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**A longitudinal study
of organizational
capability
development process**

Rendering project portfolio management capability (PPMC)



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Tiivistelmä Tämä tutkimus analysoi projektiportfolion hallintaa koskevan kyvykkyyden moninaisia kehittämismahdollisuuksia. Aiempi tutkimus on keskittynyt organisaation toimintaa tukevien kyvykkyyksien luokitteluun, mutta kyvykkyyksien kehittymistä on tutkittu vähemmän. Kyvykkyyden kehittämiseen (kuten dynaamiseen kyvykkyyteen) tähtäävä tutkimus keskittyy enimmäkseen organisaation näkökulmaan. Lisäksi kyvykkyyden kehittämistutkimusta vaikeuttaa se, että alan keskeiset tutkijat käyttävät keskenään erilaista terminologiaa. Tämä tutkimus on pitkittäinen ja siinä rakennettiin kriittisen realismin lähestymistavan avulla kyvykkyyden kehittämisen tutkimista varten viitekehys. Kyvykkyyden osatekijöitä, rutiineja ja toiminnan tuloksia kuvaavaa viitekehystä kehitettiin edelleen niin, että sitä voidaan käyttää organisaation projektisalkun hallinnan kyvyn selvittämiseen. Tämän viitekehysten avulla osoitettiin tapausyrityksen kolmen yksikön kyvykkyyden kehittämispolku yhdeksän vuoden ajalta. Tapaustutkimuksen tulokset selittävät kyvykkyyden kehittämisen mekanismeja, jotka joko vahvistavat organisaation vallitsevia kehittämispolkuja tai johtavat uuden kehittämispolun valintaan. Tapaustutkimukset myös osoittavat, että tehokas toiminta ei ole kirjallisuudessa mainitun yksittäisen organisaation kyvykkyyden osatekijän seurausta. Sen sijaan kaikki tunnistetut oppivan organisaation oppimiskeinot kehittävät tehokkaasti toimivan organisaation kyvykkyyksiä. Tämän tutkimuksen johtopäätös on, että kyvykkyyden kehittämisprosessi muodostuu improvisoiduista hienosäätö-, uudelleenkonfigurointi- ja muokausvaiheista. Niiden tuloksena organisaation kyvykkyys säilyy aina yksityiskohdissaan omaperäisenä ja siten voi tuottaa vaihtelevia tuloksia. Tämä väitöskirja on luonut kriittiseen realismiin perustuvan mallin, jolla laajennetaan uutta kyvykkyyden kehittämispolku-riippuvuuden teoriaa muihin organisaatiokonteksteihin.		
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Abstract <p>This dissertation analyzes the heterogeneous development paths of project portfolio management capability (PPMC). Earlier, modern literature has prioritized its focus on the performance-based classification of organizational capabilities, while their development process remained obscure. Consequently, scholarship advocating high performance organizational capabilities (such as a dynamic capability) are in abundance. However, the evidence of development path-affected performance dissimilarities is rather sparse or otherwise remained implicit due to the increasing conceptual differences among the prominent scholarship.</p> <p>Along with the longitudinal process research design of this research, a critical realism-based retroduction approach has enabled the discovery of the capability investigation framework. This capability dimensions, routines, and performance outcome based framework has been further extended to investigate project portfolio management capability (PPMC). This retroductive framework is operationalized to evidence the nine years of capability development path heterogeneity at three entities of a case company.</p> <p>The research case findings explain the effect of underlying mechanisms, which due to their context dependent outcomes, either positively reinforce the existing development paths or lead to an alternative path selection. The case findings also confirm that higher performance is not universally attributable to any specific organizational capability known in the literature. Instead, the actuation of all three identified learning mechanisms (of a learning organization) can develop high performing organizational capabilities. This research concludes that a capability development process endures through an extemporized mixture of refinement, reconfiguration, and transformation activities. As a result, an organizational capability always remains idiosyncratic in its details and, hence, produce diverse performance outcomes. Finally, this PhD research has created a critical realist model to extend the emergent theory of capability path dependence to the other organizational contexts.</p>		
Keywords Critical realism, learning organization, organizational capabilities, routines, path dependence, project portfolio management, retroduction,		

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I wish, the learnings from this PhD research bring some good to humanity and to this life...

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Abbreviations

B2B	Business-to-business (transactions)
CoPS	Complex product system
DBD	Delta Business Division (of TCA)
DCV	Dynamic Capability View
EPPMO	Enterprise project portfolio management office
EPPM	Enterprise project portfolio management
ERP	Enterprise resource planning
ID Projects	Internal development projects
IT	Information technology function (at TCA)
OL	Organizational learning
OPM	Organizational project management
P&S Projects	Product & solutions projects
PBO	Project-based organization
PMIS	Project/Portfolio management information system
SBD	Sigma Business Division (of TCA)
TCA	The Company Alpha (the research case company)
PMO	Project management office
PPGB	Project portfolio governance bodies
PPM	Project portfolio management
PPMC	Project portfolio management capability
PPMO	Project portfolio management office
RBV	Resource Based View
VRIN	Valuable, rare, imperfectly imitable, and non-substitutable (organizational resources)

SEGMENT I: RESEARCH MOTIVATION AND METHODS

1 INTRODUCTION

This chapter introduces the research background as researcher's motivation to conduct this interesting and repeatedly demanded longitudinal case study research about organizational capability development process. Then follows sections specifying the research objective and questions, research process, research positioning, and the scope limitations. Thereafter, the last section outlines the structure of this dissertation.

1.1 Research Background

Organizational capabilities are central to the realization of business value. These capabilities put semi-permanently acquired organizational resources into learned action patterns (Makadok, 2003; Winter, 2000, 2003, 2012). Business organizations, therefore, strive to possess the right resources for sustaining superior performance (Barney, 1991; Helfat & Peteraf, 2003; Teece, 2014). Through their administrative structures and entrepreneurial leadership (Penrose, 1959, 1960), organizations orchestrate resources (Sirmon, 2011) into recognizable and interdependent actions, known as work routines (Felin et al., 2012). The knowledge of an organization resides in its routines (Nelson & Winter, 1982). An organization upgrades its knowledge by practicing the existing routines (Miller et al., 2012).

Capability performance through routinization is economical and less hectic, and hence, offers an efficient utilization of organizational resources. Therefore, business organizations accomplish, even the less frequently practiced *ad hoc*, tasks through a routinized coordination of resources (Winter, 2003). Meanwhile, through a persisted resources' preference, certain routines (Argyris, 1999, p. 6) become institutionalized as organizational behavior (Schreyögg & Sydow, 2011). These institutionalized action patterns bind organizations' strategic choices (Arthur, 1994) for capability development paths (Helfat et al., 2007, p. 116-120). The extant literature refers to this phenomenon as path dependence (Schreyögg & Sydow, 2011; Sydow et al., 2009; Vergne & Durand, 2011). Still, in successful organizations, work routines continuously evolve through the learning of resources (Zollo & Winter, 2002).

Responding to the day-to-day work challenges through routinized actions entails continuous learning of the socially interacting humanistic systems (Argyris & Schön, 1996; Banathy & Jenlink, 2004; Cyert & March, 1992). Hence, business organizations create their future by learning continuously (Senge, 1990; Scharmer,

2009) the best match between their capabilities and the operating environment (Grant, 1991; Helfat et al., 2007; Porter, 1980; Teece et al., 1997; Teece, 2007, 2009). These organizations, therefore, purposefully develop and combine several capabilities to enhance their value propositions for earning and sustaining a competitive advantage (Barney, 1991; Helfat & Peteraf, 2003; Helfat & Winter, 2011; Teece et al., 1997; Winter, 2012). For example, organizations develop project portfolio management capability (PPMC) by combining many other organizational routines and capabilities, including project management (Crawford, 2006; PMI, 2013c; Rad & Levin, 2006).

Project portfolio management capability is about aligning projects with organizational strategy by creating a responsive decision-making environment (Killen & Hunt, 2013). Hence, project portfolio management embodies dynamic decision-making processes whereby a list of active projects is constantly updated and revised; new projects are evaluated, selected and prioritized; existing projects might be accelerated, killed or deprioritized and; resources are allocated and reallocated to the active projects. Accordingly, the philosophy of project portfolio management is oriented around organizational efforts to complete individual projects successfully while contributing to the long-term organizational success. Organizations endeavor to enhance their PPM success by adapting to the organizational strategy changes for a dynamic environment. Similarly, the dynamic nature of project portfolios is evident from the temporarily of portfolio components (each project or program is temporary). Such a dynamism is inherited to portfolios, for instance, by introducing a new project, closing a project, and rescheduling or redefining the scope of an existing project. This vibrant dynamism and consequent decision-making uncertainties entail a continuous evolution of PPM capabilities (Petit, 2011).

The strategic management literature segregates organizational capabilities as “operational/ordinary capabilities” and “dynamic capabilities” (Teece et al., 1997). In business organizations, these capability types aim at fulfilling their specific purposes (Helfat & Winter, 2011; Teece, 2012, 2014, 2014a). Ordinary capabilities perform business value delivery processes in an organization (Felin, 2012; Teece et al., 1997). Whereas, dynamic capabilities “*integrate, build, and reconfigure internal and external competencies to address rapidly changing environment*” (Teece et al., 1997, p. 516). Through dynamic capabilities, organizations build, integrate, reconfigure and transform their ordinary capabilities to maintain an “*evolutionary fit*” with the business environment (Helfat et al., 2007, Teece, 2007). Prominent scholarship on PPM capabilities (for example, Killen & Hunt, 2010, 2013; Petit, 2011) has been promoting the generalizability of PPM as a

dynamic capability for all business organization. However, the findings of the current PhD research does not support such prognosis.

In fact, Teece and colleagues (Teece & Pissano, 1994; Teece et al., 1997; Teece, 2007) developed the benchmarking framework for dynamic capabilities. These scholars explained that dynamic capabilities have the capacity (i) to sense and shape market opportunities and threats; (ii) to grasp opportunities and; (iii) reconfigure tangible and intangible resources. Through a nexus of sensing, seizing and reconfiguration and transformation activities, dynamic capabilities constantly rejuvenate organizational routines at a well-regulated pace. Dynamic capabilities align the pace of this reinvention with the changing business environment. Such a regulated rejuvenation guides organizations not only to invent but to innovate as well (Teece, 2007). Subsequently, an organization's competitive advantage is sustained by the dynamic capability guided rejuvenation of ordinary/operational capabilities (Eisenhardt, 2000; Teece et al., 1997). Further, like all organizational capabilities, dynamic capabilities purposefully develop and keep evolving (Helfat & Peteraf, 2014; Teece 2007, 2009, 2012).

Correspondingly, a manufacturing and services sector-based scholarship (Killen, 2008) found that PPM dynamic capabilities developed in organizational structures, processes and resources [competences]. Other studies by Killen (Killen et al., 2008; Killen & Hunt, 2010, 2013) believed in PPM development as a generalizable dynamic capability. These referenced scholarship embraced Teece and colleagues' (1997) conceptualization of path, position and processes to describe PPM as a dynamic capability. Resource *position* is the organization's resource base in a particular market and from an industry perspective, and it includes tangible as well as intangible resources. The development *paths* connect past, present and future decision choices of an organization. In their dynamic capability study, Zollo & Winter (2002) explained that the paths are related to organizational choices of what they want to know in the future and what they have learned from the past. The extant literature generally argued that organizational investments in learning mechanisms (by Zollo & Winter, 2002) are directly related to the performance outcomes of PPM capability (Killen et al., 2008; Killen & Hunt, 2010, 2013).

Further, drawing from Killen's ground-breaking scholarship (Killen, 2008; Killen & Hunt, 2010), Yvan Petit (2011, 2012) extended the dynamic capability hierarchy (Ambrosini et al., 2009) to PPM capabilities. Accordingly to these studies, PPM capabilities develop and operate at three orderly levels. At the first order, PPM dynamic capability enhance the operational capabilities to execute portfolio components. These capabilities make small adjustments to the routines and

resource capabilities to increase the efficiency of portfolio elements (projects and programs). The second order PPM dynamic capability has the ability to develop new organizational processes, routines and related governance mechanisms. Petit (2011) further theorized that the third level of PPM dynamic capability concerns the selection of portfolios and prioritizing them. At this level, leadership makes decisions to ensure portfolio budgeting and resourcing alignment with the vision, mission and corporate strategy. However, Petit expressed the limitation of his research (Petit, 2011, 2012) to understand the third level of PPM capabilities.

From a resource management perspective, dynamic capabilities are routines through which organizations competitively reconfigure their resource architecture (Helfat & Peteraf, 2003). Dynamic capabilities encourage collaborations among various organizational units and departments (Eisenhardt, 2000; Teece, 2016). Consequently, business routines coevolve to synergize the knowledge between cross-functional multi-hierarchical resources. For example, cross-functional teams with their diversified knowledge are instrumental to the success of new product development (Takeuchi & Nonaka, 1986; Teece, 1998). Dynamic capabilities enable an optimized integration of various knowledge resources to produce or improve the product and service project portfolio (Killen, 2008). An organization's dynamic capabilities further facilitate the efficient utilization of these resource combinations by the managers (Helfat & Peteraf, 2014).

However, strategic management and resource management theorists believe that all business organizations operate uniquely, even when delivering very similar products and services (Barney, 1991, 2001; Eisenhardt & Martin, 2000; Grant 1991; Helfat & Peteraf, 2003; Helfat & Winter, 2011; Teece, 2007, 2009). This uniqueness results from their idiosyncratic capabilities. Business organizations develop heterogeneously, and their unique capabilities become the source of competitive market positioning (Helfat & Winter, 2011). Accordingly, organizational capabilities are always idiosyncratic (Eisenhardt & Martin, 2000) because of the firm specific combination of interacting resources (Barney, 1991, 2001). Unique resource combinations as capabilities not only armor an organization against environmental changes but also position the organization to shape its business environment (Chmielewski, 2007). A superior understanding of valuable resources and idiosyncratic capabilities also leads to a more pragmatic strategy formulation (Grant, 1991; Helfat & Winter, 2011). Meanwhile, an organization may develop several capabilities simultaneously (Helfat & Winter, 2011) by orchestrating its limited resource base (Sirmon, 2011).

The dynamic capability concept has been very influential in explaining the superior performances that lead to a sustained competitive advantage (Teece et al., 1997).

According to Teece (2009), dynamic capability framework (Teece, 2007) bridges the outside-in view of a strategic organization (Porter, 1980, 1985) with the inside-out view of a resourceful organization (Barney, 1991; Grant, 1991; Penrose, 1959). By bridging these two views, it is possible to answer why some organizations are more successful in sustaining superior performances (Teece, 2007, 2012, 2014, 2014a). Therefore, due to this theoretical inclusiveness (Stefano et al., 2010), the last two decades' research on organizational capabilities has been dominated with a prioritized attention to formalizing the potential benefits of dynamic capabilities (Helfat & Winter, 2011; Wilden et al., 2016). A series of well-organized scholarship (for example: Eriksson, 2014; Peteraf et al., 2013; Stefano et al., 2010; Vogel & Güttel, 2013; and Wilden et al., 2016) has summarized the ever-expanding conceptual diversifications of organizational capabilities in this dynamic capability research-dominated era. Even with the all-known attention of academia, however, the literature's confusion about dynamic capabilities has only increased (Teece, 2016).

Today all-known organizational capabilities in literature are generalized as the dynamic capabilities of lower-order and higher-order (for example, see the recent work of Verreynne and colleagues (2016)). Similarly, some of the earlier research has either differentiated learning and knowledge-based capabilities as the real dynamic capabilities (Zahra & George, 2002), or otherwise as the processes of making dynamic operational capabilities (Eriksson, 2014; Vogel & Güttel, 2013; Zollo & Winter, 2002). Another genre of dynamic capability scholarship has focused on the individuals' cognition-based capabilities as dynamic capability micro-foundations (for example, see Helfat & Peteraf, 2015). The latest development, however, identified the short-term benefits of individual resource dependent capabilities and therefore, cannot be the sole source of sustained competitive advantage (Teece, 2016). More recently, other scholars have taken one step further to develop comprehensive models for generalizable dynamic capabilities. For example, dynamic marketing capabilities by Molina and colleagues (2014) and PPM dynamic capabilities by Killen & Hunt (2010) and Petit (2011). Furthermore, many other scholarship established a quantitative relationship between their aspired dynamic capabilities and their environmental performance (For example, in Wilden and colleagues (2013)). Whereas, the academia's confusion about dynamic capabilities kept increasing despite many worthy efforts.

