	0.5	2	0.9	5	2.3	23	10.6	41	18.8	134	61.5	10	4.6	218	100

F13. Benefits in Collaborative Projects

In regard to collaborative projects, 59% of participants strongly agree that working in collaboration improves brainstorming and problem solving with the supply of new ideas, closely followed by 58.3% who strongly agree that it improves creative learning, 52.8% who strongly agree that it promotes fresh ideas, 50% who strongly agree that it improves coordinating skills, 48.2% who strongly agree that collaborative partners contribute to a continuous flow of ideas, 45.0% who strongly agree that working in collaboration facilitates faster development of individual skills, 39.0% who strongly agree that their organization has learned or acquired new critical capabilities or skills from collaborative project partners, and 38.5% who strongly agree that their collaborative projects have led to long-term relationships with collaborative project partners. This is in contrast to only 22.9% of participants strongly agreeing that they have acquired access to external R&D through collaboration, and to only 19.3% who strongly agree that working in collaboration has improved their organization's access to public funding (19.3%).

Table F-13. Benefits in Collaborative Projects

COLLABORATION BENEFITS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Collaborative partners contribute to a continuous flow of ideas	2	0.9	0	0	4	1.8	16	7.3	22	10.1	66	30.3	105	48.2	3	1.4	218	100
(2) Working in collaboration improves brainstorming and problem solving with the supply of new ideas	1	0.5	0	0	0	0	8	3.7	25	11.5	54	24.8	129	59.2	1	0.5	218	100
(3) Working in collaboration promotes fresh ideas	1	0.5	0	0	1	0.5	7	3.2	30	13.8	63	28.9	115	52.8	1	0.5	218	100
(4) Working in collaboration improves collective learning	1	0.5	0	0	3	1.4	5	2.3	22	10.1	57	26.1	127	58.3	3	1.4	218	100
(5) Working in collaboration facilitates faster development of individual skills	1	0.5	1	0.5	5	2.3	11	5.0	42	19.3	57	26.1	98	45.0	3	1.4	218	100
(6) Working in collaboration improves coordinating skills	1	0.5	3	1.4	5	2.3	12	5.5	28	12.8	59	27.1	109	50.0	1	0.5	218	100
(7) My collaborative projects have been financially successful	3	1.4	5	2.3	8	3.7	33	15.1	50	22.9	59	27.1	50	22.9	10	4.6	218	100
(8) My collaborative projects have led to long-term relationships with my collaborative project partners	3	1.4	7	3.2	4	1.8	14	6.4	39	17.9	61	28.0	84	38.5	6	2.8	218	100
(9) My organization has learned or acquired new critical capabilities or skills from collaborative project partners	3	1.4	4	1.8	8	3.7	19	8.7	25	11.5	64	29.4	85	39.0	10	4.6	218	100
(10) Through collaboration, we have acquired access to external R&D	14	6.4	12	5.5	10	4.6	24	11.0	26	11.9	43	19.7	50	22.9	39	17.9	218	100
(11) Working in collaboration improved my organization's access to public funding	25	11.5	25	11.5	17	7.8	12	5.5	23	10.6	24	11.0	42	19.3	50	22.9	218	100

F14. Performance of a Project With Collaborating Teams Versus Other Projects Without Collaborators

The majority of the participants (> 50%) agree to strongly agree that their collaborative projects perform better in meeting cost (64.3%), time (38.8%), scope (75.7%), and quality targets (74.3%) as well as in leading to innovative solutions (71.1%) and in managing risks (69.6%).

RELATIVE PROJECT PERFORMANCE	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) My collaborative projects perform better in meeting cost targets.	8	3.7	10	4.6	16	7.3	42	19.3	47	21.6	46	21.1	47	21.6	2	0.9	218	100
(2) My collaborative projects perform better in meeting time targets.	6	2.8	6	2.8	19	8.7	35	16.1	45	20.6	54	24.8	51	23.4	2	0.9	218	100
(3) My collaborative projects perform better in meeting scope targets.	2	0.9	6	2.8	13	6.0	30	13.8	44	20.2	56	25.7	65	29.8	2	0.9	218	100
(4) My collaborative projects perform better in meeting quality targets.	3	1.4	8	3.7	12	5.5	30	13.8	37	17.0	62	28.4	63	28.9	3	1.4	218	
(5) My collaborative projects perform better in leading to innovative solutions.	7	3.2	7	3.2	15	6.9	32	14.7	36	16.5	61	28.0	58	26.6	2	0.9	218	100
(6) My collaborative projects perform better in managing risks.	6	2.8	12	5.5	11	5.0	34	15.6	33	15.1	57	26.1	62	28.4	3	1.4	218	100

F15. *Financial Performance of Projects*

Survey

Results showed that 32.1% of participants agree to strongly agree that 10% to 25% of their projects are financially successful; 33.5% agree to strongly agree that 26% to 50% of their projects are financially successful; 45.4% agree to strongly agree that 51% to 75% of their projects are financially successful; and 56.9% agree to strongly agree that over 75% of their projects are financially successful. Regarding the financial success compared to the main competitors, only 40.4% of participants agree to strongly agree that their own projects are financially more successful.

FINANCIAL SUCCESS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) 10% to 25% of my projects are financially successful.	69	31.7	20	9.2	12	5.5	19	8.7	19	8.7	17	7.8	34	15.6	28	12.8	218	100
(2) 26% to 50% of my projects are financially successful.	63	28.9	17	7.8	15	6.9	21	9.6	30	13.8	17	7.8	26	11.9	29	13.3	218	100
(3) 51% to 75% of my projects are financially successful.	44	20.2	9	4.1	12	5.5	29	13.3	35	16.1	35	16.1	29	13.3	25	11.5	218	100
(4) Over 75% of my projects are financially successful.	25	11.5	11	5.0	14	6.4	28	12.8	31	14.2	35	16.1	58	26.6	16	7.3	218	100
(5) My projects are financially more successful compared to my main competitors.	21	9.6	20	9.2	17	7.8	55	25.2	29	13.3	23	10.6	36	16.5	17	7.8	218	100

Appendix G: Bivariate Analysis Process Followed

Case Screening—Missing Data in Rows
The 217 cases were screened for missing data. For 40 cases, more than 10% of the data is missing (i.e., 16 or more questions of the survey were not answered). It was decided that these 40 cases should be deleted, as they don't add any value to the results (list-wise deletion).

Case Screening—Unengaged Responses
The cases are screened for unengaged responses (i.e., cases where all the answers are the same and no variability in the answers is observable). For this purpose, the standard deviation of all variables is calculated in SPSS. Two cases had a standard deviation of 0. These cases were deleted because they did not add any value to the results. One more case had a standard deviation of less than 0.5 with 0.44. This case was explored in more detail: There is a very high number of the same scores in this case. It is assumed that these answers are unengaged as they don't show a sufficient variance. Therefore, it was decided that this case should be deleted as well. This results in a final sample of 175.

Case Screening—Outliers (Gaskin, 2012)
Outliers are scores that are atypical of the data set or extreme compared to the rest of the scores (Kline, 2011; Schumacker & Lomax, 2010). As a Likert scale was used for most of the variables, these scores don't need to be screened for outliers. These variables can only have a score between 1 and 7, and it cannot be said with certainty if a score of 1 or 7 is an outlier or a deliberate response. The remaining variables offer the opportunity to choose from certain values. Therefore, outliers cannot be produced. A detailed screening for outliers was therefore not conducted as it was not applicable.

Linearity and Homoscedasticity
The screening of the data for linearity and homoscedasticity is most easily done graphically with scatterplots. Different scatterplots are printed for the data set at hand and they all show linear relations and uniform distributions (homoscedasticity) of the data (Field, 2013; Kline, 2011). It was unfeasible to verify every common frequency distribution of the variables because of the high number of variables, but based on the samples taken, it was assumed that linearity and homoscedasticity are not an issue for the data at hand. This is also supported by Gaskin (2013).

Normality
The data were then screened for univariate normality. This was done with the two statistics of skewness, which means that the data are asymmetrically distributed around the mean or median, and kurtosis, which means that the distribution has got a peak or is particularly flat (Kline, 2011; Byrne, 2001). Generally, it can be presumed that with a large sample of 175 cases, normality shouldn't be an issue (Field, 2013), which was confirmed by the brief analysis of kurtosis and skewness with P-P plots.

Appendix H: Inferential Statistics—Bivariate Analysis

H1. Years of Project Management Experience
The table indicates the difference between the experienced and less experienced project managers (in terms of years of practice) with respect to project complexity, collaboration in projects, and innovation. The significant relationships are shown in Table H-1.

H2. Position in Organization
Table H-2 indicates the differences between more senior and less senior project managers (in terms of position in the organization) with respect to project complexity, collaboration in projects, and innovation. The major findings are summarized as:

- There is a positive relationship between "position in organization" and the different aspects of "complexity of projects" (i.e., the more senior the project manager is in the organization, the more complex the projects they work on tend to be).

- There is a significant positive relationship between "position in organization" and the assessment of turbulences in projects (i.e., the more senior the project manager is in the organization, the higher they rate the impact of turbulences in projects).

Table H-1. Years of Project Management Experience

VARIABLES	PEARSON CORRELATION	N
Age	.585**	176
Position within organization	.256**	176
Complexity of projects		
. . . in terms of size	.164*	176
. . . with many interdependencies	.309**	176
. . . in terms of technology issues	.196**	174
. . . in terms of stakeholders	.298**	176
. . . in terms of decision-maker influence	.160*	176
. . . in terms of political issues/influence	.156*	174
. . . in terms of uncertainty	.264**	175
. . . as a result of product/process novelty	.211**	168
. . . in terms of unanticipated challenges	.180*	175
Project characteristics		
Unpredictable events occurring in projects	.160*	174
Responses to disruptions		
Robust risk management procedures and risk mitigation actions	.180*	176
Project management practice		
Estimating project risks	.157*	173
Planning for risk mitigation	.168*	172
Leading project teams	.193*	171
Managing relationships with clients, suppliers, partners	.204**	173
Resolving disputes and avoiding these	.287**	174
Estimating partner subcontractor risk	.239**	173
Awareness of project management standards/methodologies		
PMBOK® Guide	.298**	173
Agile	.176*	164
Proprietary (company's own methodology)	.172*	153

(continued)

Table H-1. Years of Project Management Experience *(continued)*

VARIABLES	PEARSON CORRELATION	N
Use and adherence to project management standards or methodologies		
PMBOK® Guide	.194*	169
Agile	.175*	146
Proprietary (company's own methodology)	.178*	156
Significance of project management practice		
Principles (values and assumptions)	.168*	174
Purpose and intentions	.160*	175
Collaboration in projects		
Email, phone, interactive audio/video/whiteboards	.195**	174
Management software like SharePoint	.165*	165
Authoring/design	.160*	163
Management systems	.280**	161
Online virtual tools (Skype)	.179*	168
Collaboration with clients to find project solutions	.180*	176
Good communication among team members/collaborators	.161*	176
Collaboration is seen as beneficial	.163*	176
Collaborative teams from different partners have diverse priorities and interests	.168*	175
My collaborative projects perform better in managing risks	.190*	175

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

- There is a significant positive relationship between "position in organization" and the awareness and use of project management tools, techniques, and methodologies (i.e., the more senior the project manager is in the organization, the more aware they are of project management tools, techniques, and methodologies and the more they use them).

- There is a significant positive relationship between "position in organization" and the motivators and challenges of collaboration (i.e., the more senior the project manager is in the organization, the more they agree with the motivators of collaboration and the higher they evaluate the impact of the challenges of collaboration).

- There is a significant positive relationship between "position in organization" and measures of success for projects (i.e., the more senior the project manager is in the organization, the more they agree with certain performance indicators for projects).

The significant relationships are shown in Table H-2.

Table H-2. Position in Organization

VARIABLES	PEARSON CORRELATION	N
Years of project management experience	.256**	176
Sector	.172*	176
Complexity of projects		
. . . in terms of pace	.250**	174
. . . in terms of stakeholders	.178*	176
. . . in terms of uncertainty	.306**	175
. . . as a result of product/process novelty	.156*	168
. . . in terms of unanticipated challenges	.197**	175
Project characteristics		
Unpredictable events occurring in projects	.158*	174
Rapid changing customer requirements impact projects in my organization	.175*	171
New legislation has been introduced that impacts our projects	.201**	175
Actions from our competitors impact our projects	.168*	170
Project management practice		
Resolving disputes and avoiding these	.168*	174
Estimating partner subcontractor risk	.182*	173
Awareness of project management standards		
PMBOK® Guide	.165*	173
Proprietary (your company's own methodology)	.193*	153
Significance of project management practice		
Project members, their capabilities, knowledge, and ability to exercise good practical judgments	.220**	175
Collaboration in projects		
To improve competitiveness	.183*	168
Specialized skills are not available in my organization	.188*	171
To expand into a new industry by partnering with sector experts	.203**	166
To expand into new regions by partnering with local agents	.175*	163
Collaborators need to have shared direction for the project	.221**	176
Collaborative teams from different partners have diverse priorities and interests	.291**	175

Table H-2. Position in Organization *(continued)*

VARIABLES	PEARSON CORRELATION	N
Project/collaborator team behavior issues, such as some showing low project effort or nonparticipation	.242**	174
My collaborative projects have led to long-term relationships with my collaborative project partners	.151*	174
Measures for success		
Meeting project scope, cost, and quality	.191*	176
Project had a positive impact on customers	.150*	175
Business success	.164*	176
Enhanced strategic potential	.154*	175

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

H3. Benefits in Collaborative Projects

Continuous Flow of Ideas

The relationships between the "collaborative partners contribute to a continuous flow of ideas" and various variables referring to project management, collaboration, and innovation were tested. In summary:

- There is a significant positive relationship between "collaborative partners contribute to a continuous flow of ideas" and the "awareness," "use and adherence," and "effectiveness of project management standards and methodologies" (i.e., the more the participants agree that collaborative partners contribute to a continuous flow of ideas, the more they are aware of and use certain project management standards and methodologies, and the higher they rate the effectiveness of these standards and methodologies).

- There is a significant positive relationship between "collaborative partners contribute to a continuous flow of ideas" and the significance of different aspects of "project management practice" (i.e., the more the participants agree that collaborative partners contribute to a continuous flow of ideas, the more important they find different aspects of project management practice).

- There is a significant positive relationship between "collaborative partners contribute to a continuous flow of ideas" and different "reactions to turbulences" (i.e., the more the participants agree that collaborative partners contribute to a continuous flow of ideas, the more they agree on certain reactions to turbulences).

- There is a significant positive relationship between "collaborative partners contribute to a continuous flow of ideas" and certain "performance criteria" for projects (i.e., the more the participants agree that collaborative partners contribute to a continuous flow of ideas, the more they agree that collaborative projects perform better in meeting cost, time, scope, and quality targets and in managing risks and leading to innovative solutions).

The significant relationships are shown in the Table H-3.

Table H-3. Benefits in Collaborative Projects

VARIABLES	PEARSON CORRELATION	N
Complexity of projects		
. . . in terms of pace	.178*	173
. . . in terms of decision-maker influence	.155*	175
. . . in terms of uncertainty	.170*	174
. . . as a result of product/process novelty	.174*	167
Project characteristics		
Project part of larger program	.348**	175
Unpredictable events occurring in projects	.169*	173
Turbulences		
Impacts of environmental/economic issues on projects in my organization	.200**	174
Rapid technological changes and emerging technologies have an impact on projects in my organization	.297**	174
Organizational change	.217**	174
Reactions to turbulences		
Robust risk management procedures and risk mitigation actions	.209**	175
Reactive scheduling procedure where the baseline schedule is amended	.250**	175
Reference to project sponsors/board to gain advice	.259**	174
Instinctive reactions	.213**	175
Project management practice		
Discovering and furthering new opportunities and prospects	.397**	173
Rapidly assessing complex and changeable situations	.328**	175
Selling project ideas to customers	.334**	164
Applying technology know-how	.377**	171
Applying knowledge from one task to another	.398**	175
Absorbing knowledge from external sources	.401**	173
Estimating financial cost	.346**	174
Estimating schedules, timing, and completion	.337**	171
Estimating project risk	.333**	172
Planning for risk mitigation	.419**	171

(continued)

Table H-3. Benefits in Collaborative Projects *(continued)*

VARIABLES	PEARSON CORRELATION	N
Leading project teams	.342**	170
Adjusting team dynamics to address unforeseen issues	.390**	174
Managing relationships with clients, suppliers, partners	.384**	172
Resolving disputes and avoiding them	.338**	173
Estimating partner subcontractor risk	.449**	172
Awareness of project management standards		
PMBOK® Guide	.279**	173
Agile	.200*	163
Proprietary (your company's own methodology)	.184*	152
Use and adherence to project management standards or methodologies		
Prince2	.181*	137
Agile	.200*	145
Proprietary (company's own methodology)	.206*	155
Effectiveness of these standards to improve collaboration		
PMBOK® Guide	.203**	164
Prince2	.197*	119
Agile	.231**	134
Proprietary (company's own methodology)	.262**	152
Significance of project management practice		
Project members, their capabilities, knowledge, and ability to exercise good practical judgments	.412**	174
Procedures (rules, routines, resources, actions)	.431**	174
Principles (values and assumptions)	.499**	173
Purpose and intentions	.382**	174
Place (context, cultural, and social conditions)	.351**	173
Collaboration in projects		
Email, phone, interactive audio/video/whiteboards	.400**	174
Collaborative project management systems	.193*	160
Online virtual tools (Skype)	.183*	167

(continued)

VARIABLES	PEARSON CORRELATION	N
Online social media (blogs, LinkedIn)	.292**	160
Collaboration with clients to find project solutions	.310**	175
To improve competitiveness	.232**	175
To save cost	.532**	169
To expand into a new industry by partnering with sector experts	.270**	165
To expand into new regions by partnering with local agents	.276**	162
To improve project performance	.546**	170
To overcome project uncertainty, complexity, and high risk	.512**	171
It is our organizational strategy to collaborate with certain partners formally	.392**	171
I collaborate informally with project experts in my own professional network for solving problems	.394**	170
Collaborators need to have shared direction for the project	.258**	175
Similar competency levels should be evident in the collaborative teams	.297**	174
Trust between team members/collaborators should be evident	.436**	175
Power distribution must be clearly defined from outset with clear responsibilities	.291**	175
Good communication should be evident among team members/collaborators	.311**	175
The collaboration is seen as beneficial	.473**	175
There is organizational commitment, satisfaction with partnership	.414**	175
Collaborative teams from different partners have diverse priorities and interests	.209**	174
Project/collaborators' team skills have diverse and varying capabilities/skills to execute and lead projects	.305**	175
Project/collaborator team behavior issues such as some showing low project effort or nonparticipation	.299**	173
Team dynamics and continuity: team members are transiently engaged and rotate throughout project phases	.319**	172
Trust between team members	.325**	168

(continued)