Resultantly, a plethora of dynamic capability-guided scholarship has overwhelmed the strategic management literature. Still, academia's complaints about the scarcity of research focusing on the development of interconnected routines and capabilities remain relevant (Grant & Verona, 2015; Winter, 2003;). Therefore, in

this marathon of registering generalizable dynamic capabilities, the well-known literature confusion, for example, listed by Peteraf and colleagues (2013) and Stefano and colleagues (2014) has not been relieved. Today, neither a single uniformly acclaimed definition of dynamic capabilities exists in literature, nor has their (dynamic capabilities) role in organizational success been well-evidenced (Wilden et al., 2016). Although, there have been a few descriptions of field-tested dynamic capabilities, for example, the case study by Felin & Teece (2014). Still, several conceptual issues remained unresolved (Helfat & Peteraf, 2011, p. 1243). Therefore, relieving the literature disagreements on dynamic capabilities is still a scholarly challenge (Wilden et al., 2016).

Avoiding the wide-spread question of which of the organizational capabilities are classifiable as dynamic capabilities, let us simplify the organizational capability equation by focusing on the all-acclaimed, agreement in the modern literature, which is that organizational capabilities evolve with time through organizations' historical paths (Eisenhardt & Martin, 2000; Teece et al., 1997, Teece, 2012). Accordingly, the heterogeneous development of organizational capabilities, either ordinary or dynamic capabilities [see: Table 6], is due to their path-dependent nature (Helfat & Peteraf, 2003; Vergne & Durand, 2011; Winter, 2000). It is therefore that organizational capabilities are always idiosyncratic in their details (Eisenhardt & Martin, 2000), and their value to the business performance is context-dependent (Collis, 1994; Schreyögg & Kliesch-Eberl, 2007). This PhD research also recognized that the post-dynamic capability conceptualization (Teece et al., 1997) research has given limited consideration to the business environment affected context-specific capabilities (compare: Teece, 2016, p. 214). Meanwhile, those scholarship have been ignoring the work routines which also evolve through endogenous and exogenous shocks from operating environment (Garud et al. 2010; Pentland et al., 2012).

Business context-specific (Helfat et al., 2007) path-dependent development is also valid for dynamic capabilities (Eisenhardt & Martin, 2000; Helfat & Winter, 2011; Teece, 2007, 2009, 2012; Winter, 2012) because past success offers a legacy for future development (Teece, 2014a). However, if path dependence reflects organizational limitations of adapting to the changing environment (Arthur, 1994), then how it can be a critical condition for developing even the high-performing organization-specific dynamic capabilities? Moreover, how does the context specificity affect this path-dependent development of organizational capabilities? The literature is not fertile in evidencing these effects. This PhD research endeavors to address such questions.

1.2 Research Objective

This dissertation focuses on the increasing distress in the strategic management and resource management literature about organizational capability research. Accordingly, the principal objective of this PhD research is to understand the dynamics of organizational capability development process. In particular, the goal is to elucidate the interdependent development of organizational capabilities and their constituting routines. Certainly, the underlying mechanisms for organizational routines and capability development, especially in the field of strategy and organization management, have not been explained enough (Foss et al., 2012). This is especially true for the prevailing dynamic capability research, which has paradoxically focused on the potential performances, rather than the process of capability development itself (Helfat et al., 2007, p. 34). Because, explaining this process entails the identification of causal mechanisms affecting the interactive and interdependent development of organizational routines and capabilities. This interdependent development leads to organization specific ideosyncratic organizational capabilities.

Evolutionary economics (Nelson & Winter, 1973, 1982) underlines that individual resources collectively perform the capability routines. In practice, these routines involve multi-hierarchical and cross-functional resource coordination. Consequently, organizational capabilities are socially embedded constructs, and individual resources in an organization (including managers and leaders) often lack a comprehension about the capabilities and routines (Foss et al., 2012; Grant & Verona, 2015; Schreyögg & Kliesch-Eberl, 2007). Meanwhile, Sydney Winter offered valuable advice that the capability development mechanisms must be understood in their temporal and spatial settings (Winter, 2012). Stating differently, a pragmatic understanding of capability development was not likely through cross-sectional data and a quantitative analysis (Grant & Verona, 2015). Earlier, discrepancies brought by the quantitative measures of organizational capabilities, especially of dynamic capabilities, have already been identified (for example, in Verryne et al., 2016). Therefore, a longitudinal data collection would facilitate the identification of the local causalities (Miles & Huberman, 1994, p. 146-148) behind organizational capability development heterogeneity.

Organizational capabilities are complex constructs of context-specific path-dependent development. The strategic management and resource management literature lacks evidence on this context-specific path-dependent capability development process. Therefore, a subsequent objective of this research is to understand and explain the context specifically developing path-dependent organizational capabilities. Demystifying the impact of context specificity and path

dependency offers an invaluable opportunity to alleviate the literature confusion about dynamic capability conceptualization. However, it requires reaching to a case (business) organization which represents the phenomenon. And then a long-term observation of this phenomenon in the real-life settings must be ensured. This current PhD research has fulfilled these two conditions.

On the otherhand, a variety of guidance on the content of specific organizational capabilities is present in the extant literature. Capability maturity models are such an example of the available guidance. However, according to Grant & Verona (2015), a valid complaint about capability development research is the lack of in-depth explanation that how that content can be developed. Their further advice (Grant & Verona, 2015) was to demonstrate the development of a specific literature-known organizational capabilities [further explanations in Segment II of this dissertation]. These scholars believed that without such explication, the validity of the dynamic capability framework (see: Teece, 2007) will remain questionable.

Following the guidance from Grant and Verona (2015), this current research is limited to the project portfolio management (PPM) evolution as an organizational capability (PPMC). In the literature, PPM 'practices' are more frequent than PPM as an organizational capability. Wherein the available guidance on PPM capability has focused on the content and performance potentials (Killen & Hunt, 2010, 2013). These studies, like many other literature-known capabilities have been generalizing PPMC as a dynamic capability, and thus have ignored the process of PPMC development. According to these studies PPM dynamic capability is attained through the accumulation of experience and knowledge articulation and knowledge codification. Contrarily, by avoiding the wide-spread delusion of universally classifying PPMC as a dynamic capability, this longitudinal research has focused on investigating the context-specific path-dependent PPMC development process in a real case settings.

1.3 Research Questions

The overarching objective of this dissertation is to explain the context-specific path-dependent development of organizational capabilities. This objective is dividable in the following three sequenced research questions:

RQ1: How are project portfolio management capabilities (PPMC) developed in the case organization?

RQ2: *How do learning mechanisms effect the path-dependent development of organizational capabilities?*

RQ3: *How to explain the (idiosyncratic) development of organizational capabilities?*

The first research question (RQ1) addresses the literature limitations of evidencing the development process of the literature-known and already investigated project portfolio management capability (PPMC). Organizational capabilities develop over longer periods. Therefore, a retrodution-based process theory approach was used to understand PPMC development at three different entities of the case company. It entailed disentangling the temporal connectedness of events leading to PPMC development. This research approached the case data analysis to learn the interdependence of developing capability dimensions of structures, processes, and resources and their constituting routines.

Organizational learning processes/mechanisms are frequently discussed as dynamic capability enablers and antecedents (Eisenhardt & Martin, 2000; Eriksson, 2014; Zollo & Winter, 2002; Teece et al., 1997; Vogel & Güttel, 2013). The second research question (RQ2), therefore, has focused on explicating the effect of learning mechanisms on the path dependently developing organizational capabilities. Meanwhile, as distinguished from earlier research, this research deploys a system's view based three learning mechanisms that affect organizational capabilities. Furthermore, understanding the path dependence as a three-staged process, rather than a final '*locked-in*' state, facilitated understanding the effect of learning on the other self-inforcing mechanisms as well.

The third question (RQ3) is focused on developing an (analytically) generalizable explanation about capability development process. Herein, the adopted approach has been to develop an explanation by synergizing the findings related to the first two research questions (RQ1 & RQ2). Capabilities characterize organizations' intended performance potential, while also reflecting their past, present and future decision choices. Therefore, capability development process unfolds "*over time in a context*" (Pettigrew, 1997, p. 338). Organizations as social systems actuate mechanisms reinforcing capability development paths through positive feedback and negative feedback loops. However, these contextually actuating mechanisms produce heterogeneous outcomes (Sayer, 2000), and hence, organizational capabilities remain idiosyncratic in their details. This research endeavors to enlighten this development process by operationalizing system's thinking from a critical realist viewpoint. Answering to this question aslo involves developing an emergent theory (Eisenhardt & Graebner, 2007) of capability path dependence.

1.4 Research Process

This PhD is an independent research project, which though, had resource limitations; however, this restriction also offered flexibility for selecting a path with innovative choices for clarifying the literature confusion about the development of organizational capabilities. The prior professional experience of the researcher and the intellectual goals for gaining insights (Maxwell, 2013, p. 28) into organizational development have certainly benefited from this flexibility. Meanwhile, the selection of research philosophy (Chapter 2) was a decisive accomplishment in this research process, and it realized before access to the case data.

Critical realism based philosophy encouraged to question the extant literature's position on project portfolio management (PPM) as organizational practices. Whereas, the rare scholarships on PPM as organizational capabilities (Killen, 2008; Killen & Hunt, 2010; Petit, 2011) positioned PPM as generalizable dynamic capability across the firms and industries. This was in contradiction with the original conceptualization about the role of dynamic capabilities that are always organization-specific (Teece, 2007, 2009, 2012). However, following the available guidance (Killen et al., 2012) this PhD research initiated the data collection by conceptualizing PPM as a generalized dynamic capability. This delusion kept clarifying during the research process (Figure 1).

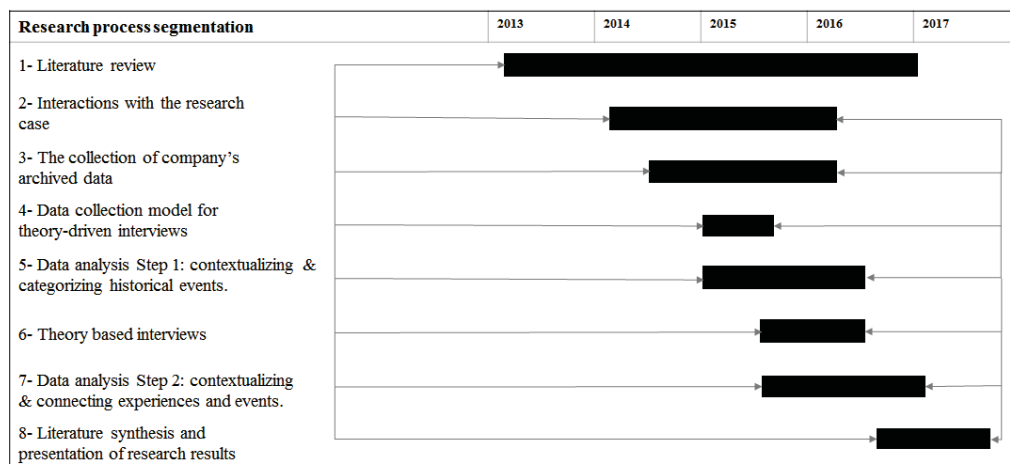


Figure 1. The PhD research process and timeline

With a critical case (Yin, 2003) in reach and intensive research design, the research process has based on a constant comparison (Bhaskar, 2014) between the case observations and literature guidance. It reflects a retrodution-based approach towards case data collection and analysis. Such process involves “*introspection and observation*” (Teece, 2014a, p. 335) and brings gradual clarifications to local

causality between the events and their underlying mechanisms. Practically, different segments of this research process overlapped until the completion of data analysis. For readers' convenience, Figure 1 illuminates the research process along with an approximate timeline. The forthcoming chapters of this dissertation have the essential details of research process segments in Figure 1.

1.5 Research Positioning

Business organizations' capabilities and their constituent resource work routines are the central constructs in evolutionary economics (Nelson & Winter, 1973, 1982). The conceptualization of organizational capabilities also accommodated its other analogous concepts, for example, competences (Marino, 1996). Meanwhile, in this expanding body of knowledge, organizational capabilities have been studied from various theoretical perspectives. Such identifiable extensions to Nelson & Winter's (1982) routine-based capabilities included resource knowledge application and integration based capabilities (Barney, 1991; Grant, 1996; Kogut & Zander, 1993). Another latest influential addition to the modern literature was organization-specific dynamic capabilities (Helfat et al., 2007; Teece, 2007).

Subsequently, an analysis of the literature (for example by Mulders, 2010; Stefano et al., 2010, 2014) highlights that resource-based view (Barney, 1991), knowledge-based view (Grant, 1991:1996; Kougat & Zander, 1993; Nonaka, 1994) and the behavioral theory approach (Cyert & March, 1963) influenced modern literature on organizational capabilities. In addition, the mutual inclusiveness of positioning view (Porter, 1980, 1985), the entrepreneurial resources view (Penrose, 1959), and the constructive destruction view (Schumpeter, 1934) have made organizational capabilities an important construct in strategic management literature (Teece, 2009). With all its inclusiveness, investigating organizational capabilities is demanding as it entails understanding business organizations' efforts toward the coordinated working of resources from different hierarchies and functions (Teece, 2016). Accordingly, this dissertation accepts that an organizational capability is the "*capacity to perform a particular activity in a reliable and at least minimally satisfactory manner*" (Helfat & Winter, 2011, p. 1244).

The current research investigates the development of project portfolio management capability (PPMC). PPMC is an organizational capability to manage projects, programs and portfolios in an integrative manner in order to align resource competences and performance with business expectations. PPMC also concerns learning competences, processes, and systems related to project portfolio management (Killen & Hunt, 2013). Although, the earlier prominent PPMC

investigations (Killen & Hunt, 2010, 2013; Petit, 2011, 2012) have considered the trendy approach of generalizing PPMC as a dynamic capability. Whereas, this PhD research has sought guidance from Helfat & Winter (2011) to limit the PPMC investigation as an organizational capability. Because a universal segregation between different capabilities of an organization is “*unavoidably blurry*” (Helfat & Winter, 2011, p. 1243).

This research also applied Winter’s (2012) idea that new organizational capabilities develop through the interaction of existing ones. It reflects that PPMC, along with its other constituents, also require project management capabilities to deliver its intended performance outcomes. This way PPMC and its constituents interact like any sub-system of a bigger organizational system (compare: Scharmer, 2009, p. 20). An organizational system actuates mechanisms for generating contingent outcomes (Sayer, 1992, p. 107) as the observable events. These observable events lead to our apprehension of capability development paths. Meanwhile, the systems’ structures which actuate the capability development mechanisms remain invisible (compare: Senge, 1990, p. 40-44) in the real domain of reality (compare: Sayer, 2000).

Hence, this approach offers PPMC investigation through system’s view of inter-dependently interacting parts of an organizational system (see: Figure 2). Interactively developing parts (sub-systems) of a system maintain its unique characteristics. Therefore, organizational capabilities remain idiosyncratic in their details. The need for system’s view based PPM research is well recognized (for example in Crawford et al., 2009; Locatelli et al., 2014; Pourdehnud, 2007; Sheffield et al., 2012; Teller et al., 2012). Because system’s view has potential to explain how a business organizational system and its sub-systems collectively learn from their historical paths to produce future choices. The role of literature identified learning mechanisms of a learning organization is central to this temporally and spatially connected development of organizational capabilities.