Table H-3. Benefits in Collaborative Projects *(continued)*

VARIABLES	PEARSON CORRELATION	N
Projects with collaborative teams perform better in . . .		
. . . meeting cost targets	.439**	175
. . . meeting time targets	.481**	175
. . . meeting scope targets	.493**	175
. . . meeting quality targets	.511**	174
. . . leading to innovative solutions	.446**	175
. . . managing risks	.463**	174
Financial success of collaborative projects		
10%–25% of the projects are financially successful	.167*	157
Over 75% of the projects are financially successful	.245**	167
Projects are more successful compared to main competitors	.284**	164
Innovativeness of projects compared to competitors		
26%–50% of the projects are more innovative	.198*	134
51%–75% of the projects are more innovative	.224**	146
Over 75% of the projects are more innovative	.332**	138
Innovation performance		
New product innovation	.275**	149
Recombining technical knowledge to take advantage of existing products in new areas	.325**	161
Development of new channels of distribution	.264**	139
Innovation in product design	.344**	147
Innovation in using new materials	.344**	151
New process innovation	.338**	160
Innovation in terms of development and/or adaptation of new technologies	.374**	165
Innovation in reaching new market segments and consequent business growth	.319**	155
Project innovation performance		
Increase in employee satisfaction because of involvement in innovation projects	.343**	171
. . . focused on the initiation of idea, generation, conceptualizing, data gathering, and planning stage	.330**	171

Table H-3. Benefits in Collaborative Projects *(continued)*

VARIABLES	PEARSON CORRELATION	N
. . . focused on the implementation stage that consist of actions and decisions involved in putting an innovation to use	.250**	169
Benefitted from innovation	.437**	167
Drivers for innovation		
Top management support and practices	.332**	169
Communication	.348**	170
Organizational politics and culture	.241**	171
Individual knowledge and skill set	.364**	171
Resource availability	.369**	169
Trusting relationships	.431**	172
Information sharing	.321**	170
Available technologies	.368**	171
Mission and strategy	.336**	171
Organizational structure and size	.289**	169
Leadership behavior	.352**	173
Individual needs and motives	.321**	169
Measures for success		
Meeting or exceeding stakeholder needs and expectations	.412**	175
Meeting project scope, cost, and quality	.343**	175
Project had a positive impact on customers	.490**	174
Business success	.338**	175
Enhanced strategic potential	.502**	174
Enhanced ability to innovate in our area	.496**	175
Enhanced ability to collaborate with partners	.515**	173

H4. T-Test: Size of Organization

The test of difference, also called the t-test, was used to test whether the differences between two means are significantly different from zero. For the research at hand, this shall be investigated for the size of the organization. Various t-tests are conducted to compare the means of the two groups (Group 1: number of staff employed ≤250; Group 2: number of staff employed >250).

The findings are summarized in the table below to indicate the difference between larger companies (with more than 250 staff) and smaller and medium enterprises with respect to project characteristics, as well as collaborative aspects in projects and project success factors. For most variables, the two groups are not significantly different, but there are some variables where a significant difference was found based on the number of staff employed. These are:

- The difference regarding the **complexity of projects in terms of size** (COMP_SIZE) between organizations with ≤250 and organizations with >250 is −0.80 (BCa 95%, CI [−1.27, −0.33]) and significant $t(173) = -3.38$, $p = 0.001$.

- The difference regarding the **complexity of projects in terms of technology issues** (COMP_TECH) between organizations with ≤250 and organizations with >250 is −0.57 (BCa 95%, CI [−1.07, −0.07]) and significant $t(171) = -2.23$, $p = 0.027$.

- The difference regarding the **impact of the change in collaborator/supplier status on projects** (TURB_COLLA) between organizations with ≤250 and organizations with >250 is −0.70 (BCa 95%, CI [−1.27, −0.13]) and significant $t(169) = -2.14$, $p = 0.017$.

- The difference regarding the **practice of robust risk management procedures and risk mitigation actions as a reaction to disruptions in projects** (REACT_RISK) between organizations with ≤250 and organizations with >250 is 0.54 (BCa 95%, CI [0.27, 1.05]) and significant $t(173) = 2.08$, $p = 0.039$.

- The difference regarding the **relevance of discovering and furthering new opportunities and prospects** (PMACQU_DISC) between organizations with ≤250 and organizations with >250 is 0.54 (BCa 95%, CI [0.12, 0.95]) and significant $t(171) = 2.57$, $p = 0.011$.

- The difference regarding the **relevance of selling project ideas to customers** (PMACQU_SELL) between organizations with ≤250 and organizations with >250 is 0.66 (BCa 95%, CI [0.17, 1.14]) and significant $t(162) = 2.67$, $p = 0.008$.

- The difference regarding the **relevance of applying technology know-how** (PMKNOW_TECH) between organizations with ≤250 and organizations with >250 is 0.46 (BCa 95%, CI [0.11, 0.81]) and significant $t(163) = 2.58$, $p = 0.011$.

- The difference regarding the **relevance of estimating project risks** (PMTECH_RISK) between organizations with ≤250 and organizations with >250 is 0.33 (BCa 95%, CI [0.00, 0.66]) and significant $t(170) = 1.98$, $p = 0.050$.

- The difference regarding the **relevance of estimating partner subcontractor risk** (PMTECH_SUBRISK) between organizations with ≤250 and organizations with >250 is 0.54 (BCa 95%, CI [0.07, 1.01]) and significant $t(170) = 2.28$, $p = 0.024$.

- The difference regarding the **significance of project members, their capabilities, knowledge, and ability to exercise good practical judgments** (PMPRA_PHRO) between organizations with ≤250 and organizations with >250 is 0.31 (BCa 95%, CI [0.04, 0.58]) and significant $t(170) = 2.25$, $p = 0.026$.

- The difference regarding the **significance of procedures** (**rules, routines, resources, actions**) (PMPRA_PROC) between organizations with ≤250 and organizations with >250 is 0.34 (BCa 95%, CI [0.02, 0.67]) and significant $t(172) = 2.07$, $p = 0.040$.

- The difference regarding the **use of the collaborative tool "content management software like SharePoint"** (COLW_SOFT) between organizations with ≤250 and organizations with >250 is −0.85 (BCa 95%, CI [−1.55, −0.16]) and significant $t(162) = -2.14$, $p = 0.017$.

- The difference regarding the **use of the collaborative tool "collaborative authoring/design"** (COLW_AUTH) between organizations with ≤250 and organizations with >250 is −0.92 (BCa 95%, CI [−1.51, −0.32]) and significant $t(160) = -3.02$, $p = 0.003$.

- The difference regarding the **collaboration with clients to find project solutions** (COLT_CLIEN) between organizations with ≤250 and organizations with >250 is 0.42 (BCa 95%, CI [0.04, 0.80]) and significant $t(173) = 2.20$, $p = 0.029$.

- The difference regarding the **collaboration with other companies** (**project teams**) (COLT_INTER) between organizations with ≤250 and organizations with >250 is 0.67 (BCa 95%, CI [0.09, 1.24]) and significant t(173) = 2.30, p = 0.023.

- The difference regarding the **reason to collaborate in a project in order to expand into a new industry by partnering with sector experts** (COLMSTRA_INDU) between organizations with ≤250 and organizations with >250 is 0.61 (BCa 95%, CI [0.03, 1.19]) and significant t(163) = 2.07, p = 0.040.

- The difference regarding the **reason to collaborate in a project in order to expand into new regions by partnering with local agents** (COLMSTRA_REGI) between organizations with ≤250 and organizations with >250 is 0.68 (BCa 95%, CI [0.07, 1.28]) and significant t(160) = 2.21, p = 0.029.

- The difference regarding the **reason to collaborate in a project in order to collaborate informally with project experts in my own professional networks for solving problems** (COMKNOW_EXP) between organizations with ≤250 and organizations with >250 is 0.62 (BCa 95%, CI [0.05, 1.19]) and significant t(168) = 2.15, p = 0.033.

- The difference regarding the **importance of the critical dimensions of successful collaboration in projects that collaborators need to have shared direction for the project** (COLESTRU_DIRE) between organizations with ≤250 and organizations with >250 is 0.38 (BCa 95%, CI [0.00, 0.76]) and significant t(173) = 1.98, p = 0.050.

- The difference regarding the **importance of the critical dimensions of successful collaboration in projects that power distribution between the collaborator members must be clearly defined from the outset with clear responsibilities** (COLESTRU_RESP) between organizations with ≤250 and organizations with >250 is 0.43 (BCa 95%, CI [0.05, 0.80]) and significant t(173) = 2.23, p = 0.027.

- The difference regarding the **performance of a project where a collaborative team was present in terms of better meeting cost targets** (COLL_COST) between organizations with ≤250 and organizations with >250 is 0.54 (BCa 95%, CI [0.07, 1.00]) and significant t(173) = 2.25, p = 0.026.

- The difference regarding the **performance of a project where a collaborative team was present in terms of better meeting scope targets** (COLL_SCOP) between organizations with ≤250 and organizations with >250 is 0.49 (BCa 95%, CI [0.08, 0.89]) and significant t(173) = 2.36, p = 0.019.

- The difference regarding the **performance of a project where a collaborative team was present in terms of better meeting quality targets** (COLL_QUAL) between organizations with ≤250 and organizations with >250 is 0.55 (BCa 95%, CI [0.12, 0.98]) and significant t(172) = 2.53, p = 0.012.

- The difference regarding the **performance of a project where a collaborative team was present in terms of better leading to innovative solutions** (COLL_INNO) between organizations with ≤250 and organizations with >250 is 0.21 (BCa 95%, CI [0.10, 0.92]) and significant t(167) = 2.45, p = 0.015.

- The difference regarding the **share of 10% to 25% financially successful projects** (SUCCFIN_10) between organizations with ≤250 and organizations with >250 is −1.12 (BCa 95%, CI [−1.83, −0.41]) and significant t(145) = −3.12, p = 0.002.

- The difference regarding the **share of 26% to 50% financially successful projects** (SUCCFIN_26) between organizations with ≤250 and organizations with >250 is −0.86 (BCa 95%, CI [−1.56, −0.17]) and significant t(154) = −2.45, p = 0.015.

- The difference regarding the **share of over 75% financially successful projects** (SUCCFIN_75) between organizations with ≤250 and organizations with >250 is 0.75 (BCa 95%, CI [0.12, 1.38]) and significant t(165) = 2.33, p = 0.021.

- The difference regarding the **share of 10% to 25% of projects which are more innovative than the competitors'** (INNOV_10) between organizations with ≤250 and organizations with >250 is −0.77 (BCa 95%, CI [−1.52, −0.02]) and significant t(133) = −2.03, p = 0.044.

- The difference regarding the **share of 51% to 75% of projects which are more innovative than the competitors'** (INNOV_51) between organizations with ≤250 and organizations with >250 is 0.71 (BCa 95%, CI [0.01, 1.14]) and significant t(144) = 2.01, p = 0.046.

- The difference regarding the **innovation performance over the past five years in terms of new processes** (INNT_PROC) between organizations with ≤250 and organizations with >250 is 0.61 (BCa 95%, CI [0.13, 1.09]) and significant $t(158) = 2.50$, $p = 0.013$.

- The difference regarding the **importance of the performance indicator "meeting or exceeding stakeholder needs and expectations"** (SUCC_STAKE) between organizations with ≤250 and organizations with >250 is 0.30 (BCa 95%, CI [0.03, 0.57]) and significant $t(172) = 2.19$, $p = 0.030$.

- The difference regarding the **importance of the performance indicator "meeting project scope, cost, and quality"** (SUCC_SCCOQUAL) between organizations with ≤250 and organizations with >250 is 0.33 (BCa 95%, CI [0.06, 0.61]) and significant $t(172) = 2.43$, $p = 0.016$.

Table H-4. T-test—Size of Organization

VARIABLE	SMALL/MEDIUM MEAN	LARGE MEAN	DIFFERENCE	INTERVAL OF THE		T	DF	SIG (2-TAILED)
				LOWER	UPPER			
Complexity of projects in terms of size	4.77	5.58	−0.80	−1.27	−0.33	−3.38	173	0.001
Complexity of projects in terms of technology issues	4.68	5.25	−0.57	−1.07	−0.07	−2.23	171	0.027
Impact of the change in collaborator/supplier status	3.86	4.55	−0.70	−1.27	−0.13	−2.14	169	0.017
Practice of robust risk management procedures and risk mitigation actions as a reaction to disruptions	5.37	4.8	0.54	0.27	1.05	2.08	173	0.039
Relevance of discovering and furthering new opportunities and prospects	6.13	5.59	0.54	0.12	0.95	2.57	171	0.011
Relevance of selling project ideas to customers	5.68	5.02	0.66	0.17	1.14	2.67	162	0.008
Relevance of applying technology know-how	5.99	5.53	0.46	0.11	0.81	2.58	163	0.011
Relevance of estimating project risk	6.45	6.12	0.33	0.00	0.66	1.98	170	0.050
Relevance of estimating partner subcontractor risk	5.81	5.27	0.54	0.07	1.01	2.28	170	0.024
Significance of project members, their capabilities, knowledge, and ability to exercise good practical judgments	6.59	6.28	0.31	0.04	0.58	2.25	170	0.026
Significance of procedures	6.23	5.88	0.34	0.02	0.67	2.07	172	0.040
Use of collaborative tool "content management software"	3.73	4.58	−0.85	−1.55	−0.16	−2.14	162	0.017
Use of the collaborative tool "collaborative authoring/design"	3.98	4.90	−0.92	−1.51	−0.32	3.02	160	0.003
Collaboration with clients to find project solutions	6.30	5.88	0.42	0.04	0.80	2.20	173	0.029

Table H-4. T-test—Size of Organization *(continued)*

VARIABLE	SMALL/MEDIUM MEAN	LARGE MEAN	DIFFERENCE	INTERVAL OF THE LOWER	UPPER	T	DF	SIG (2-TAILED)
Collaboration with other companies	5.20	4.53	0.67	0.09	1.24	2.30	173	0.023
Reason to collaborate: expand into a new industry partnering with sector experts	5.62	5.01	0.61	0.03	1.19	2.07	163	0.040
Reason to collaborate in a project in order to expand into new regions by partnering with local agents	5.58	4.91	0.68	0.07	1.28	2.21	160	0.029
Reason to collaborate: informally with experts in professional networks for solving problems	5.84	5.21	0.62	0.05	1.19	2.15	168	0.033
Importance of the critical dimensions of successful collaboration in projects that collaborators need to have shared direction for the project	6.14	5.76	0.38	0.00	0.76	1.98	173	0.050
Importance of the critical dimension of successful collaboration in projects that power distribution between the collaborator members that must be clearly defined from the outset with clear responsibilities	6.25	5.83	0.43	0.05	0.80	2.23	173	0.027
Performance of a project where a collaborative team was present: meeting cost targets	5.35	4.82	0.54	0.07	1.00	2.25	173	0.026
Performance of a project where a collaborative team was present: better meeting scope targets	5.83	5.35	0.49	0.08	0.89	2.36	173	0.019
Performance of a project where a collaborative team was present: meeting quality targets	5.80	5.25	0.55	0.12	0.98	2.53	172	0.012
Performance of a project where a collaborative team was present in terms of better leading to innovative solutions	5.73	5.22	0.21	0.10	0.92	2.45	167	0.015

(continued)

Table H-4. T-test—Size of Organization *(continued)*

VARIABLE	SMALL/MEDIUM MEAN	LARGE MEAN	T-TEST FOR EQUALITY OF MEANS					
			DIFFERENCE	INTERVAL OF THE LOWER	UPPER	T	DF	SIG (2-TAILED)
Share of 10%–25% financially successful projects	2.66	3.77	−1.12	−1.83	−0.41	−3.12	145	0.002
Share of 26%–50% financially successful projects	2.92	3.78	−0.86	−1.56	−0.17	−2.45	154	0.015
Share of over 75% financially successful projects	5.22	4.47	0.75	0.12	1.38	2.33	165	0.021
Share of 10%–25% of projects which are more innovative than the competitors'	3.39	4.16	−0.77	−1.52	−0.02	−2.03	133	0.044
Share of 51%–75% of projects which are more innovative than the competitors'	4.58	3.87	0.71	0.01	1.14	2.01	144	0.046
Innovation performance over the past five years in terms of new processes	5.77	5.16	0.61	0.13	1.09	2.50	158	0.013
Importance of the performance indicator "meeting or exceeding stakeholder needs and expectations"	6.55	6.25	0.30	0.03	0.57	2.19	172	0.030
Importance of the performance indicator "meeting project scope, cost, and quality"	6.51	6.17	0.33	0.06	0.61	2.43	172	0.016

Appendix I: Innovation Frequency Statistics—Univariate Analysis

I1. Innovative Project Evaluation

Results showed that 30.3% of participants agree to strongly agree that between 10% to 25% and 26% to 50% of their own projects are more innovative compared to their competitors', whereas 33.5% agree to strongly agree that between 51% and 75% of their own projects are more innovative compared to their competitors, and 33.9% agree to strongly agree that over 76% are more innovative. This also shows that 10.6% to 13.8% of the participants rate their projects as neutral compared to their competitors', whereas a particularly high number of missing responses (at around 30%) for each item is noticeable.

Table I-1. Innovative Project Evaluation

PROJECT INNOVATIVENESS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Between 10% and 25% of my projects are more innovative than my competitors'	38	17.4	16	7.3	6	2.8	23	10.6	22	10.1	20	9.2	24	11.0	69	31.7	218	100
(2) Between 26% and 50% of my projects are more innovative than my competitors'	32	14.7	12	5.5	15	6.9	25	11.5	22	10.1	24	11.0	20	9.2	68	31.2	218	100
(3) Between 51% and 75% of my projects are more innovative than my competitors'	30	13.8	13	6.0	13	6.0	30	13.8	20	9.2	23	10.6	30	13.8	59	27.1	218	100
(4) Over 76% of my projects are more innovative than my competitors'	26	11.9	13	6.0	12	5.5	27	12.4	18	8.3	18	8.3	38	17.4	66	30.3	218	100

I2. Innovation Performance (*Over the Past Five Years*)

In the past five years, the biggest growth regarding innovation performance among the participants' organizations was in the field of innovation in terms of development and/or adaption of new technologies with a fairly strong to strong growth for 49.1%. This is followed by new process innovation (47.2% fairly strong/strong growth), recombining technical knowledge to take advantage of existing products in new areas (46.3%), innovation in reaching new market segments and consequent business growth (39.5%), innovation in using new materials (39.0%), innovation in product design (37.2%), new product innovation (31.7%), and development of new channels of distribution (29.4%). A particularly high number of missing responses is to be highlighted for these questions as well, ranging between 12.8% and 30.7% per question.