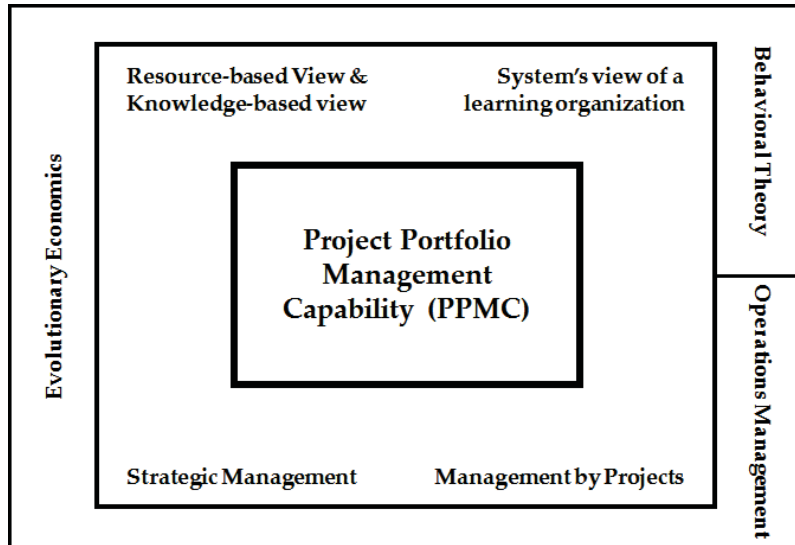


Figure 2. Theoretical positioning of the PhD research

Within its theoretical positioning (Figure 2), this PhD research seeks for a critical redirection (Conlon, 2002, p. 489) to organizational capability literature. It enables such redirection by explicating the phenomenon of path dependence as a process that affects the organizational capability development, rather than an irreversible state of organizational rigidity (Arthur, 1994). This redirection required context specific explanation of mechanisms (Harrison & Easton, 2004) which provide positive- and negative-feedbacks for development path reinforcements. This is a novel approach towards explaining the path-dependent development of organizational capabilities. It required synthesizing the prior research and theories to a critical realist model of organizational capability development. This model explains how learning organizations combine different learning mechanisms, including single-loop, double-loop, and triple-loop learning mechanisms, and maintain the peculiarity of their operations. Based on already validated prior scholarship the theoretical contributions of this PhD are of incremental nature (compare: Corley & Gioia, 2011). However, the novelty of this research offers revelatory scientific utility and practical implications. Those are briefed in the Chapter 11.

1.6 Research Limitations

The objectives, questions and the achieved contributions and implications of this PhD research directly focus on business organizations. Therefore, the longitudinal data for this research has been collected from a globally renowned industrial organization. Following guidance from Grant and Verona (2015), this data collection was limited to only one organizational capability i.e. project portfolio

management capability (PPMC). The case organization achieved PPMC development related critical achievements during the data collection periods. During data collection, this critical realist research recorded the important events which could have impacted the development of PPMC at the case company. However, it is accepted that collecting all such events could have not been practically achievable. Subsequently, this research remained its investigation only to the literature-known constituents (dimensions and routines) of PPMC.

Conducting a real-time longitudinal case study research is a demanding task. Including “everything” that connects with the capability development phenomenon, was beyond the scope of this research. Meanwhile, a long commitment to the research case helped to specify the limitations and exclusions so that the reader may focus and build on the operationalized theoretical arguments (compare: Siggelkow, 2007). Here again, the position of this critical realist research is that our theory laden explanations will remain short of revealing the whole reality. Since there is not a single theory that has potential to absolutely explain a phenomenon from our complex social systems. Therefore, the first limitation of this PhD research reflects its philosophical positioning. This research does not claim the absoluteness of its findings about the real world, which is always in the state of making (compare: Sayer, 2000).

A related limitation of this research concerns the anonymity of the case company and its experts, and the consequent impact on data usability for analysis and presentation of the case findings. For example, directly quoting the interviewed experts has been avoided. Similarly, the collected case data includes sensitive information, such as artefacts subjected to intellectual property rights (IPR). No such case specific information could be revealed publically. In short, the case evidence could be presented in a rather limited manner, mainly a few general illustrations [in Segment III of this dissertation]. Even to present those illustrations required concealing sensitive information and then seeking approvals from the case company.

Most of the interviewed experts have had a long work history with the case company. Their emotional attachment (Foss et al., 2012) with their work environment and company culture was intriguing. Similarly, the recorded events as well as the interviewed experts indicated about the leadership style (see similar advice in Teece, 2016) during the data collection periods. These behavioral factors would have been a valuable addition to bring another perspective to this research. However, collecting specific information about personal traits of the experts was not possible with the already agreed research collaboration limits. Furthermore, the literature on project portfolio management (PPM) also had limitations in

defining the best leadership style to support capability developments, especially PPMC. Henceforth, the theoretical positioning and consequent data analysis indirectly addressed the effects of leadership styles by investigating the collective phenomena of developing shared vision and mental models of leaders, managers and individual resources. This has been achieved through understanding the effects of various learning mechanisms.

An individual's capacity to learn is vital to the organizational learning (Crossan et al., 1999). Therefore, a noticeable portion of the earlier research has focused on individuals as the microfoundations to organizational capabilities (Felin et al., 2012), such as the managers' role in developing dynamic capabilities (Helfat & Peteraf, 2013). However, as mentioned previously, it was not possible to collect data about the individual experts of the case company. This limitation included data related to individual resource cognition, learning and other individualistic "psychological traits," which may have affected the capability development. Similarly, the demographic characteristics of individual resources and teams lead to varying cognitive orientation towards capability development were not included in the data collection. Interestingly, by the end of the research, the limitation was "a blessing in disguise." Using critical realism also alleviated the effect of this limitation by focusing on the context-specific actuation of learning mechanisms instead of depending on the subjective interpretation of experts. Meanwhile, not to forget that capability microfoundations as a research field has certain challenges that must be addressed (Barney & Felin 2013; Felin et al., 2015) before it can be used to comprehend the real-world phenomenon of capability development. Furthermore, individual resources, due to the socially embedded causal ambiguity and unobservable nature of organizational capabilities, can only limitedly comprehend the level of capabilities in their organizations (Foss et al., 2012; Grant & Verona, 2015; Schreyögg & Kliesch-Eberl, 2007; Winter, 2003).

Developing capabilities indicate a change to the organizational system (Winter, 2003). Explaining the development of capabilities is also possible by implementing change management models (for example, Kotter, 1995) or change management process theories (Van De Ven, 1995). However, this PhD research has focused on conducting processual analysis (Pettigrew, 1997, p. 340) of the major historical events of capability development (Teece, 2012) in the case company. The aim was to learn the path-dependent development or change of an organizational capability (PPMC). Instead of depending on the already tested-change management process theories (for example, in Lawrence et al. (2016) and Rungi (2015)), this research has operationalized the path dependency as a process driving changes (Schreyögg & Sydow, 2011) to organizational capabilities (Schreyögg & Kliesch-Eberl, 2007). Still, combining change management process theories (Van

De Ven, 1995) with the path dependency (Schreyögg & Sydow, 2011) may further elucidate capability development for organizational stability and change (Farjoun, 2010).

Literature prioritization on dynamic capabilities has established the pivotal importance of path-dependent development of organizational capabilities (Teece et al., 1997; Teece, 2007). Similarly, the phenomena of path-dependent development of organizational capability are at the crux of this PhD research. However, this research has remained limited to elucidating the path-dependent process with the help of self-reinforcing mechanisms. It was important to clarify that why organizational capabilities remain idiosyncratic in their details and some organization outperform others possessing the same capability. Meanwhile, this research has excluded discussions on declaring a capability as a dynamic capability in each organizational context. It has also avoided investigating sensing, seizing, and transforming activities central to the dynamic capability constructs, because this research aspires to clarify the literature confusion on dynamic capabilities (Stefano et al., 2014; Peteraf et al., 2013; Wilden et al., 2016). Whereas, building on already confused constructs would have led to undermining the valuable contributions this dissertation offers to the literature. Meanwhile, this PhD research has positioned so that all organizational capabilities, either ordinary capabilities or dynamic capabilities, are constituted from routines. These routines are only partially apprehended by the actors (Miller et al., 2012), as are the organization-specific dynamic capabilities. Accordingly, this research theorizes that sensing, seizing, and transforming are three organizational routines distributed among different organizational hierarchies (recently, David Teece (2016) has also taken a similar position). However, within the given resource limitations and already agreed protocols with the case company, empirical testing of these routines (sensing, seizing, and transforming) is left for future research.

The focus, thus, has been specifically on researching project portfolio management (PPM) as an organizational capability (PPMC). According to the capability investigation framework developed for this research (Figure 10), the development process of organizational capabilities is perceivable through a simultaneous investigation of capability dimensions, routines and performance outcomes. Meanwhile, critical realists believe that an all-inclusive explanation of the phenomenon is beyond an individual researcher's capacity. Therefore, only a limited routines and performance outcomes (see: Figure 12), though those are the most referred to in the literature, have been investigated in this longitudinal case study research.

Literature advice for conducting a real-time longitudinal case study as a future research extension and real-world verification of any large population (sample) based quantitative scholarship is ubiquitous. According to the most prominent research on organizational capabilities, a single case with prolonged involvement with the phenomenon is the best method to elucidate the traits of capability development process. Still, some scholars have questioned the generalizability of findings from such research. This critical realism research, however, does not seek a variance-based generalization of the results over a large population. Because such a study aiming at absolute generalizability requires a sufficiently enormous number of organizations with comparable designs in the diversified industries (Sydney Winter in Foss et al., 2012). This is not practical. Moreover, according to Sydney Winter, the “management *scholars are particularly ill-prepared*” for executing such a galactic research program (Foss et al. 2012, p. 194).

Meanwhile, this PhD research has successfully created a learning mechanisms-based capability development model (Figure 30). This model satisfies the criteria for analytical generalizability, which is the success of a critical realism research (Maxwell, 2012). Accordingly, the applicability of this model to the other business organizations shall require demystifying their capability development contexts (Helfat et al., 2007; Teece, 2014, 2016). Because capabilities and routines are idiosyncratic, and their development trajectories are heterogeneous across the firms (Jacobides & Winter, 2012; Rahmandad & Repenning, 2016). Meanwhile, it is accepted that establishing an acceptable description of the capability development phenomenon shall remain to the available research opportunities and to the cognitive capacity of the researcher(s).

1.7 Dissertation Structure

The eleven chapters of this dissertation are organized in four segments (Figure 3). The first chapter which introduces this dissertation is part of the first segment which is composed of two chapters. The second chapter is about the operationalization of research methods, including the philosophical stance, methodology (including strategy & design), case data collection and analysis, and research quality considerations.

The second segment of this dissertation includes three chapters of literature synthesis, as an outcome of retrodution-based logic (see: Figure 8). The development of the organizational capability investigation framework, based on capability dimensions, routines, and performance outcomes, has been explained in Chapter 3. In the same chapter, a theoretical framework drawn from the critical

realism based literature investigation of organization-specific dynamic capabilities has been proposed. This chapter also describes the central construct of path dependence as a change process and the effect of self-reinforcing mechanisms. The fourth chapter (Chapter 4) includes a literature synthesis framework (Figure 12) for investigating project portfolio management capability (PPMC) and at length explicates the framework constituents. This is a unique contribution to project portfolio management (PPM) literature. In addition, this chapter also identifies attention-grabbing shortcomings of the PPMC literature that has predominantly focused on promoting best practices. In the real world, these best practices are not able to repeat the same universally claimed performance outcomes across different businesses and organizational contexts. The fifth chapter (Chapter 5) discusses the limitations associated with extant literature about the organizational learning (related to organizational capabilities). This chapter describes the system's view based three learning mechanisms responsible for an idiosyncratic development of organizational capabilities.

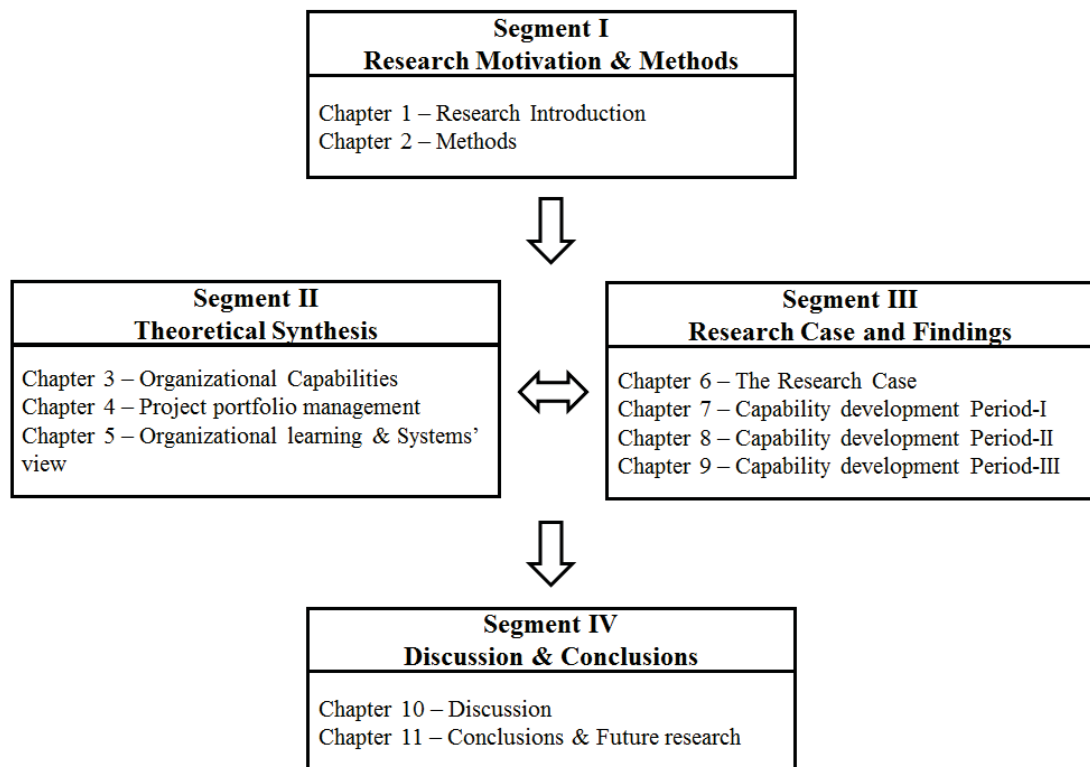


Figure 3. Dissertation structure

The third segment of this dissertation introduces the case organization and the research findings. In a retroduction logic-based research, the literature and case evidence corroborate each other (see: Figure 8). Accordingly, in this dissertation, the research case findings reinstate the literature synthesis chapters presented in

the previous segment. In this longitudinal process research, the development of PPMC has been analyzed through temporal bracketing strategy (Langley, 1999). Subsequently, the research case findings are presented in three chapters; each chapter explains PPMC development during a particular period (see: Table 4). These results account for a context specifically actuating self-reinforcing mechanisms (compare: Harrison & Easton, 2004).

The last segment of the dissertation is comprised of two chapters. Aiming at an analytical generalization, the first chapter (Chapter 10) of this segment discusses the research case findings. In this chapter, the learning mechanisms based capability development model was developed. Critical realism based discussions of the case findings purport the deployment of this model to the other organizational contexts (compare: O'Mahoney & Vincent, 2014, p. 18). The last chapter includes a research summary, contributions and implications, and future research directions.

2 METHODS

Methods reflect the ontological, epistemological, methodological choices, and the research paradigm which guide researcher's actions during the research process (Guba & Lincoln, 1994). Ontology is about the nature of reality (Denzin & Lincoln, 2011, p. 91) which is what a researcher intends to know about, in search for new knowledge about the world (Guba & Lincoln, 1994). Epistemology is about the "*relationship between what we know and what we see*" (Denzin & Lincoln, 2011, p. 91). Methodology is "*the best means for gaining knowledge*" about the world (Denzin & Lincoln, 2011, p. 91). Scientific research literature has developed acclaimed philosophical paradigms, each with intrinsic ontological, epistemological and methodological positions. Accordingly, critical realists acknowledge the limitation of all known research paradigms (in extant literature) to bring forth the absolute and complete truth about reality (Denzin & Lincoln, 2011; Maxwell, 2012).

The ontological, epistemological and methodological choices deployed in this scientific research have developed from critical realism. Ontologically, this research undertakes the evolutionary economist view that organizations administer their resources to develop various business capabilities (Nelson & Winter, 1982). Epistemologically, this research deploys Peter Senge's (1990) learning organization view to explain the path-dependent development of these organizational capabilities through three learning mechanisms. Such an approach was also suggested by David Teece (in Teece, 2007) whose contributions to organizational capability literature are amongst the most prominent (see: Teece et al., 1997; Teece, 2007, 2009, 2012, 2014, 2014a, 2016). Methodologically, this research deploys a retrodution-based process theory approach for the qualitative analysis of data collected from a longitudinal case study. The subsequent subsections of this chapter shall further detail the adopted methods.

2.1 Critical Realist Ontology & Epistemology

Critical realism is one extension to a dominant paradigm in social sciences research (Maxwell, 2012, p. 3), scientific realism, which positions "*the view that entities exist independently of our theories about them*" (Phillips, 1987). A critical realist researcher believes in the existence of a real-world independently from our knowledge about it, and posits that one can apprehend only a part of real-world based on the limitation of human knowledge. Further, the mental and physical phenomena are part of this world; it also involves the actors' (interviewed experts)

perceptions about a given situation and the researcher's mental models (Maxwell, 2012, p. 20). Consequently, critical realists share the positivist ontology and constructivist epistemology (Morais, 2011). Ontologically, a critical realist believes in the existence of world independently from our knowledge about it. While epistemologically, critical realists believe that our understanding of the world has been affected by the already available descriptions and discourses. Thus, the creation of our new knowledge about the world is always theory laden. The critical realist ontological and epistemological perspective "*instead of revealing reality through subjective constructivism,*" lets the reality itself guide the research process (Anderson & Kragh, 2011, p. 152-153).