Table I-2. Innovation Performance Over the Past Five Years

INNOVATION PERFORMANCE	NO GROWTH		2		3		4		5		6		STRONG GROWTH		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) New product innovation	12	5.5	4	1.8	16	7.3	18	8.3	39	17.9	37	17.0	32	14.7	60	27.5	218	100
(2) Recombining technical knowledge to take advantage of existing products in new areas	6	2.8	4	1.8	4	1.8	19	8.7	47	21.6	51	23.4	50	22.9	37	17.0	218	100
(3) Development of new channels of distribution	8	3.7	7	3.2	12	5.5	20	9.2	40	18.3	34	15.6	30	13.8	67	30.7	218	100
(4) Innovation in product design	10	4.6	5	2.3	11	5.0	21	9.6	29	13.3	39	17.9	42	19.3	61	28.0	218	100
(5) Innovation in using new materials	9	4.1	4	1.8	14	6.4	27	12.4	32	14.7	42	19.3	43	19.7	47	21.6	218	100
(6) New process innovation	6	2.8	6	2.8	8	3.7	22	10.1	36	16.5	48	22.0	55	25.2	37	17.0	218	100
(7) Innovation in terms of development and/or adaptation of new technologies	7	3.2	4	1.8	10	4.6	23	10.6	39	17.9	48	22.0	59	27.1	28	12.8	218	100
(8) Innovation in reaching new market segments and consequent business growth	11	5.0	6	2.8	8	3.7	18	8.3	40	18.3	42	19.3	44	20.2	49	22.5	218	100

I3. Impact of Innovative Projects

The research indicated that 66.5% of participants agree to strongly agree that employee satisfaction has increased because of their involvement in innovative practices; and 72.0% agree to strongly agree that project innovation performance is focused on the initiation of idea generation, conceptualizing, data gathering, and planning stages; 64.2% agree to strongly agree that project innovation performance is focused on the implementation stage that consists of actions and decisions involved in putting an innovation to use; 71.1% agree to strongly agree that they have benefited from using an innovation; and only 31.2% agree to strongly agree that they have benefited financially by selling an innovation.

Table I-3. Impact of Innovative Projects

INNOVATION PHASES	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Employee satisfaction has increased because of their involvement in innovative practices	6	2.8	12	5.5	9	4.1	29	13.3	37	17.0	50	22.9	58	26.6	17	7.8	218	100
(2) Project innovation performance is focused on the initiation of idea generation, conceptualizing, data gathering, and planning stage	3	1.4	10	4.6	14	6.4	19	8.7	46	21.1	53	24.3	58	26.6	15	6.9	218	100
(3) Project innovation performance is focused on the implementation stage that consists of actions and decisions involved in putting an innovation to use	6	2.8	6	2.8	16	7.3	32	14.7	36	16.5	47	21.6	57	26.1	18	8.3	218	100
(4) I have benefited from using an innovation	7	3.2	10	4.6	10	4.6	14	6.4	32	14.7	53	24.3	70	32.1	22	10.1	218	100
(5) I have benefited financially by selling an innovation	30	13.8	14	6.4	11	5.0	27	12.4	20	9.2	18	8.3	30	13.8	68	31.2	218	100

I4. Enablers and Barriers to Collaborative Innovation in Projects

The survey results showed that 49.5% of participants indicate that there is a high impact of communication to help or hinder the materialization of innovation through collaboration within projects. In addition, 49.1% of participants also see a high impact of leadership behavior, and 48.6% of top management support and practices. This is followed by resource availability (42.7% high impact), information sharing (39.9%), trusting relationships (37.2%), individual knowledge and skill sets (36.2%), mission and strategy (34.4%), organizational politics and culture (33.9%), available technologies (33.5%), individual needs and motives (31.7%), and organizational structure and size (26.6%).

DRIVERS FOR INNOVATION	LOW IMPACT		2		3		4		5		6		HIGH IMPACT		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Top management support and practices	6	2.8	7	3.2	5	2.3	14	6.4	22	10.1	45	20.6	106	48.6	13	6.0	218	100
(2) Communication	3	1.4	0	0	1	0.5	11	5.0	21	9.6	62	28.4	108	49.5	12	5.5	218	100
(3) Organizational politics and culture	4	1.8	10	4.6	16	7.3	19	8.7	30	13.8	54	24.8	74	33.9	11	5.0	218	100
(4) Individual knowledge and skill sets	3	1.4	3	1.4	7	3.2	14	6.4	35	16.1	66	30.3	79	36.2	11	5.0	218	100
(5) Resource availability	4	1.8	5	2.3	6	2.8	14	6.4	30	13.8	53	24.3	93	42.7	13	6.0	218	100
(6) Trusting relationships	5	2.3	4	1.8	10	4.6	22	10.1	30	13.8	55	25.2	81	37.2	11	5.0	218	100
(7) Information sharing	3	1.4	2	0.9	8	3.7	16	7.3	26	11.9	64	29.4	87	39.9	12	5.5	218	100
(8) Available technologies	4	1.8	4	1.8	13	6.0	21	9.6	38	17.4	54	24.8	73	33.5	11	5.0	218	100
(9) Mission and strategy	4	1.8	4	1.8	13	6.0	22	10.1	34	15.6	55	25.2	75	34.4	11	5.0	218	100
(10) Organizational structure and size	7	3.2	5	2.3	10	4.6	28	12.8	45	20.6	52	23.9	58	26.6	13	6.0	218	100
(11) Leadership behavior	5	2.3	3	1.4	8	3.7	10	4.6	19	8.7	57	26.1	107	49.1	9	4.1	218	100
(12) Individual needs and motives	6	2.8	3	1.4	23	10.6	17	7.8	38	17.4	48	22.0	69	31.7	14	6.4	218	100

I5. Performance Indicators for Project Success

The survey showed that 93.6% of participants agree to strongly agree to the performance indicators for project success of meeting or exceeding stakeholder needs or expectations and of meeting project scope, cost, and quality; 94% agree to strongly agree to the indicator of positive impact on customers; 92.2% agree to strongly agree to the indicator of business success; 85.3% agree to strongly agree to the indicator of enhanced strategic potential; 73.4% agree to strongly agree to the indicator of enhanced ability to innovate in their area; and 72.5% agree to strongly agree to the indicator of enhanced ability to collaborate with partners.

Table I-5. Performance Indicators for Project Success

PROJECT SUCCESS	STRONGLY DISAGREE		2		3		4		5		6		STRONGLY AGREE		MISSING		TOTAL	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
(1) Meeting or exceeding stakeholder needs and expectations	3	1.4	0	0	3	1.4	6	2.8	19	8.7	53	24.3	132	60.6	2	0.9	218	100
(2) Meeting project scope, cost, and quality	1	0.5	2	0.9	2	0.9	8	3.7	23	10.6	63	28.9	118	54.1	1	0.5	218	100
(3) Project had a positive impact on customers	2	0.9	1	0.5	1	0.5	6	2.8	22	10.1	60	27.5	123	56.4	3	1.4	218	100
(4) Business success	2	0.9	1	0.5	5	2.3	8	3.7	27	12.4	67	30.7	107	49.1	1	0.5	218	100
(5) Enhanced strategic potential	3	1.4	0	0	8	3.7	19	8.7	43	19.7	71	32.6	72	33.0	2	0.9	218	100
(6) Enhanced our ability to innovate in our area	8	3.7	8	3.7	11	5.0	30	13.8	47	21.6	48	22.0	65	29.8	1	0.5	218	100
(7) Enhanced ability to collaborate with partners	5	2.3	11	5.0	10	4.6	31	14.2	41	18.8	48	22.0	69	31.7	3	1.4	218	100

8. References

Adler, P., Heckscher, C., & Prusak, L. (2011). Building a collaborative enterprise. *Harvard Business Review*, *89*(7–8), 94–101.

Ahlemann, F., Teuteberg, F., & Vogelsang, K. (2009). Project management standards—Diffusion and application in Germany and Switzerland. *International Journal of Project Management*, *27*(3), 292–303.

Ahlemann, F., El Arbi, F., Kaiser, M. G., & Heck, A. (2013). A process framework for theoretically grounded prescriptive research in the project management field. *International Journal of Project Management*, *31*(1), 43–56.

Ahmadi, H. B., Kusi-Sarpong, S., & Rezaei, J. (2017). Assessing the social sustainability of supply chains using Best Worst Method. *Resources Conservation and Recycling*, *126*. 10.1016/j.resconrec.2017.07.020.

Ahn, J. M., Minshall, T., & Mortara, L. (2015). Open innovation: A new classification and its impact on firm performance in innovative SMEs. *Journal of Innovation Management*, *3*(2), 33–54.

Antonacopoulou, E. P. (2006). Working life learning: Learning-in-practice. In E. P. Antonacopoulou, P. Jarvis, V. Andersen, B. Elkjaer, & S. Hoeyrup (Eds.), *Learning, working and living: Mapping the terrain of working life learning* (pp. 234–254). Palgrave.

Antonacopoulou, E. P. (2008). On the practice of practice: In-tensions and ex-tensions in the ongoing reconfiguration of practice. In D. Barry, & H. Hansen (Eds.), *Handbook of new approaches to organization studies* (pp. 112–131). Sage.

Antonacopoulou, E. P. (2009). Strategizing as practicing: Strategic learning as a source of connection. In L. A. Costanzo, & R. B. McKay (Eds.), *Handbook of research on strategy and foresight* (pp. 169–181). Sage.

Antonacopoulou, E. P. (2010a). Global research: Transcending boundaries by learning to collaborate and learning from collaboration. In C. Cassell & W. J. Lee (Eds.), *Management research: Challenges and controversies* (pp. 86–104). Routledge.

Antonacopoulou, E. P. (2010b). Advancing practice-relevant scholarship: Delivering impact. In C. Cassell & W. J. Lee (Eds.). *Management research: Challenges and controversies* (pp. 314–334). Routledge.

Antonacopoulou, E. P. (2010c). Beyond co-production: Practice-relevant scholarship as a foundation for delivering impact through powerful ideas. *Public Money and Management, Special Issue – The Politics of Co-production Research*, *30*(4), 219–225.

Antonacopoulou, E. P. (2015). One more time—What is Practice? *Teoria e Práctice em Administração* (*Theory and Practice Management Journal*), *5*(1), 1–26

Antonacopoulou, E. P. (2016). Practicing innovating through learning-in-crisis: Realizing the impact of management in HRM practice. In P. Sparrow, H. Shipton, P. Budwar, & A. Brown (Eds.), *Human resource management, innovation and performance* (pp. 266–281). Palgrave

Antonacopoulou, E. P., & Bento, R. (2010). Learning leadership in practice. In J. Storey (Ed). *Leadership in organizations: Current issues and key trends* (pp. 81–102) (2nd ed.). Routledge.