This research understands that the world is characterized by emergence, in which physical and behavioral (social) objects are participatory through their structures and causal powers (compare: Sayer, 2000). Ontologically, a phenomenon is constituted from real, actual, and empirical domains of stratified reality (Figure 4, modified from Sayer (2000) and Morais (2011)). Herein, "the real" domain of this stratified reality consists of structures and causal power of objects and entities. This real domain of reality is directly unobservable. However, its existence and actuation are irrefutable. The structures from the real domain actuate causal mechanism under given contextual settings. These mechanisms are how certain entities exercise their causal power and create observable events in the actual domain of reality. The relationship between causal powers (or mechanisms) and their effects is not fixed, however, only contingent (Sayer, 1992, p. 107). In a given context, these causal mechanisms trigger in the real domain and engender observable events leading to the experience of a particular phenomenon (Sayer, 2000). In another context, a mechanism acts differently to produce different outcomes (i.e. observable events). Inversely, a single event can be the outcome of completely different causal mechanisms (Blundel, 2007, p. 51; Easton, 2010; Sayer, 2000). These causal mechanisms are not directly observable, whereas their generated events are observed as the subjective experiences of humans, and constitute the empirical domain of reality (Figure 4).

Accordingly, this research posits that an organizational entity actuates the causal mechanisms of capability development in the real domain of reality. The actuation of these mechanisms is organizational business context dependent, as are the outcomes (organizational capabilities) generated by the causal mechanisms. Therefore, an organization's capabilities always remain idiosyncratic in their details (its dimensions, routines, and performance outcomes). This research, therefore, understands that neither the capabilities development process nor do the developed capability in one organizational context can be perfectly imitable as "best practices" to another context (Orlikowski, 2002). Furthermore, in another

organization with a similar business context, dissimilar causal mechanisms can actuate to develop the same capabilities through a different development path. Hence, the capabilities with similar maturity levels, usually measured based on capability best practice models, shall correspondingly result in different performance outcomes. Consequently, a capability, developed through different paths due to actuated causal mechanisms and contexts, can take alternative roles in the organizational development (either as ordinary capabilities or dynamic capabilities) and contributes to its business performance accordingly.

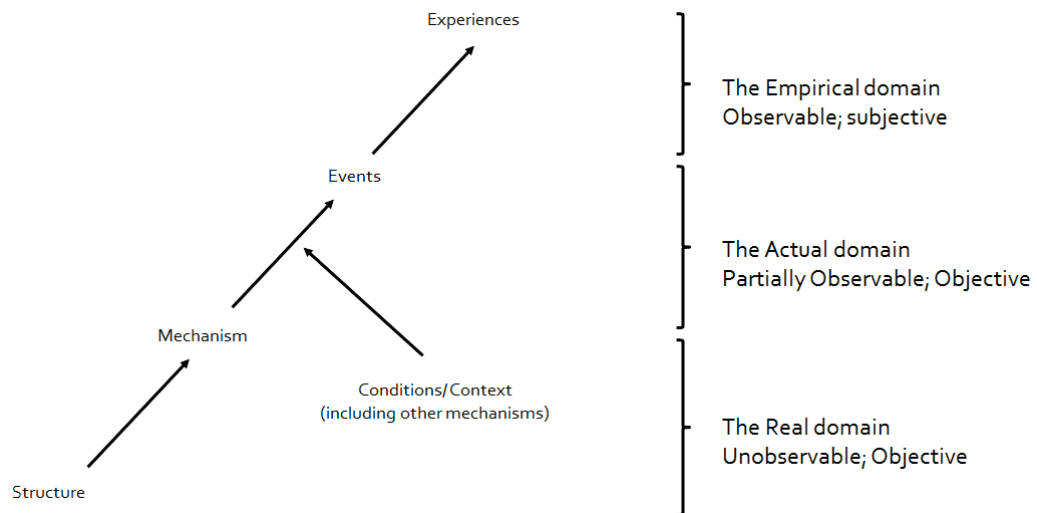


Figure 4. Critical realist's world view of stratified reality

The actuated causal mechanisms do not become obvious to the participants contributing to the development of organizational capabilities. Because these participants can only observe the temporally sequenced events as the generated outcomes of causal mechanisms. Their observation of these events depends on (their domain specific) subjective knowledge about the capability dimensions and routines (discussed in section 3.3.1). Accordingly, organizations' (expert) resources can imperfectly interpret the causes of these events. Meanwhile, their interpretations are based on the limited exposure to certain capability routines and performance outcomes. The critical realists aim to further clarify the reality by explaining the capability development causal mechanisms through observed events and the experience of expert resources in the case organization (Table 1). Accordingly, a retrodution-based process theory approach was adopted to explain this capability development process in the case company (The Company Alpha) and its two business divisions.

Table 1. Organizational capability development ontology [modified from Center for Critical Realism (2017)]

Capability development	Observability		
	Domain of Real	Domain of Actual	Domain of Empirical
Causal Mechanisms	Yes		
Events	Yes	Yes	
Experts' Experiences	Yes	Yes	Yes

Critical realism has the capacity to explain empirical events through their causal processes (O'Mahoney & Vincent, 2014). Herein, the causal mechanisms and actuating contexts are inextricable parts of these causal processes (Ackroyd & Karlsson, 2014; Maxwell, 2012, p.36) which temporally and spatially tie-up the experienced events into investigated phenomenon. Maxwell (2013, p. 36) referred it as a process-theory approach toward building an explanation based on “*theoretical propositions*” (O'Mahoney & Vincent, 2014, p. 18). According to Miles and Huberman (1994, p. 146-148), such an explanation brings “*local causality*” by linking the events with the processes leading to a specific outcome, and it offers superior value to scientific research. This can be distinguished from positivism and empiricism, which remain limited to only outlining a phenomenon based on regularities and variance in empirical experiences (Maxwell, 2013; O'Mahoney & Vincent, 2014). In practice, explaining the above-described local causality (involving context and mechanism) requires close association with the phenomenon (Sayer, 2000). Accordingly, the later described methodological selections in this PhD research reasonably convene the ontological and epistemological choices discussed in this section (detailed below).

2.1.1 Retroduction

Determining the mechanisms responsible for organizational capability development process proved a demanding task [as it was cautioned by Pettigrew, 1997]. Because, it required an uninterrupted interplay between the case data and the extant literature. Essentially, such an approach is referred as retroduction which ensures the refurbishment of conditions (the context) by which the temporally sequenced events (in time and space) led to the investigated phenomenon (Blundel, 2007, p. 55): the development of project portfolio management capability (PPMC). In addition, retroduction enable a plausible explication of causal mechanisms through transfactual generalization (Morais, 2011, p. 72). Therefore, contrary to the induction or deduction based logic, retroduction is a “*mode of inference in which events are explained by postulating*

(and identifying) mechanisms which are capable of producing them” (Sayer, 1992, p. 107).

Retroduction entailed imagining an ‘all-inclusive’ model of mechanisms, “*which if it were real, would account for the phenomenon*” (Bhaskar, 2014, p. vii) of capability (PPMC) development in the research case context. Accordingly, this PhD research adopted retroduction as DREIC model of theoretical inquiry to guide the research process (compare: Bhaskar, 2014, p. vii) as follows:

[D] Describing (theoretically) the pattern of identified events related to the capability development process.

[R] Reproduction of logically disjunctive explanations about the alternative capability development paths.

[E] Eliminating the less compelling explanation through interpolation of applicable theories and case data.

[I] Identification of causal mechanisms that actuated during the data collection period in the research case.

[C] Continuously correcting the earlier findings along the data collection and analysis process.

Simply stating, this PhD research has operationalized retroduction as a meta-process to develop knowledge about capability development (compare: Easton, 2010). In practice it required adding appropriate theoretical insights to the case data (Hodgkinson & Starkey, 2012; O’Mahoney & Vincent, 2014, p. 18). It resulted in gradual enhancements to the researcher’s knowledge and required continuously revisiting the theory and the recorded events through interpolation (Anderson & Kragh, 2011). Earlier in literature, Teece (2014a, p. 335) has advised examining organizational capability development through “*introspection and observation*”. Such an examination obliges combining the deductive and inductive logics of qualitative inquiry: a critical realist retroduction-based approach (compare: Easton, 2010, p. 124). It entailed an extended engagement of the researcher with project portfolio management capability (PPMC) development process in the research case context (compare: Eriksson, 2014; Foss et al., 2012; Grant & Verona, 2015; Helfat et al., 2007, p. 36-38; Teece, 2014; Winter, 2012).

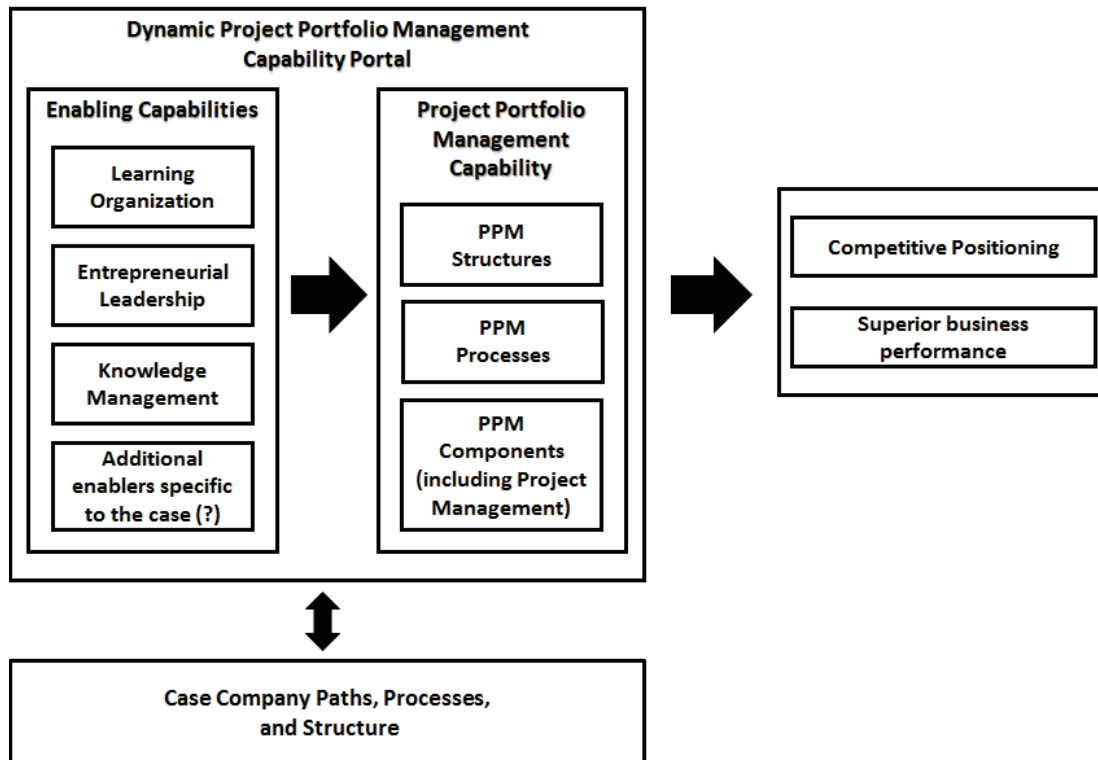


Figure 5. 'All-inclusive' model of mechanisms for PPMC development in the case company

For readers' understanding, it is important to specify that this 'all-inclusive' model (Figure 5) of capability development reflects the researcher's approach towards data collection. Because retrodution required imagining all those mechanisms (compare: Bhaskar, 2014, p. vii) which could have been responsible for the heterogeneously developing PPMC at TCA. Through introspection and case observations this model kept refining along with the researcher's knowledge about the phenomenon. Such a retrodution-based approach enabled the researcher to reach to a generalized framework for investigating organizational capabilities (Figure 10). Later, that generalized framework was populated to render PPMC through literature synthesis (Segment II) and presentation of the case results (Segment III).

2.2 Methodological Choices

The literature offered diversified methodological approaches for critical realist research (Edwards et al., 2014; Fleetwood & Ackroyd, 2004; and, Piekari & Welch, 2011). These critical realist methodologies deployed both qualitative and quantitative research inquires (as verified earlier by Ackroyd, 2004)). According to Sayer (2000, p. 19-22), critical realism qualitative inquiries are supported

through an intensive research design, and quantitative inquiries deployed in an extensive research design. Meanwhile, according to Teece (2012), research on the development of capabilities and their role (ordinary capabilities and dynamic capabilities) in an organization's performance is still at an early stage. Teece (2012) further advised that learning about capabilities requires qualitative approaches to do in-depth historical verifications about the interaction between different organizational entities. Therefore, this PhD research deploys a qualitative case study based on an intensive research design (Maxwell, 2013, 2012).

An intensive research design requires the long-term involvement of a researcher with the investigated phenomena and its surroundings (Easton, 2010; Maxwell, 2012, p. 43; Sayer, 2000, p. 21). Sayer (2000) confirmed the methodological choices that intensive research designs develop causal explanations based on connections between the structures of entities (unobservable as they presented in real domain and transformed with time) that generate causal mechanisms to perform the experienced events. Adapted from Maxwell (2013), Figure 6 sketches the research design of this intensive case study research, and the succeeding subsections contain the details and application of this design.

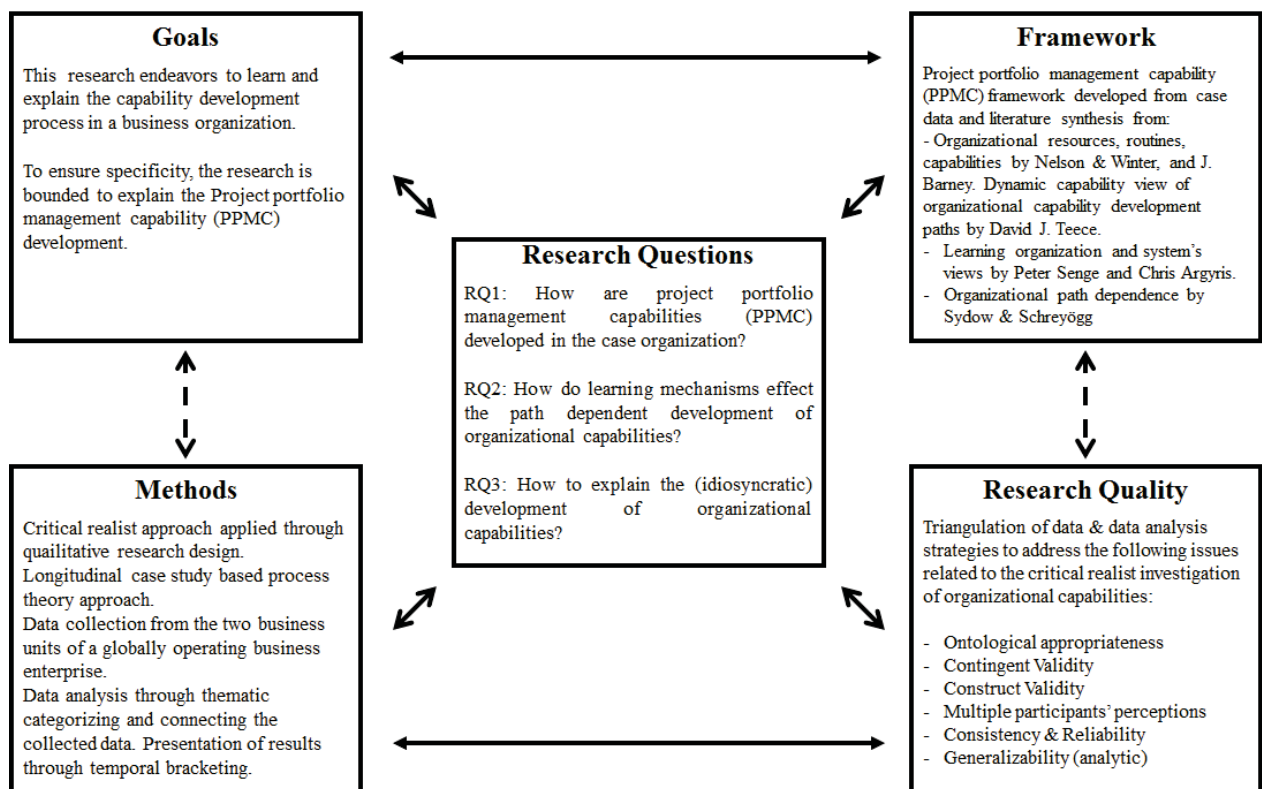


Figure 6. Research design map of the current PhD (based on Maxwell, 2013)

An intensive (qualitative) case study research design for this PhD was the outcome of a six-stepped selection by the researcher (comparable with Easton (2010)):

1. This research aspires to learn the development of organizational capabilities and specifically the development of project portfolio management capability (PPMC). Organizational capability development is a complex phenomenon and is considered as an under-researched area in strategic management literature (discussed in chapter 3).
2. The research questions aim at elucidating the process of capability development over a longer period. It entailed understanding the causal connections between the observable events and their underlying mechanisms in the case context. Therefore, a longitudinal process research approach was adopted (discussed in section 2.2.2).
3. The selected entities (the case organization and its business divisions) characterized the phenomenon of capability (PPMC) development. Equally important was the researcher's access to the case evidence of such development (discussed in section 2.3.1).
4. Data must be collected from multiple sources and in sufficient quantity to reach to the capability development causal mechanisms (discussed in section 2.3.2).
5. The retrodution-based approach toward case data collection and analysis demanded the researcher's flexibility to continuously revisiting the theory and the recorded events through interpolation. Because the researcher's knowledge about the phenomenon and underlying mechanism increased though a real-time interaction with the case organization over two (2) years (Figure 8 in section 2.3.2).
6. Epistemologically, critical realists believe in the imperfection of human knowledge. It is because the human-acquired knowledge is only explainable through the existing theories. Subsequently, these theories keep refining with the acquisition of theory-laden new knowledge, and later are used for acquiring further knowledge. Therefore, critical realist explanations about phenomena are based on the researcher's mental models that kept refining during the research process. Through retrodution, the aim has been to reach to the theoretically correct explanation about PPMC development process through synthesizing the extant literature (in Segment II). Meanwhile, the applicability of extant theoretical constructs was also learned during this retrodution based

research process (discussed in section 1.4). Hence, the explanations in this report qualify the criteria of “*judgmental rationality*” (Easton, 2010, p. 124). Furthermore, the research quality criteria has been maintained during this research process are discussed in section 2.5.