Antonacopoulou, E. P., & Chiva, R. (2007). The social complexity of organizational learning: Dynamics of learning and organising, Special Issue. *Management Learning*, *38*(3), 277–295.

Antonacopoulou, E. P., & Sheaffer, Z. (2014). Learning in crisis. *Journal of Management Inquiry*, *23*(1), 5–21.

Artto, K., Martinsuo, M., Gemünden, H. G., & Murtoaro, J. (2009). Foundations of program management: A bibliometric view. *International Journal of Project Management*, *27*, 1–18.

Aubry, M., Hobbs, B., & Thuillier, D. (2007). A new framework for understanding organisational project management through the PMO. *International Journal of Project Management*, *25*(4), 328–336.

Auld, G. W., Diker, A., Bock, M. A., Boushery, C. J., Bruhn, C. M., Cluskey, M., . . . Zaghloul, S. (2007). Development of a decision tree to determine appropriateness of NVivo in analyzing qualitative data sets. *Journal of Nutrition Education and Behavior*, *39*(1), 37–47. doi: http://dx.doi.org/10.1016/j.jneb.2006.09.006.

Becerik-Gerber, B. (2004). A review on past, present and future of web-based project management & collaboration tools and their adoption by the US AEC industry. *International Journal of IT in Architecture, Engineering and Construction*, October 2004, *2*(3), 233–248.

Beech, N., MacIntosh, R., Antonacopoulou, E. P., & Sims, D. (2012). Practicing and knowing management: A dialogic perspective. *Management Learning*, *43*(4), 373–383.

Benner, M. J., & Tushman, M. L. (2003). Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, *28*, 238–256.

Besner, C. & Hobbs, J. B. (2006). The perceived value and potential contribution of project management practices to project success. *Project Management Journal*, *37*(3), 37–48.

Blomquist, T., Hällgren, M., Nilsson, A., & Söderholm, A. (2010). Project-as-practice: In search of project management research that matters. *Project Management Journal*, *41*(1), 5–16. doi: 10.1002/pmj.20141.

Bourdieu, P. (1990). *The logic of practice*. Stanford University Press.

Brown, S. L., & Eisenhardt, K. M. (1995) Product development: Past research, present findings, and future. *The Academy of Management Review*, *20*(2), 343–378.

Byrne, B. M. (2001). *Structural equation modelling with AMOS: Basic concepts, applications, and programming*. Lawrence Erlbaum Associates, Inc.

Camarinha-Matos, L., & Afsarmanesh, H. (2005) Collaborative networks: A new scientific discipline. *Journal of Intelligent Manufacturing*, *16*, 439–452.

Carroll, B., Levy, L., & Richmond, D. (2008). Leadership as practice: Challenging the competency paradigm. *Leadership*, *4*(4). 363–379.

Chesbrough, H., & Bogers, M. (2014). Explicating open innovation: Clarifying an emerging paradigm for understanding innovation. In H. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *New frontiers in open innovation* (pp. 3–28). Oxford University Press.

Cicmil, S., & Hodgson, D. (2006). New possibilities for project management theory: A critical engagement. *Project Management Journal*, *37*(3), 111–122.

Cicmil, S., Williams, T., Thomas, J., & Hodgson, D. (2006). Rethinking project management: Researching the actuality of projects. *International Journal of Project Management*, *24*(8), 675–686. doi: http://dx.doi.org/10.1016/j.ijproman.2006.08.006.

Cicmil, S., Cooke-Davies, T., Crawford, L., & Richardson, K. (2009). *Exploring the complexity of projects: Implications of complexity theory for project management practice*. Project Management Institute.

Cooke-Davies, T., Cicmil, S., Crawford, L., & Richardson, K. (2007). We're not in Kansas anymore, Toto: Mapping the strange landscape of complexity theory, and its relationship to project management. *Project Management Journal*, *38*(2), 50–61.

Crawford, L. (2005). Senior management perceptions of project management competence. *International Journal of Project Management*, *23*(1), 7–16.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches.* (3rd ed.). SAGE Publications, Inc.

Creswell, J. W., & Plano-Clark, V. L. (2011). *Designing and conducting mixed methods research.* (2nd ed.). SAGE Publications, Inc.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, *39*(6), 699–709.

Davis, J. P. & Eisenhardt, K. M. (2011) Rotating leadership and collaborative innovation: Recombination processes in symbiotic relationships. *Administrative Science Quarterly*, *56*(2), 159–201. doi: https://doi.org/10.1177/0001839211428131

De Meyer, A., Loch, C. H., & Pich, M. T. (2002). Managing project uncertainty: From variation to chaos. *MIT Sloan Management Review*, *43*(2), 60–67.

Engeström, Y. (1987). Learning by expanding: *An activity-theoretical approach to developmental research*. Orienta-Konsultit.

Everett, J., & Jamal, T. B. (2004). Multistakeholder collaboration as symbolic marketplace and pedagogic practice. *Journal of Management Inquiry*, *13*(1), 57–78.

Faems, D., & Van Looy, B., & Debackere, K. (2005). Interorganizational collaboration and innovation: Toward a portfolio approach. *Journal of Product Innovation Management*. *22*(3), 238–250.

Feldman, M., & Orlikowski, W. (2011). Theorizing practice and practicing theory. *Organization Science*, *22*(5). 1240–1253.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage Publications Ltd.

Floricel, S., Bonneau, C., Aubry, M., & Sergi, V. (2014). Extending project management research: Insights from social theories. *International Journal of Project Management*, *32*(7), 1091–1107.

Forza, C. (2002). Survey research in operations management: A process-based perspective. *International Journal of Operations & Production Management*, *22*(2), 152–194. doi: https://doi.org/10.1108/01443570210414310

Gambatese, J. A., & Hallowell, M. (2011). Enabling and measuring innovation in the construction industry. *Construction Management and Economics*, *29*(6), 553–567.

Gann, D. M., & Slater, A. (2000) Innovation in project-based, service-enhanced firms: The construction of complex products and systems. *Research Policy*, *29*(7–8), 955–973.

Gaskin, J. (2012). Validity and reliability. *Gaskination's StatWiki*. Retrieved from http://statwiki.kolobkreations.com

Gaskin, J. (2013). SEM series part 2: Data screening. *Gaskination's statistics*. Retrieved from http://statwiki.kolobkreations.com

Geraldi, J. G., & Albrecht, G. (2007). On faith, fact, and interaction in projects. *Project Management Journal*, *38*(1), 32–43

Geraldi, J., Maylor, H., & Williams, T. (2011). Now, let's make it really complex (complicated): A systematic review of the complexities of projects. *International Journal of Operations and Production Management*, *31*(9), 966–990.

Gherardi, S. (2006). *Organizational knowledge: The texture of organizing*. Blackwell.

Giddens, A. (1984). *The constitution of society*. Cambridge University Press.

Goleman, D., & Boyatzis, R. E. (2008). Social intelligence and the biology of leadership. *Harvard Business Review*, 86(9), 74–81.

Greer, C. R., & Lei, D. (2012). Collaborative innovation with customers: A review of the literature and suggestions for future research. *International Journal of Management Reviews*, *14*(1), 63–84.

Hällgren, M., & Maaninen-Olsson, E. (2009). Deviations and the breakdown of project management principles. *International Journal of Managing Projects in Business*, *2*(1), 53–69.

Hällgren, M., & Söderholm, A. (2011). Projects-as-practice: New approach, new insights. *The Oxford handbook of project management* (pp. 500–518). Oxford University Press.

Hernes, T. (2014). *A process theory of organization*. Oxford.

Hodgson, D. E., & Cicmil, S. (2006). *Making projects critical*. Palgrave Macmillan.

Hodgson, D., & Cicmil, S. (2007). The other side of projects: The case for critical project studies. *International Journal of Managing Projects in Business*, *1*(1), 142–152.

Howard, M., Steensma, H. K., Lyles, M., & Dhanaraj, C. (2016). Learning to collaborate through collaboration: How allying with expert firms influences collaborative innovation within novice firms. *Strategic Management Journal*, *37*, 2092–2103.

Huxham, C. & Hibbert, P. (2008). Manifested attitudes: Intricacies of inter-partner learning in collaboration. *Journal of Management Studies*, *45*(3), 502–529.

Ibarra, H., & Hansen, M. T. (2011). Are you a collaborative leader? *Harvard Business Review*, *89*(7–8), 68–74.

Issa, R. R. A., Flood, I., & Caglasin, G. (2003). A survey of e-business implementation in the US construction industry. In B. Bjork (Ed.), *Journal of Information Technology in Construction* (Vol. 8), 15–28.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, *52*(11), 1661–1674.

Jarzabkiowski, P. (2005). *Strategy as practice: An activity-based approach*. Sage Strategy Series.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, *33*(7), 14–26.

Kadefors, A., Björlingson, E., & Karlsson, A. (2007). Procuring service innovations: Contractor selection for partnering projects. *International Journal of Project Management*, *25*(4), 375–385.

Kanter, R. (2006). Innovation: The classic traps. *Harvard Business Review*, *84*, 72–83.

Karrbom, T., & Hallin, A. (2015). Goal seeking and goal-oriented projects—Trajectories of the temporary organisation. *International Journal of Managing Projects in Business*, *8*(2), 368–378. doi: 10.1108/IJMPB-03-2014-0027.

Ketchen, D. J, Jr., Ireland, R. D., & Snow, C. C. (2008). Strategic entrepreneurship, collaborative innovation, and wealth creation. *Strategic Entrepreneurship Journal*, *1*(3–4), 371–385.

Klein, L., Biesenthal, C., & Dehlin, E. (2015). Improvisation in project management: A praxeology. *International Journal of Project Management*, *33*(2), 267–277.

Kline, R. B. (2011). *Principles and practice of structured equation modeling* (3rd ed.). Guilford Press.

Kohlmann, T., & Moock, J. (2009). How to analyze your data. In D. Stengal, M. Bhandari, & B. Hanson (Eds.). *Statistics and data management* (pp. 93–110). Thieme.

Koskela, L., & Howell, G. (2002). *The underlying theory of project management is obsolete*. Paper presented at PMI® Research Conference 2002: Frontiers of Project Management Research and Applications. Seattle, Washington. Project Management Institute.

Lakemond, N., Bengtsson, L., Laursen, K., & Tell, F. l. (2016). Match and manage: The use of knowledge matching and project management to integrate knowledge in collaborative inbound open innovation. *Industrial and Corporate Change*, *25*(2), 333–352.

LaLonde, P., Bourgault, M., & Findeli, A. (2012). An empirical investigation of the project situation: PM practice as an inquiry process. *International Journal of Project Management*, *30*(4), 418–431. doi: http://dx.doi.org/10.1016/j.ijproman.2011.09.005.

Latour, B. (1986). The powers of association. In J. Law (Ed.), *Power, action and belief* (pp. 261–277). Routledge and Kegan Paul.

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, *27*(2), 131–150.

Lee, S., Olson, D., & Trimi, S. (2012). Co-innovation: Convergenomics, collaboration, and co-creation for organizational values. *Management Decision*, *50*(5), 817–831.

Lee, S., Park, G., Yoon, B., & Park, J. (2010). Open innovation in SMEs—An intermediated network model. *Research Policy*, *39*(2), 290–300.

Lee, G., & Xia, W. (2005). The ability of information systems development project teams to respond to business and technology changes: A study of flexibility measures. *European Journal of Information Systems*, *14*(1), 75–92.

Lenfle, S., & Loch, C. (2010). Lost roots: How project management came to emphasize control over flexibility and novelty. *California Management Review*, *53*(1), 32–55.

Lloyd-Walker, B. M., Mills, A. J., & Walker, D. H. T. (2014). Enabling construction innovation: The role of a no-blame culture as a collaboration behavioural driver in project alliances. *Construction Management and Economics*, *32*(3), 229–245.

Loewe, P., & Dominiquini, J. (2006). Overcoming the barriers to effective innovation. *Strategy & Leadership*, *34*(1), 24–31.

Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Scandinavian Journal of Management*, *11*(4), 437–455.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*(1), 71–87.

Maylor, H., & Turner, N. (2017). Understand, reduce, respond: Project complexity management theory and practice. *International Journal of Operations & Production Management*, *37*(3), 1076–1093.

Maylor, H., Turner, N., & Murray-Webster, R. (2013). How hard can it be? Actively managing complexity in technology projects. *Research Technology Management*, *56*(4), 45–51.

McDermott, R., & Archibald, D. (2010). Harnessing your staff's informal networks. *Harvard Business Review*.

Miles, M. B., & Huberman, M. (1994). *Qualitative data analysis: A sourcebook of new methods* (2nd ed.). Sage Publications.

Miller, R., & Lessard, D. R. (2001). *The strategic management of large engineering projects: Shaping institutions, risks and governance*. Massachusetts Institute of Technology.

Mishra, A., Chandrasekaran, A., & MacCormack, A. (2015). Collaboration in multi-partner R&D projects: The impact of partnering scale and scope. *Journal of Operations Management*, *33–34*, 1–14.

Morris, P. W. G., Pinto, J. K., & Söderlund, J. (2011). *The Oxford handbook of project management*. Oxford Handbooks.

Morrison, M., & Moir, J. (1998). The role of computer software in the analysis of qualitative data: Efficient clerk, research assistant or Trojan horse? *Journal of Advanced Nursing*, *28*(1), 106–116.

Müller, R. & Söderlund, J. (2014). Innovative approaches in project management research. *International Journal of Project Management*, *33*(2), 251–253. doi: 10.1016/j.ijproman.2014.10.001.

Nicolini, D. (2013). *Practice theory, work, and organization: An introduction*. Oxford University Press.

Nicolini, D., Gherardi, S., & Yanow, D. (2003). *Knowing in organizations: A practice-based approach*. M. E. Sharpe.

Nightingale, P., & Brady, T. (2011). Projects, paradigms and predictability. In G. Cattani, S. Ferriani, L. Frederiksen, & F. Täube (Eds.), *Project-based organizing and strategic management. Advances in Strategic Management* (Vol 28.) (pp. 83–112). Emerald Group Publishing Limited.

Ollus, M., Jansson, K., Karvonen, I., Uoti, M., & Riikonen, H. (2011). Supporting collaborative project management. *Production Planning and Control: The Management of Operations*, *22*(5–6), 538–553.

Packendorff, J. (1995). Inquiring into the temporary organization: New directions for project management research. *Scandinavian Journal of Management*, *11*(4), 319–333.

Packendorff, J., & Lindgren, M. (2014). Projectification and its consequences: Narrow and broad conceptualisations. *South African Journal of Economic and Management Sciences (SAJEMS)*, *17*(1), 7–21.

Palermo, T., Power, M., & Ashby, S. (2017). Navigating institutional complexity: The production of risk culture in the financial sector. *Journal of Management Studies*, *54*(2), 154–181.

Papke-Shields, K. E., Beise, C., & Quan, J. (2010). Do project managers practice what they preach, and does it matter to project success? *International Journal of Project Management*, *28*(7), 650–662.

Perminova, O., Gustafsson, M., & Wikström, K. (2008). Defining uncertainty in projects––A new perspective. *International Journal of Project Management*, *26*(1), 73–79. doi: http://dx.doi.org/10.1016/j.ijproman.2007.08.005.

Pich, M., Loch, C., & De Meyer, A. (2002). On uncertainty, ambiguity, and complexity in project management. *Management Science*, *48*(2), 1008–1023.

Pinto, J., & Winch, G. (2016). The unsettling of "settled science": The past and future of the management of projects. *International Journal of Project Management*, *34*(2), 237–245. doi: https://doi.org/10.1016/j.ijproman.2015.07.011

Project Management Institute (PMI). (2017). *A guide to the project management body of knowledge (PMBOK® guide)* – Sixth edition. Author.

QSR. (2012). *NVIVO10 getting started guide*. QSR International.

Reckwitz, A. (2002) Toward a theory of social practices: A development in culturalist theorizing. *European Journal of Social Theory*, *5*(2), 243–263.

Richards, L., & Richards, T. (1991). The transformation of qualitative method: Computational paradigms and research processes. In N. G. Fielding, & R. M. Lee (Eds.), *Using computers in qualitative research* (pp. 38–53). SAGE.

Richards, L., & Richards, T. (1994). From filing cabinet to computer. In A. Bryman, & R. G. Burgess (Eds.), *Analysing qualitative data* (pp. 146–172). Routledge.

Rothwell, R. (1994). Towards the fifth-generation innovation process. *International Marketing Review*, *11*(1), 7–31.

Rutten, M. E. J., Dorée, A. G., & Halman, J. I. M. (2014). Together on the path to construction innovation: Yet another example of escalation of commitment? *Construction Management and Economics*, *32*(7-8), 695–704.

Sage, D., Dainty, A., & Brookes, N. (2010). A consideration of reflexive practice within the critical projects movement. *International Journal of Project Management*, *28*(6), 539–546. http://dx.doi.org/10.1016/j.ijproman.2009.10.002.

Sandberg, J., & Tsoukas, H. (2011) Grasping the logic of practice: Theorizing through practical rationality. *Academy of Management Review*, *36*(2), 338–360.

Schatkzi, T. (2002). Social science in society. *Inquiry*, *45*(1), 119–138.

Schneider, A., Wickert, C., & Marti, E. (2017). Reducing complexity by creating complexity: A systems theory perspective on how organizations respond to their environments. *Journal of Management Studies*, *54*(2), 182–208.

Schumacker, R. E., & Lomax, R. G. (2010). *A beginner's guide to structural equation modeling*. Routledge/Taylor & Francis Group.

Shaner, M. B., Beeler, L., & Noble, C. H. (2016). Do we have to get along to innovate? The influence of multilevel social cohesion on new product and new service development. *Journal of Product Innovation Management*, *33*(S1), 148–165.

Smith, C. F. (2007). *Making sense of project realities: Theory, practice and the pursuit of performance*. Gower Publishing Ltd.

Söderlund, J. (2008). Competence dynamics and learning processes in project-based firms: Shifting, adapting and leveraging. *International Journal of Innovation Management,* 12, 41-67.

Söderlund, J. (2011) Pluralism in project management: Navigating the crossroads of specialization and fragmentation. *International Journal of Management Reviews*, *13*(2), 153–176.

Söderlund, J., & Maylor, H. (2012). Project management scholarship: Relevance, impact and five integrative challenges for business and management schools. *International Journal of Project Management*, *30*(6), 686–696.

Suprapto, M., Bakker, H., & Mooi, H. (2015). Relational factors in owner–contractor collaboration: The mediating role of teamworking. *International Journal of Project Management*, *33*(6), 1347–1363. doi: 10.1016/j.ijproman.2015.03.015.

Thomas, J., George, S., & Cicmil, S. (2013). *Project management implementation as management innovation: A closer look*. Project Management Institute.

Thomas, J., & Mullaly, M. (2007). Understanding the value of project management: First steps on an international investigation in search of value. *Project Management Journal*, *38*(3), 74–89.

Tidd, J., Bessant, J. R., & Pavitt, K. (1997). *Managing innovation: Integrating technological, market, and organizational change*. Wiley.