2.2.1 Case study research strategy

The prime focus of this critical realist research was to unravel the local causalities in a contemporary and complex phenomenon of organizational capability development. Moreover, rather than explaining the capability development process through the experience of interviewees [an aspiration of interpretivism/constructivism based research], it reached into the underlying mechanisms generating the historical events experienced by these interviewees. This entailed understanding and explaining the PPMC development process through richly contextualized data collection, in which the researcher did not have control over the investigated phenomenon. Therefore, a qualitative case study research strategy (Creswell, 2012) was methodologically a correct selection for this critical realist investigation of capability development process (compare: Ackroyd & Karlsson, 2014, p. 26; Grant & Verona, 2015; Maxwell, 2012; Teece, 2012). Case study strategy enabled a holistic approach towards the collection of richly contextualized data in a real-life case setting (compare: Creswell, 2012; Eisenhardt & Graebner, 2007; Piekkari & Welch, 2011; Yin, 2003).

Earlier recognized by Grant & Verona (2015), the research on organizational capabilities has lacked specificity in the details. Addressing this frequent complaint, the current research aspired to specifically detail the development process of project portfolio management capability or capabilities (PPMC) in real-life settings. One selection criterion ensured in this research was the case organization should have a history of developing PPMC. According to the most prominent research on PPMC, these capabilities take the role of dynamic capabilities. For example, Killen & Hunt (2010) who following Eisenhardt & Martin (2000) believed PPMC was an absolute dynamic capability. Whereas, Martinsuo and colleagues (2014) have contradicted this absolute stance. Therefore, the second criterion for the research case selection was to have permission for an investigation into different functions and hierarchical levels of the case company so to understand if PPMC developed as an ordinary capability or as a dynamic capability (see: Table 6). Impliedly, it also entailed investigating that if business divisions developed PPMC hetergenously even within a single business corporation.

Testing existing and acclaimed theories are accomplished in a critical case settings (Maxwell, 2013, p. 98; Yin, 2003, p. 40). Therefore, the selected research case could be a single organization with multiple business units where the development process of one capability (i.e. PPMC) could be investigated. Such a unique critical case was in the researcher's knowledge gained through earlier research projects. The access to this critical case is discussed in section 2.3.1. Meanwhile, the context of the selected case is discussed in Chapter 6 of this dissertation.

The selected research case company, The Company Alpha (TCA), is a multinational cooperation with globally operating multiple business divisions. Considering the time and resourcing limitations, only two of the business divisions, Delta Business Division (DBD) and Sigma Business Division (SBD) were selected for this research project. These business divisions have maintained obvious contextual similarities as well as differences with each other. One single case company and two of its selected business divisions [three investigated entities] included in this research led to an embedded research case design (Yin, 2003). These three investigated entities offered the extended data analysis possibilities and comparison. Meanwhile, it was possible to differentiate the dynamically changing contextual settings at two hierarchal levels in one single business corporation. Also, observing the impact of contextual settings on temporally and spatially connected events, and that how the experts (interviewees) experienced these events, has been an invaluable feature of this research.

2.2.2 Longitudinal process study

The development of organizational capabilities through its dimensions of structures, processes, and resources (people) (compare: Felin et al., 2012; Sirmon et al., 2007) renders organizational changes (Langley et al., 2013). This PhD research learned capability development as a temporally unfolding phenomenon (compare Siggelkow, 2007, p. 22) connected with historical choices, present performance, and future aspirations of a business organization (Langley et al., 2013; Pettigrew, 1987; Pettigrew et al., 2001; Van de Ven & Huber, 1990). Organizational development over time have been investigated through process-based studies referred throughout this dissertation. A process study aspires to understand the “*sequence of individual and collective events, actions and activities unfolded over time in a context*” (Pettigrew, 1997, p. 338). A process researcher ensures the spatial and temporal relationships between the key events and their connectivity with organizational realities, and develops process theories (Mohr, 1982). Notably, process researchers do not seek linearity between the cause and effect (see: Pettigrew, 1997; Langley et al., 2013), rather they appreciate the

system's view adopted in this research that cause and their effects are not necessarily connected in time (Senge, 1990). Therefore, unravelling the casual processes entails thinking about the phenomena of dynamically linked cyclic events rather than only linear actions in time (Langley, 2007).

In this process theory approach implemented through qualitative research, the researcher directly observed in TCA the capability development causal processes and experienced events (Maxwell, 2013) in their causal sequence over time (Van-de-Ven, 1992). These processes are patronized through mechanisms local to the organizational context (Maxwell, 2012; Pettigrew, 1997). Therefore, a qualitative researcher undertakes process-tracing approach to gain access to these causal mechanisms behind the investigated phenomenon (George & Bennett, 2005, p. 147). Meanwhile, a process study is complex to undertake as it requires an intensive involvement of the critical realist researcher with the dynamically unfolding phenomenon of organizational capability development (Pettigrew, 1990; Maxwell, 2012, p. 43; Van de Ven & Huber, 1990).

Understanding capability development through process theory is also recommended by prominent scholars of the field (Helfat et al., 2007, p. 147). This approach guided the researcher to focus on how and why PPMC capabilities evolved in different parts of TCA and its business divisions (similar guidance is in Langley et al., 2013). It helped in developing an understanding about why the capability development events evolved in a particular sequence and how contextually generated mechanisms led to particular outcomes (Soulsby & Clark, 2011).

Practically, this critical realist process case study required a long-term commitment with the PPMC capability development phenomenon in The Company Alpha (TCA) – a longitudinal study approach (compare: Blazejewski, 2011; Langley et al., 2013; Pettigrew, 1990, 1997). It was noted that the past events of capability development shape the present events and capability performance outcomes (Pettigrew, 1997). It was pertinent for explicating self-reinforcing mechanisms behind the path dependent development of capabilities. Hence, a longitudinal process case study with the researcher's continuous engagement with the case context was a vital decision during this PhD research which elucidates the underlying mechanisms of PPMC development (compare: Eriksson, 2014; Foss et al., 2012; Grant & Verona, 2015; Helfat et al., 2007, p. 36-38; Helfat & Winter, 2011; Maxwell, 2012, p. 43; Teece, 2014; Winter, 2012).

In this longitudinal process case study, the researcher approached richly contextualized temporal data through intensive access to multiple source information within the reach of researcher (see: Creswell, 2012; Pettigrew, 1990; Stake, 1995; Van de Ven & Huber, 1990; Yin, 2003). Real-time as well as

retrospectively collected data from The Company Alpha and its business divisions facilitated to understand the role of self-reinforcing mechanisms that led to path-dependent development of PPMC. Revealing the context-specific actuation of these self-reinforcing mechanisms is mission critical for a process study targeting organizational path-dependent development. Because these self-reinforcing mechanisms are responsible for generating positive feedback loops toward stability and locking-in a development path (Berthod & Sydow, 2013), or otherwise generating negative feedback for unlocking the existing path (Ericson & Lundin, 2013).

2.3 Data Collection & Analysis

Organizational capabilities evolve over longer periods (Helfat & Peteraf, 2003; Teece, 2007). Deeper insights into this evolution process entails the understanding of temporally sequenced events and their underlying mechanisms (Winter, 2012). This establishes the importance of starting point (in time) for recording capability development (Foss et al., 2012); meanwhile it would not be a critical realist claim to observe completely matured capability in an organizational system. Rather, it goes to the limit of establishing the evidence of persistent development to a point where capability dimensions, routines, and any of its performance outcomes can be observed by multiple experts facilitating the data delivery to the researcher.

For this purpose, the longitudinal case research approach facilitated the collection of events over longer periods that unravel the underlying mechanisms of capability development process. Longitudinal case data richness and specificity underlines the causal relationship of operationalized theoretical constructs (Siggelkow, 2007). However, this requires an expansive engagement with the case, so to directly or indirectly observe the phenomenon of PPMC evolution. During this continuous engagement, data was collected real-time as well as retrospectively (Blazejewski, 2011) from the case company and its two business divisions. The focus was on the path-dependent development (Pettigrew, 1997) mechanisms for project portfolio management capability (PPMC) development.

This engagement resulted in collection of longitudinal data including the events experienced over the period of more than nine years (9) years, starting from 2007 and finishing during 2016 (Figure 7). The retrospective data collection covers the first seven years, and the real-time data collection lasted for over two years after seeking the formal approvals from the case company. The real-time data collection simultaneously accomplished from both the business divisions and the corporation [three investigated entities at the case company]. Reiterating that a

retroduction-based approach was adopted for data collection and analysis. Consequently, such a simultaneous data collection (from both the divisions) had been facilitating the development of the researcher's knowledge about the phenomenon under investigation. This was because what was learned from one division was utilized for clarifying the theoretical constructs and searching for related empirical evidence from the other division, and vice versa. This simultaneous data collection also facilitated identification and comparing the actuated mechanisms at different hierarchical levels, as these two divisions had very similar (from products and technological knowledge perspective) legacy of the parent company, which was inherently an OEM (original equipment manufacturer).

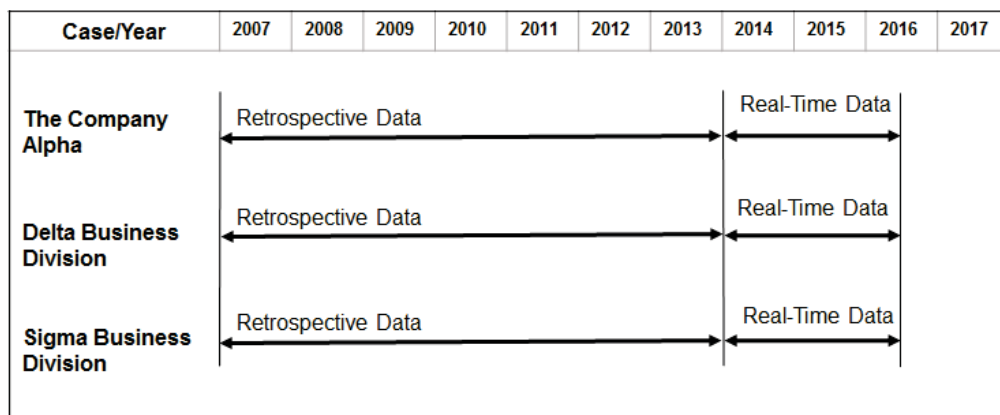


Figure 7. PPMC development longitudinal data collection timeline

Critical realism can take into account “*the actual beliefs, values, and dispositions*” of the organizational entities (Maxwell, 2012, p. 97). During the data collection and data interpretation using a critical realist approach, a researcher develops mental models which are integral to the organizational reality (Easten, 2010; Sayer, 2000). The interplay between data collection and literature using retroductive logic brings clarification to these mental models. Meanwhile, the duration and quality of interaction between the researched and the researcher is crucial (Maxwell, 2012, p. 43). This interaction impacts on the extent of the reality revealed through the researcher's mental models. Therefore, it is also important to explicate the connection between the researcher of this PhD research and the researched entities.

2.3.1 Research case, and researcher's site access

Ealier, a research collaboration with the case company was first established during 2011. It involved conducting a joint research about project management

leadership. This research was facilitated by a former PMO expert in Sigma Business Division (SBD) of TCA. The rapport that developed during the first research project led to another research collaboration during 2012, however, this time with Delta Business Division (DBD). This second independent research was about organizational process development, and it required the researcher to work with a team of experts from different business divisions of TCA. The researcher observed unusually good cooperation between the business divisions and support functions of TCA. During the course of this second collaboration opportunity, the researcher perceived PPMC development being realized as the strategic intent of TCA (compare: Hamel & Prahalad, 1994).

Later during the development of this PhD research proposal, high quality information gathered from the earlier research projects with TCA led the researcher to identify this organization (TCA) as a critical case (Eisenhardt & Graebner, 2007; Yin, 2003) for this PhD research. The sufficient confidence level developed with the gatekeepers at the case company (compare: Yin, 2003) was also considered an opportunity to gain access to the research sites. The presence of a critical case made the research case selection process rather convenient and minimized the risk of the case not representing the investigated phenomenon (compare: Fletcher & Plakoyiannaki, 2011; Grant & Verona, 2015). Furthermore, the phenomenon under investigation in the PhD research was special to the case organization as it involved understanding two of the company's most important core capabilities, i.e. organizational project management and integrating complex product systems (Söderlund & Tell, 2009).

After a year from the initial contact, the PhD research facilitation understanding with The Alpha Company (TCA) was established. Accordingly, it was decided that TCA would not sponsor any part of this PhD research, but would facilitate arranging internal security clearances. It was also agreed that a certain number of interviews could be performed after receiving informed consent from the experts who were to be interviewed. The responsibility of the researcher was to maintain the anonymity of the research case and any of its experts and their discussions. Researcher had to also ensure that this PhD research and its consequences would not cause any risk or harm to TCA's business and to the interviewed experts. TCA required the researcher to store and use the archived data as per intellectual property rights (IPR) protection protocols at TCA.

After receiving the needed permissions and clearances, the researcher could access the research sites from the beginning of 2014. This was a period when the collection of direct observations (real-time data) from research sites was initiated. These field observations were frequent, and notes were handwritten during each

site visit. The gatekeepers were helpful in arranging access to the special events, meetings, and training sessions. At the research site, access to the experts was established through introductory letters emailed by the concerned leaders at TCA. These experts were not bound to contribute to this research, but did so only to the limit of their consent and availability. There were more than three incidents when experts refused to accept the requests for theory-driven interviews.

Like many other big corporations, TCA has developed IT (information technology) based controlled access to the databases and company intranet. The researcher was allocated rights as an external consultant for project management. This enabled access to archived documents related to organizational development events and external evaluation reports, for example, the project management and project portfolio management maturity assessments etc. The access to the case company's intranet was also an important data source as the researcher could get the real-time business strategy and organizational development updates published for the case company's worldwide employees.