Torres, L. T. R., & Ibarra, E. R. B. (2015). Open innovation practices: A literature review of case studies. *Journal of Advanced Management Science*, *3*(4), 362–367.

Tsoukas, H. (2017). Strategy and virtue: Developing strategy-as-practice through virtue ethics. *Strategic Organization*, *16*(3), 323–351.

Turner, N., Swart, J., Maylor, H., & Antonacopoulou, E. (2016). Making it happen: How managerial actions enable project-based ambidexterity. *Management Learning*, *47*(2), 199–222.

Vaara, E., & Whittington, R. (2012). Strategy-as-practice: Taking social practices seriously. *The Academy of Management Annals*, *6*(1), 285–336

Vidal, L. A., & Marle, F. (2008) Understanding project complexity: Implications on project management. *Kybernetes*, *37*(8), 1094–1110.

West, J., & Bogers, M. (2017). Open innovation: Current status and research opportunities. *Innovation*, *19*(1), 1–8.

Whittington, R. (2006). Completing the practice turn in strategy research. *Organization Studies*, *27*(5), 613–634.

Yu, Y., Dong, X-Y., Shen, K., Khalifa, M., & Hao, G. (2013). Strategies, technologies and organizational learning for developing organizational innovativeness in emerging economies. *Journal of Business Research*, *66*(12), 2507–2514.

9. Contributors

Dr. Roula Michaelides is a senior lecturer in operations and project management and leads the project management postgraduate programs in the University of Liverpool—Management School. She comes from a computing and information systems background and diversified into social sciences and operations management in the early 2000s. Her research advances areas in technology and collaborative innovation in projects and in new approaches to complexity within large public organizations such as the National Health Service (NHS).

Dr. Michaelides has successfully received funding for research projects investigating various aspects of managing projects in the industrial and public sector settings as a principal and co-investigator. She was recently awarded a Horizon 2020 RISE (2016) grant for "Being Lean and Seen: Meeting the Challenges of Delivering Projects Successfully in the 21st Century" (as a principal investigator for the University of Liverpool team and chief investigator for the project). She is the principal investigator of the PMI-funded research project, "Project Management as a Dynamic Collaborative Social Practice: Collaborative Innovation Revisited," and also a co-investigator on the "Value-Based Procurement in NHS" project that is funded by the NHS.

She is the PMI academic lead for the University of Liverpool Management School.

Elena P. Antonacopoulou is professor of organizational behavior at the University of Liverpool—Management School, where she leads GNOSIS—a research initiative advancing impactful collaborative research in management and organization studies.

Her principal research expertise lies in the areas of organizational change, learning, and knowledge management with a focus on leadership implications. Her research continues to advance cutting-edge ideas and thought leadership as well as new methodologies for studying social complexity, which is strengthened by her approach: working with leading international researchers, practitioners, and policy makers collaboratively. Her current study on "Realizing Y-Our Impact" is one example of the approach that governs her commitment to pursue scholarship that makes a difference through actionable knowledge.

Her work is published widely in leading international journals and edited books. She has editorship and associate editor roles in a range of journals (e.g., *Management Learning, British Journal of Management,* and *Emergence: Complexity and Organization*) and is on the editorial board of several journals (e.g., *Organization Science; Group and Organization Management; Society, Business and Organization Journal*; and *Irish Journal of Management*). She is a regular assessor of research grant applications and sits on commissioning panels of research councils in the United Kingdom, the United States, Australia, and Europe.

As one of only 16 senior fellows appointed to lead the prestigious Advanced Institute of Management Research, she has fostered the development of innovative, international, interdisciplinary, and interactive modes of research. In addition, she has held several other leadership roles (at the board, council, and executive levels), leading special committees, such as ethics and management practice, in the top international professional bodies in her field, including the Academy of Management (USA), the European Group for Organizational Studies, the British Academy of Management, and the Society for the Advancement of Management Studies.

She is actively engaged in collaborative consulting projects with leading businesses and frequently delivers keynote presentations and master classes on topical themes such as crisis and strategic learning, change and the dynamics of management practice, impactful learning and knowing, dynamic capabilities in leadership, and practicing for innovation and growth.
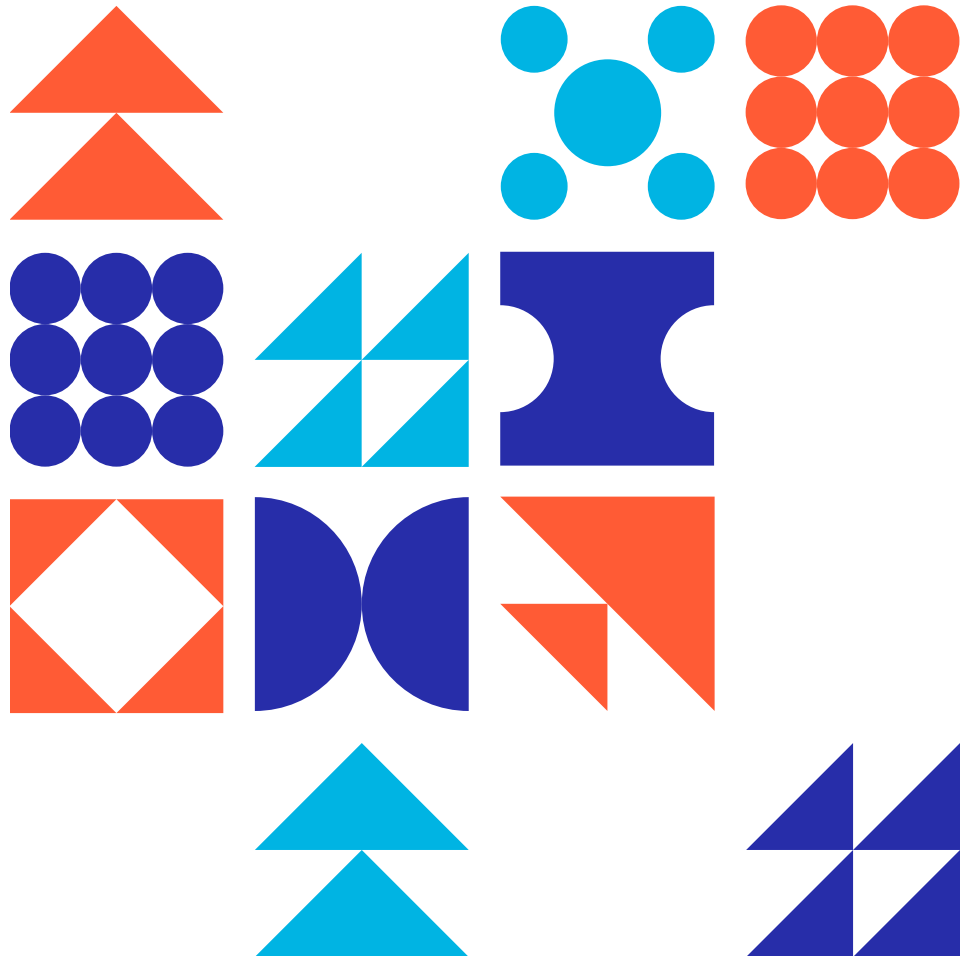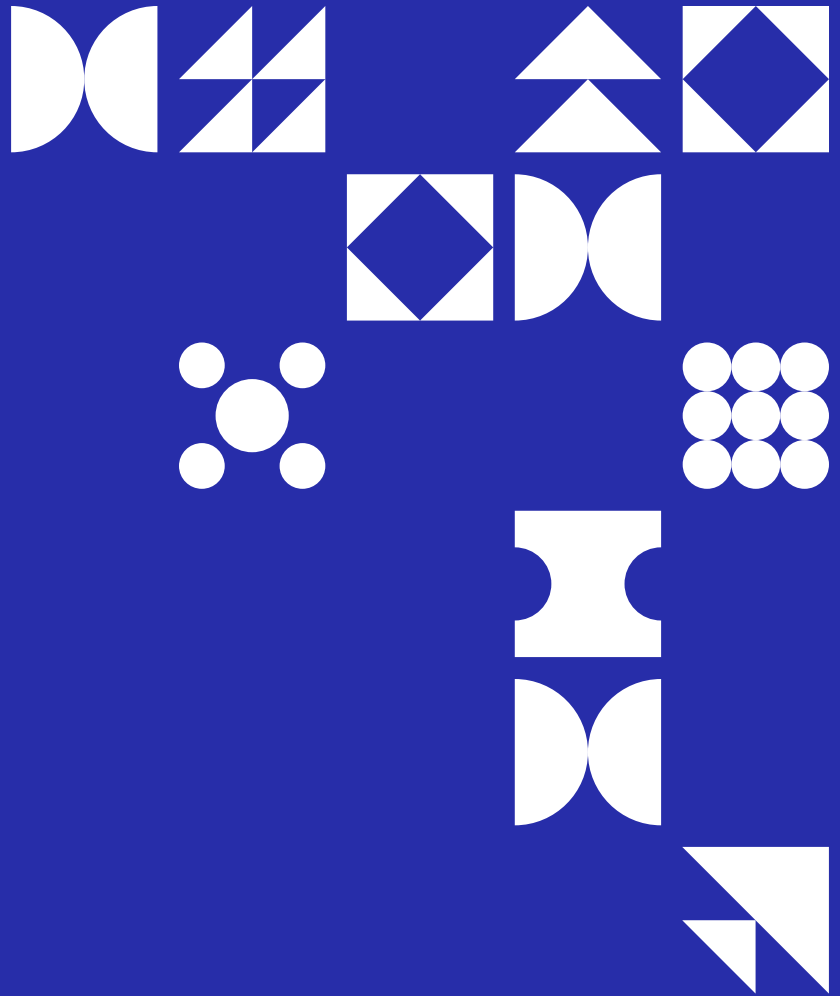
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