2.3.2 Case data (categories)

This PhD research utilized critical case data (Flyvbjerg, 2006; Miles & Huberman, 1994; Yin, 2003) about the project portfolio management capability (PPMC) development. With the necessary access to the research sites and archived data, the researcher collected richly contextualized temporal and spatial data from multiple sources (Creswell, 2012; Yin, 2003). Briefed later in this sub-section, the collected data is dividable into three main categories. Meanwhile, a retrodution-based logic of "*iterative correction of the earlier findings*" (Bhaskar, 2014, p. vii) was maintained throughout the data collection period. Such an approach required repeatedly consulting the extant literature, verifying the theoretic constructs through the critical case data, finding the causalities from real world identified in literature, identifying the literature limitations based on the real-world experiences, and proposing a more refined representation of the investigated phenomenon. A process-based research approach with longitudinal data collection facilitated this retroductive study of path-dependent organizational capabilities (Eriksson, 2014; Helfat et al., p. 36-38). Accordingly, the researcher knowledge about the investigated phenomenon kept increasing with time, as illustrated in Figure 8.

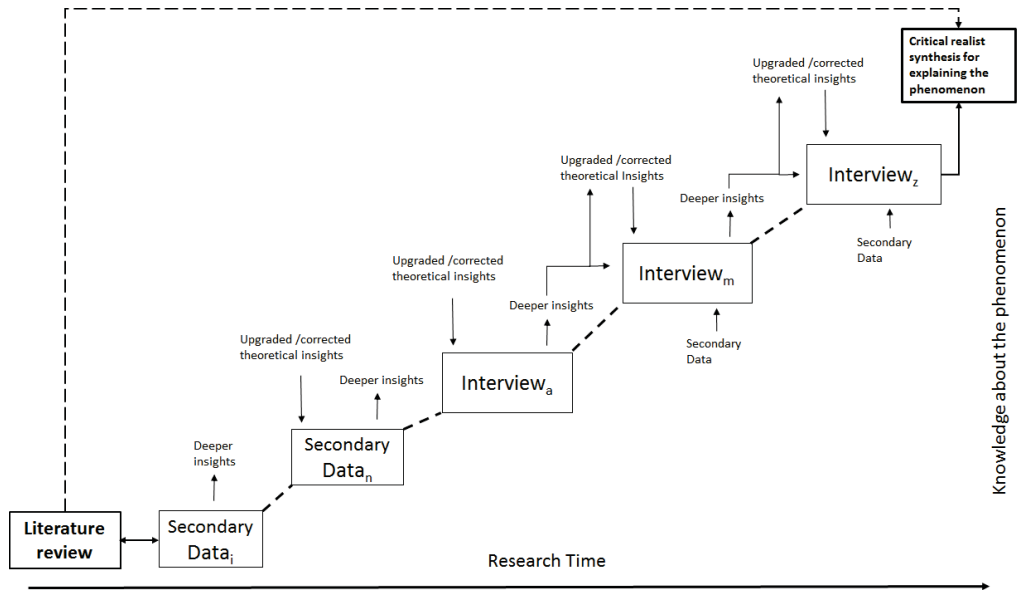


Figure 8. Retroduction-based researcher’s interactions with the case data and knowledge development about the phenomenon

[In Figure 8, “Secondary Data” represents the record of direct observations, archived documents, and participant observations. Meanwhile, the “Interview” represents the theory-based expert interviews.]

2.3.2.1 Direct observations

For the purpose of data collection, access to the research sites was authorized during the first quarter of 2014 (it is illustrated in section 1.4), and visits to the research sites began then. Each site visit lasted between two (2) hours to one (1) complete day. On average, one site visit per week could be realized, while these visits were more frequent during the second half of real-time data collection period when theory-driven interviews were being conducted. In fact, the researcher had already collected the publicly available information on TCA’s worldwide website before the beginning of site visits. Therefore, the researcher already had developed an outsider’s view (in this research context) about the company’s product and service offerings to the dedicated market segments.

During this period of site visits, which lasted for over two years, the researcher began to learn about in-house PPM practices and activities related to PPMC dimensions and routines, and how (only if) these practices were changing with time. These real-time observations recorded through the following:

- Informal discussions with employees in the corridors and coffee breaks;

- Participation in business (projects and portfolio) planning and review meetings;
- Participation in project PPMO meetings;
- Participation in project lessons-learned recording and review meetings;
- Participation in project management community of practice meetings;
- Participation in business strategy and result communication (to company employees) seminars;
- Participation in short training sessions as an observer;
- etc.

2.3.2.2 Documentations (including archival records)

Although limited, access to the archived data proved to be a real luxury. This access provided the initial evidence of what had been happening in the case company. The researcher started to apprehend the multiple internal and external causalities affecting the development of PPMC in TCA and its business units. With the help of gatekeepers there were, additionally, some documents collected that had been stored in databases previously not accessible to this researcher. With this, the researcher could develop a bigger picture (Figure 5) based on historical events and identification of causal mechanisms (or as said by Bhaskar (2014, p. vii), development of a model with “*disjunctive plurality of alternatives*”). This all-inclusive model had to be further clarified by further observations and interviewing the experts who had been experiencing PPMC development at TCA. The collected documents included the following:

- Minutes of various meetings about organizational project management;
- External assessments on project management and PPM practices;
- Academic research reports;
- PPM and project management policies, procedures, best practices and guides;
- Yearly development and training programs;

- Function-wise business performance plans, including the development of key performance indicators;
- Employee magazines, internal reports, presentations and online training materials;
- etc.

2.3.2.3 Expert interviews (Theory-driven approach)

The critical realists' "world is characterized by emergence" (Sayer, 2000). Accordingly, critical realists adopt constructivist epistemology of socially constructed knowledge about reality. It reflects the importance of experts' experiences in the development of knowledge about the investigated phenomenon. However, instead of interpreting reality through the experience of the interviewed experts (as followed in constructivism), critical realists combine the interviewees' experience with extant literature to reach to the causal mechanisms generating the events experienced by interviewed experts – looking in the literature through experience of others, and *vice versa*. It is because "*people are always knowledgeable about the reasons for their conduct but in a way which can never carry total awareness of the entire set of structural conditions*" (Pawson, 1996, p. 302). Therefore, critical realist data collection is about letting the reality itself guide the research process (Anderson & Kragh, 2011), and a theory-driven interview approach thrives this data collection process (see: Smith & Elger, 2014; Pawson, 1996).

Critical realists' theory-driven interviewing approach gradually clarifies the reality through expert accounts and enables to reach into the underlying mechanisms (Smith & Elger, 2014). Meanwhile, the researcher's mental model about the investigated phenomenon gradually refines, and complements the available knowledge about reality (Pawson, 1996, p. 304-305). Herein, the selection of key informants who on-ground contributed to the PPMC dimensions related decision-making and operationalizing PPMC routines was very critical. The list of such potential experts was prepared during the direct observations and by examining archived documents. This list included experts who were working in the case company and few those who already had retired. However, the theory-driven interviews (Table 2) were conducted with the experts working in the company (not retired or switched to the other companies). Meanwhile, the researcher also managed several informal discussions in corridors and coffee breaks with the listed as well as unlisted experts.

Table 2. List of experts participated in theory-driven interviews

#	Structural role in the case company	At the case company	Interview Duration (rounded to the closest 5 minutes)
1	GM OPM	> 16 years	1 hr 45 min.
2	Program Manager	> 26 years	1 hr 25 min.
3	Director OPM	> 30 years	55 min.
4	Functional Director	> 12 years	1 hr 05 min.
5	Functional Director	> 34 years	1 hr 05 min.
6	Functional Director	> 34 years	1 hr 45 min.
7	Director OPM	> 20 years	1 hr 30 min.
8	PPMO Head	> 12 years	1 hr 05 min.
9	GM OPM	> 22 years	1 hr 30 min.
10	Director Strategy	> 20 years	1 hr
11	Functional Manager	> 18 years	30 min.
12	Functional GM	> 20 years	1 hr
13	Director OPM	> 26 years	1 hr
14	President	> 20 years	1 hr 05 min.
15	Development Manager	> 10 years	1 hr 20 min.
16	Functional GM	> 12 years	1 hr
17	Development Manager	> 20 years	35 minutes
18	Vice President	> 18 years	1 hr 25 min.
19	GM OPM	> 22 years	1 hr 05 min.
20	PPM Manager	> 8 years	1 hr 05 min.
21	Project Manager	> 6 years	55 minutes
22	Director OPM	> 24 years	1 hr 05 min.
23	GM OPM	> 22 years	1 hr 15 min.
24	PPM Manager	> 6 years	1 hr 45 min.
25	Functional Director	> 22 years	1 hr 10 min.
26	PPM Manager	> 8 years	1 hr 10 min.
27	GM Enterprise Architecture	> 18 years	55 min.
28	Functional Director	> 8 years	1 hr 05 min.
29	Vice President	> 26 years	1 hr 40 min.
30	Director OPM	> 20 years	1 hr 05 min.
31	Functional Director	> 26 years	1 hr 10 min.
32	GM PPM	> 16 years	1 hr 05 min.
33	Functional Director	> 6 years	55 min.
34	Functional Director	> 24 years	1 hr 05 min.

These interviews mainly included open-end questions about the knowledge of respondents related to past events and their impact on the present way of working (compare: Cox, 2007; Yin, 2003, p. 90-91). Remembering the past events and

context surrounding those events was not an easy task for the experts. Therefore, it was researcher's task to facilitate the recollections of the interviewees' past-memories. The archived documents from the company database were helpful in this "memory collection" support during the interviews. After looking at the past documents, reports, presentations and meeting memos, etc., the experts could express more details about these events, and sometimes could add to the archival information as well as provide the necessary documentary evidence.

The sequence of interviewing was also important and the researcher approached it through bottom-up approach of first discussing and interviewing the project management experts and then leadership. Each expert interview was a refinement to the already learned PPMC development process and led to a narrowing down of the themes for the next interviews (Johanson, 2011, p. 511). Reiterating that retroduction-based research approach required to simultaneously investigate both the business units and conduct interviews. It helped in refining the theoretical constructs about PPM capability dimensions at individual business unit as well as at the corporation-level of The Company Alpha. All these interviews were transcribed using a software (NVivo) for qualitative data analysis.

2.3.3 Data analysis

Critical realism endeavors to develop theory-laden contextualized explanations about real-world phenomena. Implicitly, the analysis commences with the data collection, as was the approach adopted for this research. Longitudinal case data collection facilitated critical realist's understanding about how the reality unfolded over time in the case context, because, "*the surroundings associated with the phenomenon,*" its context, are in itself a part of reality (Johns, 2006, p. 386). Rather, there were different mechanisms present (as the researcher observed), while only a certain mechanism(s) may have caused the experienced events (Harrison & Easton, 2004). It also means that capability development mechanisms actuated in an earlier context would have not been actuated in the later context. Therefore, the research data analysis was required to reveal those contexts and the actuated causalities through a retroductive approach of "*what must the world be like for knowledge of the world to be possible?*" (Center for critical realism, 2017). Such an approach of simultaneous literature screening, data collection, and data analysis established a plausible explanation about context, causal mechanisms, and their generated events, i.e. the phenomenon been investigated (Figure 9).

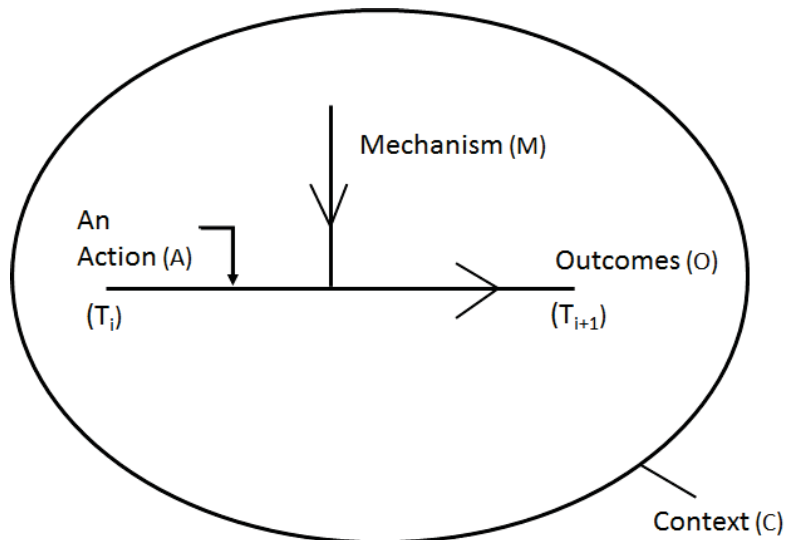


Figure 9. Basic elements of realist explanation (combined from Pawson (1996) and Ackroyd (2004))

This research also understands that the apprehension of system structures and actuated mechanisms depends on the research participants' (interviewees') perception about the phenomenon, as well as on the interpretations based on the researcher's mental models (Checkland, 1981). While attaining an absolute and the complete picture of a system is never possible, rather, it was "*continuously approached*" (Banathy & Jenlink, 2004, p. 42) through retroductive logic. Therefore, during the data analysis, one prodigiously asked question was "*what made this possible?*" and then continuously eliminating the "*speculative explanations*" through consulting the case data and literature (Bazeley, 2013, p. 336). This PhD research combined qualitative data analysis strategies of contextualizing, thematic categorizing, and connecting (compare: Bazeley, 2013, p. 283; Maxwell, 2012, p. 119; Smith, 1978). According to Maxwell (2013), the connecting strategies are based on contiguity relationships between the data portions through contextualization. On the other hand, the categorization is about fracturing the data for comparison and grouping.

Instead of data coding (which is considered to be a common approach towards qualitative data analysis), this research categorized data into themes, because thematic categories offered the possibility to combine theoretical coding with the analytic reflection of the researcher (Bazeley, 2013, p. 191). Thus, instead of fracturing data into codes based on the data collection model (Figure 5) which could involve decontextualizing, data manipulation and recontextualizing (Maxwell, 2012, p. 111-115), this critical realist research constructed thematic categories (Bazeley, 2013, p. 192) to maintain the original context, which was part

of project portfolio management capability (PPMC) development at TCA. These thematic categories were required to be refined during the data collection process, and new themes were also included. These contextualized themes were then used to identify relationship between the indexed events and experiences reported by the interviewees. The utility of data sources for performing analysis is presented in Table 3.

Table 3. Case data utilization for analysis

Case data category	Utility in data analysis		
	Contextualizing	Categorizing	Connecting
Direct Observations	Yes	Yes	-
Documentation	Yes	Yes	Yes (only indexed events)
Expert interviews	Yes	Yes	Yes

It is already established that organizations are evolving dynamically and thus, the capability development process data is comprised of events sequenced over longer time (Van-de-Ven, 1992). Analysis of such a temporally embedded case data requires that the connection between the recorded events and the consequent explanation of their reinforcing mechanisms should be done through periodization (Harrison & Easton, 2004). Accordingly, temporal bracketing strategy (see: Langley, 1999) was adopted to segregate the recorded events of capability development within three (3) interconnected successive periods (Table 4).

Table 4. Temporal bracketing of case data and applied analysis strategies

Periodization of PPMC Evolution	Temporal Bracketing	Data Collection	Data Analysis Strategies
Period I	2007-2009	Retrospective	Contextualizing, Categorizing, and Connecting
Period II	2010-2012	Retrospective	Contextualizing, categorizing, and connecting
Period III	2013-2016	Real-time + Retrospective	Contextualizing, categorizing, and connecting

To maintain comparability at the business-division level, these periods do not reflect a specific contextual relevance (compare: Harrison & Easton, 2004). Furthermore, these periods are not “phases” that reflect certain level of development or capability maturity level (compare: Langley, 1999). Such an

approach was helpful to understand the experienced events within the stimulating contexts, and also examining their effect on the contextual settings for actions taken during the next periods. In practice, capability development is a non-linear dynamic process. Herein, the temporal bracketing of longitudinal case data enabled the researcher to identify the discontinuities (as highlighted by Langley et al., 2013) in this development process through connecting the experienced events (by experts) with the self-reinforcing mechanisms of path dependence discussed in the chapter 4 of this dissertation.

2.4 Theorizing Capability Development Process

Theorizing from case studies is ubiquitous in literature (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; George & Bennett, 2005; Piekkari & Welch, 2011; Siggelkow, 2007; Welch et al., 2011). Case study research design inspires new theoretical propositions as well as illustrate them in real-life settings (Siggelkow, 2007). Philosophical and methodological choices of a case study research lead to differentiated processes of theory building (Welch et al., 2011). The rationale behind critical realism driven theories is to reach the underlying mechanisms that are generating realities experienced by the actors in a specific context. Therefore, critical realism theorizing from single case study is to develop “*contextualized explanations*” (Welch et al., 2011, p. 745) about the investigated phenomenon through unobservable mechanisms.

Nevertheless, critical realists believe that no single theory has the potential to explain a phenomenon completely, and that our theory laden explanations remain short in revealing the whole reality. Therefore, investigating organizations through critical realism encouraged this PhD research to combine different theoretical lens and explain the capability development process – this is known as theoretical pluralism (Vincent & Wapshott, 2014). It requires a continuous search for complementarities between the applicable theories and developing and refining our world-views (Figure 5) in order to explain the impact of mechanisms on the events experienced by actors (Andersen & Kragh, 2011). Retroduction-based critical realist studies, therefore, well-suited to theorize from a single critical case and its embedded units (compare: Easton, 2010). Critical realist explanations deploy theoretical propositions that can be generalizable to the other contexts (O'Mahoney & Vincent, 2014, p. 18) and thus are suitable for emergent theory development (Eisenhardt & Gaebner, 2007; Langley, 1999).

Accordingly, this PhD research aspired to establish explanations, and an emergent theory of organizational capability path dependence that could be generalizable to

the other (business organization) contexts. However, being cautioned about the importance of specificity (compare: Grant & Verona (2015)) and time and resource limitations, this research was limited to investigating the development of only one literature-renowned organizational capability (i.e. PPMC).

Balancing between the requirements for specificity and generalizability is demanding. This balance was achieved with a retrodution-based approach towards the research case. Reiterating from the preceding section that retrodution allowed a simultaneous collection of data, data analysis and refinement of the applicable theoretical constructs from literature. Attending specificity, case context-specific mechanisms leading to PPMC development over the longitudinal data collection period were identified. Maintaining generalizability, a generalized framework for investigating the development of organizational capabilities has developed through literature synthesis (process demonstrated in Figure 8).

The case data was very intensive and there was no single framework (capability development) in literature that could adequately support to investigate the PPMC development process as it had been observed by the researcher. Because, it was being observed that one capability (PPMC) has developed differently in a single business corporation as well as its two business divisions. A major contribution of this PhD research; the capability investigation framework (Figure 10) was gradually discovered to its current formation along the case data analysis process. This framework includes capability dimensions, its routines and performance outcomes. Further, to attend specificity, the capability investigation framework has extended for PPMC development research (Figure 12). This framework was used to explain the case evidences with the help of temporal bracketing strategy. In the extant literature, these three features of an organizational capability have been rarely investigated together.

Critical realists pursue mechanisms and context-specific explanations (Harrison & Easton, 2004). While, it is believed that the development of capabilities follows the development path of their parent organization (Teece, 2007). This development path of organizations is shaped by the actuation of self-reinforcing mechanisms. Similarly, this research has elucidated the development of PPMC through context specifically actuating self-reinforcing mechanisms. Herein, a special focus has been given to the role of three learning mechanisms of a learning organization. Meanwhile, the theoretical generalizability about the role of these mechanisms is also an expected outcome of a critical realism study. This required developing a framework, and a model, to theorize the effect of capability development mechanisms on capability dimensions, routines, and performance outcomes. The

research case findings facilitated the creation of this learning mechanism-based self-explanatory model for capability development (Figure 30). This critical realism research generated model has potential to explain the actuation of different learning mechanisms in a given context and their effects on the path-dependent development of organizational capabilities. This model represents (compare: Whetten, 1989) the emergent theory of organizational capability development paths further explicated in Chapter 10. This is a major contribution of this PhD research; in literature, a simultaneous effect of these learning mechanisms on the organizational capability dimensions, routines and performance outcomes has not been elucidated earlier.

2.5 Research Quality

A single case study has been thought to be a powerful tool for unravelling underlying the mechanisms of World's complex realities (Siggelkow, 2007). Additionally, a rigorous multilevel research (Klein & Kozlowski, 2000) in the embedded units (Yin, 2003) of a real business organization can furnish verified explanations as well. Due to this powerful potential to challenge and falsify the simplified organizational theories (compare: Siggelkow, 2007, p. 21), single case based qualitative studies have been questioned for their rigor and quality (Gibbert, 2007, 2010). Meanwhile, it is well-noted that positivist criteria (Piekkari et al., 2010; Pratt, 2008) have been dominant in the literature for judging the quality of research based on other philosophical stances too (Healy & Perry, 2000). It is because that there is no single set of acclaimed conditions to gauge the rigor of qualitative studies (Pratt, 2008). This situation is not different for critical realism, which is relatively a novel philosophy for conducting organizational research (Easton, 2010).

In such a situation, this critical realism based PhD research establishes the credibility of its findings (Maxwell, 2012, p. 132) by combining quality criteria from case study research (Yin, 2003), realism (Healy & Perry, 2000), and organizational capability literature (Grant & Verona, 2015). Accordingly, Table 5 summarizes the quality concerns and the implemented protocols of this research. A briefing on each of these implementations follows.

Table 5. Research quality procedures

Quality Criteria	Key concerns	Implemented protocols
Ontological appropriateness	Research problem deals with complex social phenomenon	Capability development path dependence in the case company that is not explicable through a single theoretical lens. Making ontological assumptions explicit.
Contingent validity	Focus on underlying mechanisms rather than linear relationship between variables	Context-mechanism-outcomes based explanation through synergizing multiple theoretical lens (theory triangulation).
Construct validity	Quality of conceptualizing a separable organizational capability and the operationalization of the concepts during data collection	Literature verified conceptualization of PPMC. Multiple data sources, key informants, and direct observation based data triangulation. Interview transcripts verified by the experts (not all those who interviewed). PPMC development process verified by the case company.
Multiple participants' perceptions	Triangulation of a picture of reality	Key informants' identification, who expressed their meaning, intensions, and believes about PPMC development and performance at multiple entities of the case company.
Consistency (& reliability)	Methodological trustworthy; and case can be audited	Explicated methodological choices, process steps and timeline. Collection of context-specific evidence at a case company owned database.
Generalizability (analytic)	Generalization of the research findings	Embedded units and temporal decomposition of analysis fulfil replication logic. A critical case with explicated context around capability development phenomenon.

Ontological appropriateness

Organizational capabilities are complex social constructs, and their development process is dynamic too. Likewise, this research has distinguished itself by focusing on the capability development process rather than performance potential. Project portfolio management capability (PPMC) due to its cross-functional and multi-hierarchical resource (people) routines obscures the development process. The phenomenon of path dependence further complicates the analysis, as it is comprised of the connection between temporal and spatial experiences within the case company. Correspondingly, the critical realism stance of this research is well suited for unraveling the complexities associated with the path dependence development of PPMC (compare: Easton, 2010). Critical realists believe in theory-laden explanations of the apprehended reality. Consequently, this research has made its ontological assumptions explicit through a literature synthesis (compare: Healy & Perry, 2000).

Contingent validity

Contingent validity concerns understanding the mechanisms generating social realities (Healy & Perry, 2000). Contingent validity corresponds to the internal validity of a positivist research, which aims at a variance-based linear relationship between the cause and its effect (Healy & Perry, 2000). However, the goal of critical realism research is to explain the capability development process through a system's view of a learning organization. In our social world, the cause and effect are not linear, though their relationships are often cyclic (Senge, 1990). Therefore, the experienced outcomes are contingent due to the context specificity of generative mechanisms (Sayer, 2000). The contingent validity of this research, therefore, concerned taking into account the changes to the PPMC development context at the three entities of TCA. This study has endeavored to explain the effect of these contingencies. Meanwhile, from a critical realist's view, it is acceptable that contingencies are limited to the ontological assumptions taken from already tested constructs in the literature.

Construct validity

Construct validity provides information about the quality of conceptualization and corresponding data collection (Gibbert et al., 2008). In light of the guidance in the literature around organizational capability, the construct validity aspects of face validity and discriminant validity are relevant (Grant & Verona, 2015). According to Grant & Verona (2015), face validity concerns the appropriate conceptualization

of a literature-known organizational capability. Meanwhile, discriminant validity is about ensuring that the collected data corresponds to the constructs of the investigated capability, not the other capabilities in the case organization. Maintaining the construct validity of organizational capability research requires that resources (interviewees) be cognizant about capability contents and also about their own actions in the capability performance (compare: Grant & Verona, 2015).

In contrast with earlier research, this PhD research has modeled the PPMC capability constituents as dimensions (structures, processes, and people) and routines (governance, communication, and project management). Further, a detailed conceptualization of these dimensions and routines has been established through a synthesis of the literature. The interviewed experts recognized these conceptualized PPMC constituents. However, the in-house terminologies were different from that used in the literature. Consequently the relevant concepts were included into interview protocols and then discussed during the interviews.

According to Gibbert & colleagues (2008), construct validity is maintained, primarily, through case data triangulation. It involved direct interviewing and archived data collection (including internal reports, minutes of meetings, annual reports, externally published reports). In addition to the triangulation of sources, this research collected data through closely observing the phenomenon of and understanding the dynamic interaction of capability development events. These events were selected through real-time as well as retrospective data collection. A continuous and long-period interaction with the case company was invaluable because it enabled to reach the experts who had major contributions to the path dependently developing PPMC at the case company. Interviews were transcribed (by the researcher), and then commented on by the experts [except a few]. After the data analysis and compilation of this dissertation, case findings were shared with the case company. The representative expert at TCA affirmed that these findings had captured the reflection of their PPMC development process.

Multiple participants' perception

Multiple participants' perceptions (compare: Easton, 2010; Healy & Perry, 2000; Maxwell, 2013) and their accounts of PPMC development were collected because capabilities are complex, and their development cannot be fully apprehended by an individual actor (compare: Foss et al., 2012; Schreyögg & Kliesch-Eberl, 2007). Secondly, this multilevel research (Klein & Kozlowski, 2000) was envisioned to differentiate PPMC development at three different entities of a single case company. Seeking information from multiple participants who have been

developing and practicing PPMC routines. These experts could also express their awareness about the capability development (key) events across the case company. The participants reflected their intensions, beliefs, and perspectives (Maxwell, 2013, p. 146) on the PPMC development context, practices and performance within their own divisions, as well as the interdependence between different divisions and hierarchies of the case company. It was a vital to triangulate “*a picture of reality*” through others’ preception (Healy & Perry, 2000, p. 123).

Consistency (& reliability)

Achieving consistency in research (Grant & Verona, 2015) involves methodological trustworthiness (Healy & Perry, 2000) and reliability (Gibbert et al., 2008). Consistency is defined by whether the findings of the research can be replicated by other researchers following the same process. Thus, this chapter includes details of the methodological choices of this research. Available in the first chapter, the research process steps and timeline (**Figure 1**) of this retrodution-based longitudinal investigation (Figure 8) also supports replication in other case settings. Importantly, the chosen methodological choices and the consequent research process seeks to collect context-specific evidence about capability development process.

Meanwhile, trustworthiness also relates to the appraisal of research (Healy & Perry, 2000). Accordingly, a database of all collected documents and interview transcripts has been established and maintained at TCA. Due to the inclusion of IPR applicable documents and evidence, access to this database requires TCA’s authorizations. Moreover, to ensure anonymity, the recommendation of specifying the case company name (Gibbert et al., 2008), including direct quotes from specific experts (Healy & Perry, 2000), and explicating all the business context details has been ignored.

Generalizability (analytic)

Case study generalization is about the replication (Yin, 2003) and extendibility of the research to the other situations (Maxwell, 2013). The generalizability from qualitative research is comparable to the criteria of external validity of a quantitative investigation (Healy & Perry, 2000). However, in qualitative research, generalizability refers to the development of a theory which incorporates different situations (Maxwell, 2013, p. 141). Therefore, Eisenhardt & Graebner (2007) reinstated the need for a replication logic between similar or contrasting cases. The replication of findings is possible through multiple units of analysis, from either

independent cases or embedded units within one singular case (Yin, 2003, P. 51). Similarly, Langley's (1999) scholarship on theorizing from process data indicated that a temporal decomposition of longitudinal data into data analysis periods is equivalent to the replication logic (Compare: Eisenhardt, 1989). Each data analysis period is a unit for "*replicating the emergent theory*" (Langely, 1999, p. 703).

Specifically, Gibbert and colleagues (2008) argued that external validity or analytical generalizability is possible through conducting multiple units of analysis (cases), explaining in detail the case study selection process and the context of the case(s). The findings of this PhD research have been based on analyzing PPMC development at three entities of a single business corporation. Meanwhile, the longitudinal data was divided into three temporal periods. These protocols fulfill the replication logic for developing an emergent theory (Eisenhardt & Gaebner, 2007; Langley, 1999; Yin, 2003) of organizational capability path dependence. The learning mechanism-based capability development model (Figure 30) developed through this replication is a vehicle for generalizing the findings to new cases (compare: Yin, 2003).

Meanwhile, the selection of the case and its divisions was a result of theoretical sampling (Eisenhardt, 2007), wherein, the identification of a critical case (Maxwell, 2013, p. 98; Yin, 2003, p. 40) enabled testing the existing theories and offering new theoretical insights. Earlier, the sub-sections of this chapter detailed how the case was selected and how access to the research sites and data was accomplished. Finally, while keeping intact the case organization anonymity, the research case context has been detailed in a dedicated chapter (Chapter 6) of this dissertation.

SEGMENT II: THEORETICAL SYNTHESIS

3 ORGANIZATIONAL CAPABILITIES

Organizational capabilities are among the most widely researched areas in the strategic management literature. However, lacking a consensus on what constitutes an ‘organizational capability’, the known literature segregations have become further evident. This chapter revitalizes the strategic management literature by establishing a reproduction-based organizational capability investigation framework (Figure 10).

3.1 Organizational Resources

Penrose (1959, 1960) believed that any business organization is simultaneously a pool of resources and an administrative structure. Firm resources include the semi-permanently attached people, their competences and knowledge, and potentially productive tangible and intangible assets (Barney, 1991; Helfat & Peteraf, 2003; Teece, 2014a). Barney (1991) outlines the three interacting resource groups in an organization: *Physical capital resources* can include plants, equipment, machinery, and technology, as well as access and influential position in inbound and outbound supply chains. *Human capital resources* comprise firm’s training & experience, judgment & intelligence, and human relationships and organizational culture. *Organizational capital resources* comprise informal as well as formal planning, controlling, coordination and reporting systems, as well internal and external business stakeholder relations. The orchestration of these resources engenders various organizational routines and capabilities (Sirmon et al., 2007; Winter, 2003).

Business firms [Organizations] strive first to obtain the right resources (VRIN resources) and then systematically deploy them to generate economic rents (Barney, 1991; Helfat & Peteraf, 2003; Teece, 2014). The resource portfolio of a firm defines the upper bound of its value creation potential (Makadok, 2003). Superior understanding of the resources and consequent idiosyncratic (organizational) capabilities leads to more pragmatic strategy formulation (Grant, 1991). Barney’s (1991, 2001) resource-based view of an organization focused on the valuable, rare, imperfectly imitable and non-substitutable (VRIN) resources. Additionally, firm resources should possess durability and intelligibility (Grant, 1991). Successful organizations sustain their competitive advantage through these resources (Barney, 1991; Grant, 1996). Meanwhile, organizations continuously improve their VRIN resource through bundling mechanisms (Barney, 1991; Kraaijenbrink et al., 2010) of new capability building (Sirmon et al., 2007).

3.2 Organizational Routines

Business organizations are social systems (Argyris & Schön, 1996; Feldman & Orlikowski, 2011; Garud et al., 2011; Pentland & Rueter, 1994) where the *procedural*, *declarative* and *transactive memories* of individuals perform actions in a coordinated manner (Chen & Miller, 2015). This coordination of work activities has been referred as organizational routines (Miller et al., 2012). These routines are fixed responses of organizational resources to a defined stimulus or motivation—i.e., the existence of a business organization. Fundamentally, organizational routines are complex social interactions (Pentland & Rueter, 1994) of tangible and intangible organizational resources (Barney, 1991). These routines are the source of day-to-day work accomplished by organizations (Nelson & Winter, 1982). Therefore, organizational routines, and thus capabilities, are not mindless operations but an effortful accomplishment of interdependent resources (Deken et al., 2016). The dynamic interactions (Pentland & Rueter, 1994; Deken et al., 2016) of these routines generates economic benefits (Schumpeter, 1934), and develops VRIN resources (Barney, 1991). Organizations, therefore, evolve through the nexus of their interdependent routines (Nelson & Winter, 1982).

These routines also provide stability during the adoption of novelty (Deken et al., 2016) for capability transformations (Teece, 2007). Interacting routines constitute competences and skills grouped through the “*repetitive, [and] recognizable patterns of interdependent actions, carried out by multiple actors*” (Felin et al., 2012, p. 1355). This way it becomes habitual to perform routinized work tasks without detailed direction and supervision (Deken et al., 2016; Feldman & Pentland, 2003; Pentland et al., 2012; Nelson & Winter, 1982; Stene, 1940). Therefore, it is believed that routines penetrate the resource positions, processes, and structures of organization (Felin et al., 2012). Consequently, work routines are peculiar to an organizational system (Collis, 1994) and eventually establish the foundation for its competitive advantage (Barney, 2001). It is because the knowledge of organization resides in its routines (Nelson & Winter, 1982, p. 99).

Organizational routines hold **performative** and **ostensive** nature (Feldman & Pentland, 2003), and past performances are the central aspect of routine formation (Nelson & Winter, 1982). Organizational routines carry the **procedural**, **declarative**, and **transactive** memory of an organization (Chen & Miller, 2015; Felin et al., 2012; Miller et al., 2012). In an organizational setting, a work routine evolves through the four characterizing processes of *formation*, *inertia*, *endogenous change*, and *learning* (Pentland et al., 2012). Through these four characteristics, the organizational routines can exhibit repeatable and recognizable patterns of resource performances (Pentland & Rueter, 1994; Schulz,

2008). Therefore, organizational routines are localized, path- dependent, knowledge-embedded, context-specific, and so can be static or dynamic in nature (Foss et al., 2012). Routines structures remain unobservable and therefore the participants (contributing through actions) in an organizational routine understand the coordination of individual actions; however, they do so only partially and idiosyncratically (Miller et al., 2012).

Organizational capabilities are complex enough to remain unobservable *per se* (Schreyögg & Kliesch-Eberl, 2007; Winter, 2003). Therefore, organizational capability development investigation will benefit from observing the work routines (Nelson & Winter, 1982; Teece, 2012). Such an investigation will involve a temporal elucidation (Turner & Fern, 2012; Pentland et al., 2011) of ‘resources schemas’ as well as of complementarily and competitively interacting routines (Turner & Rindova, 2012). Resource schemas are mental models through which organizations understand resource competences and their interchangeability (Danneels, 2011) in each business context.

3.3 Organizational Capabilities

An organizational capability specifies the capacity and ability of resources “*to perform a particular activity in a reliable and at least minimally satisfactory manner*” (Helfat & Winter, 2011, p. 1244). Thus, capabilities are collection of work routines (Winter, 2013) that put organizational resources into actions (Barney, 1991; Winter, 2003). Comparing with the individual resources, organizational capabilities are potentially more durable and sustainable (Grant R. M., 1996). Individual resources will not be able to generate business desired economic rents unless they are purposefully bundled (Makadok, 2001) through the capability routines peculiar to an organizational system (Collis, 1994; Teece, 2012). Organizational capabilities also demonstrate the characteristics of buildability, maintainability, extendibility, transferability, leveraging, and phasing out (Felin et al., 2012; Helfat & Peteraf, 2003).

These capabilities are intentionally developed and attain maturity through practice, and can be transferred as per organizational business preference (Helfat & Peteraf, 2003). For example, project management as an organizational capability is buildable through various other capabilities (Morris, 2013a), including cost management capabilities, risk management capabilities, communication management capabilities, scope management, integration capabilities, time management capabilities, quality management capabilities, etc. Depending on market demands, organizations should be able to earn economic rents from these

individual capabilities, or otherwise bundle them as routines constituting project management capability. These individually bundled capabilities may reside in distinct organizational structures where individual agency and cognition influences the evolution of organizational capabilities (Foss et al., 2012; Helfat & Peteraf, 2015; Winter, 2012).

The intrinsically dynamic nature of business environments requires continual renewal of organizational resources and resulting capabilities (Teece, et al. 1997; Teece, 2007). However, organizational capabilities are “*complex, structured and multidimensional*” in nature, and so is their renewal (Winter, 2003, p. 992). Capability renewal necessitates resource orchestration (Teece, 2014; 2016), as well as processes of structuring, bundling and leveraging (Kraaijenbrink et al., 2010; Sirmon et al., 2007). According to Sirmon and colleagues (2007), capability renewal through *structuring* includes acquiring new resources, accumulating resources through internal development, and divesting less valuable resources, followed by the *bundling process* of resource combination and alterations to develop new capabilities for sustained superior performance in altered environmental settings (Barney, 1991). Through resource bundling, organizations learn new skills (Zollo & Winter, 2002) and pioneer multi-functional team synergies (Sirmon et al., 2007). *Resource leveraging* refers to bridging internal capabilities with external markets. This involves mobilizing, coordinating, integrating, and deploying resources for strategic business value (Sirmon et al., 2007) and extended customer value approach (Miller, 2002).

Strategic management literature highlights different organizational capability types (Collis, 1994; Winter, 2003, p. 991). However, the most distinguishable are the ordinary capabilities and dynamic capabilities of an organization (Eisenhardt & Martin, 2000; Teece & Pisano, 1994; Teece et al., 1997; Teece, 2007). According to Teece and colleagues (1997), ordinary capabilities make organizations live. And through its dynamic capabilities an organization builds, integrates, reconfigures and transforms its ordinary capabilities to maintain evolutionary fit with the business environment. In short, ordinary capabilities are about ‘*doing the things right*’, and meanwhile, dynamic capabilities focus on ‘*doing the right things*’ (Teece et al., 1997; Teece, 2014). Among others, one interesting position in the extant literature is the attainability of these two capability types.

Dynamic capabilities are built over time (path-dependent in nature) whereas operational capabilities can be bought from local markets (Teece, 2007). In other words, unlike operational capabilities, the dynamic capabilities of an organization are not sellable or transferable as knowledge-codified best practices. Inversely, the tendency of propagating each ordinary organizational capability as a universally

generalizable dynamic capability is also ubiquitous in literature. Such entanglements between ordinary and dynamic capabilities is well recognized in literature (see: Helfat & Winter, 2011).

3.3.1 Capability dimensions, routines and performance outcomes

Organizational capabilities as “*complex, structured and multidimensional*” (Winter, 2003, p. 992). These are routinized, socially embedded, and inherently observable latent constructions (Grant & Verona, 2015). Even organizations themselves often lack “*a well-articulated understanding*” of their capabilities (Schreyögg & Kliesch-Eberl, 2007, p. 928). Nevertheless, capabilities describe what organizations can actually work (Nelson & Winter, 1982). Therefore, organizational capabilities are only observable through their constituting routines (Nelson & Winter, 1982; Teece, 2012; Turner & Rindova, 2012) and routine performance outcomes (Grant & Verona, 2015). Sydney Winter (2003) observed the literature’s limitation on field-tested constructs of organizational routines and constituted capabilities. Afterwards, organizational capability scholarship further dispersed the consensus on capability and routine constructs, as the majority of those studies were dedicated to dynamic capabilities (Vogel & Güttel, 2013). While, Stefano and colleagues (2014) connects this disparity and diverging consensus to the observability of organizational capability scholars. This divergence in dynamic capability research will, however concisely, be further highlighted in the dynamic capability section (section 3.4) of this dissertation. Another thought-provoking disparity is the recent focus of capability research on microfoundations concepts (Felin et al., 2012), which itself has not reached sufficient maturity (Felin et al., 2015) to be deployed for testing complex social constructs such as organizational capabilities (Barney & Felin, 2013).

This situation is challenging for critical realism research, such as this current PhD study, which should flexibly approach the extant literature with a retrodution-based logic (Easton, 2010). However, it also offers an opportunity to review the following basics learned during the research process:

- Organizations are made of resources and administrative structures (Barney, 1991; Penrose, 1960)
- Organizations orchestrate resources to generate business value (Sirmon et al., 2007; Teece, 2016)

- Organizations perform actual work through routinized action of orchestrated resources (Nelson & Winter, 1982; Winter, 2003; Teece et al., 1997).
- Organizational routines are formed, learned, and changed through endogenous (Pentland et al., 2012) and exogenous shocks (Garud et al. 2010; Sydow et al., 2009; Vergne & Durand, 2011).
- Organizational routines carry the procedural, declarative, and transactive memory of an organization (Argote & Ren, 2012; Chen & Miller, 2015; Felin et al., 2012)
- Individual knowledge undergirds the performance of routines (Nelson & Winter, 1982; Miller et al., 2012)
- Several routines dynamically interact, complement, and compete (Miller et al., 2012; Turner & Rindova, 2012).
- Organizational capabilities are constituted from routines (Nelson & Winter, 1982; Teece et al., 1997; Winter, 2013) and other existing capabilities (Winter, 2012).
- Capability evolution is time-dependent and (business) context-specific (Schreyögg & Kliesch-Eberl, 2007; Teece 2012).
- Capability performance is observable through organizational routines and their outcomes (Grant & Verona, 2015; Winter, 2000).

In short, through its retrodution-based approach, this critical realist research learned that an organizational capability has (i) multiple dimensions of resource arrangements; (ii) these resources are activated through organizational routines; and (iii) capability performance is realized through routine outcomes. These findings led to the construction of frameworks based on capability dimensions, routines, and performance. A generalized form of this framework is in Figure 10. A step-by-step extension of this framework was further realized during the research process.

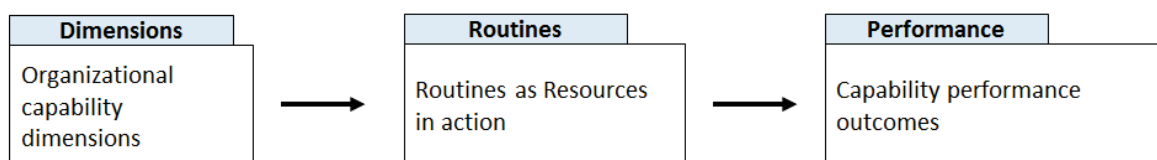


Figure 10. Retrodution-based generalized framework for investigating organizational capabilities

3.4 Organizational Dynamic Capabilities

3.4.1 Dynamic capability view (DCV)

In the modern strategic management literature, one of the most popular current research topics is dynamic capability view (DCV) (Peteraf et al., 2013; Vogel & Güttel, 2013). A systematic literature review by Moulders (2010) and Stefano et al. (2014) confirms the resource-based view (RBV) (Barney, 1991) rooted in the origination of the dynamic capability view of organization (Teece & Pisano, 1994; Teece et al., 1997). The pioneering scholar of this concept, David Teece, also establishes the intimacy of dynamic capability view (see: Teece, 2009) with a Schumpeterian view of organizational innovation (Schumpeter, 1934) and Penrose's view of entrepreneurial resources (Penrose, 1959). Additionally, Mulders (2010) and Stefano et al. (2014) also highlighted the incorporation of evolutionary theory (Nelson & Winter, 1982), knowledge-based view (Grant, 1996), transaction cost theory (Williamson, 1975), behavioral theory (Cyert & March, 1992), network theory (Granovetter, 1985), and positioning view (Porter, 1980, 1985) of an organization into dynamic capability scholarship. The motivation of the dynamic capability view was to highlight the source of sustained competitive advantage (Teece, 2007) – dynamic capabilities are about consistent market leadership (Teece, 1998).

During the last decade, a notable body of literature was dedicated to organizational capabilities research, with a stark focus on dynamic capabilities and their performance outcomes (Peteraf et al., 2013; Vogel & Güttel, 2013). Among those are also studies on the microfoundations of capabilities (Felin & Foss, 2005). A good example of such worthy attempts is a recently published article by Helfat & Peteraf (2015), who focused on individual cognition-based capabilities as dynamic capability microfoundations. Another such example is a study by Barrales-Molina and colleagues (2014) that developed a microfoundations-based framework for dynamic marketing capabilities. However, it was noted that the capability microfoundations approach is still in its construction phase (Barney & Felin, 2013; Felin et al., 2015). Therefore, attempts to explain dynamic capabilities through microfoundations, the role of agency, and performance impact on business outcomes remained unclear and confusing. According to Wilden and colleagues (2016) there is no unanimous definition of dynamic capabilities, and their role in organizational success is unclear (Wilden et al., 2016). Resolving these discrepancies remains a scholarly challenge (Wilden et al., 2016).

Another relevant study by Peteraf & Helfat (2013) noted that the majority of the literature on dynamic capability view is divided between two bodies of scholarship: the first by Teece and Colleagues (1997), and the second by Eisenhardt and Martin (2000). According to Peteraf & Helfat (2013, p. 1394), the major division is over (i) relevance of dynamic capabilities to the business environment change rate and (ii) ability of dynamic capabilities to first attain and then sustain a competitive advantage. Meanwhile, this PhD research confirms another major difference over the imitability and transferability of the dynamic capabilities of an organization (see: Teece, 2007, 2009, 2012). The resource-based view (RBV) position is that imitable and transferable resources and consequent capabilities cannot be a source of long-term competitive advantage (Barney, 1991, 2001). Imitable and transferable capabilities are sellable in the market as best practices; however, best practices cannot be source of sustained competitive advantage (Barney 1997; Eisenhardt & Martin, 2000; Teece 2007, 2012, 2014, 2016). In short, “*our understanding about dynamic capabilities and how they work is still incomplete*” (Teece, 2016, p. 214)

Is there any rationale to highlight the dynamic capability view and its discrepancies in this PhD research? Yes; it actually reflects the sole consensus in strategic management literature: dynamic capabilities are path-dependent and evolve from organizational histories (Eisenhardt & Martin, 2000; Teece et al., 1997). Understanding the capability path dependence is among the primary ambitions of this PhD research. Learning about the selected capability (PPMC) development in different business divisions of a single enterprise will enhance our understanding of the capability development process and its underlying learning mechanisms. Project portfolio management (PPM) is rarely studied in terms of organizational capabilities, and the available scholarship has generalized project portfolio management capability (PPMC) as a dynamic capability for any organizational system; their approach is closer to that of Eisenhardt and Martin (2000).

The preceding sections of this chapter further develop the generalized capability development framework (Figure 10) to understand dynamic capabilities (theoretical contribution for further development in future research) and the path-dependent development of organizational capabilities and self-reinforcing mechanisms.

3.4.2 Dynamic capability characteristics

What is a dynamic capability? According to Teece (2007, 2009, 2012), “dynamic capabilities are higher-level competences that determine the firm’s ability to

integrate, build and reconfigure internal and external resources/competencies to address, and possibly shape, rapidly changing business environment” (Teece et al., 1997, p. 516). Precisely speaking, Sydney Winter expected dynamic capabilities “to extend, modify or create” the ordinary capabilities of an organization (Winter, 2003, p. 991). It was further explained by Helfat and colleagues (2007) that dynamic capabilities maintain the fitness between organizational development and its business environment (referred to as evolutionary fitness).

According to Teece (2007, 2012, 2014, 2016), an organization’s dynamic capabilities take longer periods, possibly many years and decades, to develop. It is due to the ‘imperfect market factors and non-tradability’ of firm-specific resources (assets), which are always idiosyncratic in nature. Therefore, the dynamic capabilities of an organization are always (business) context-specific (Helfat et al., 2007, p. 7) and hence are also path-dependent (Eisenhardt & Martin, 2000; Teece et al., 1997; Teece, 2007). The articulated characteristics of dynamic capabilities are comparable to the ordinary capabilities (see: Table 6), and the relevant details are included in sections 3.5.1, 3.5.2, and 3.5.3 of this dissertation.

Table 6. Comparing some characteristics of operational and dynamics capabilities (learned from Teece (2016) and Teece (2014a) and Shuen et al. (2014))

Characteristics	Ordinary Capabilities	Dynamic Capabilities
Purpose	Technical efficiency of business functions	Achieving congruence with changing customer needs through technical opportunities and business environment
Attainability	Buy or build (adaptive learning)	Build (through generative learning)
(Tripartite) Schema	Operate, administrate, and govern	Sense, seize, and transform
Key routines	Best practices	Signature (upgraded) processes
Managerial Emphasis	Cost control for efficiency	Entrepreneurial approach to resource orchestration, leadership and learning
Priority	Doing things right	Doing the right things
Imitability	Relatively imitable	Inimitable
Focus result	Technical fitness (operational efficiency)	Evolutionary fitness (innovation through ongoing learning, capability enhancement and alignment)

Dynamic capabilities, context-specific and path-dependent in nature, are not acquired as best practices, but by the learned ‘signature processes and routines’ of an organization (Teece, 2014). Organizations learn these signature processes and routines from their development paths, processes, and resource positions (Foss et al., 2012; Teece et al., 1997; Zollo & Winter, 2002). Through its dynamic capabilities, a successful organization routinizes the sensing of opportunities [endogenous and exogenous shocks], seizing the most valuable opportunities through resource commitment decisions, and transforming its resource base to maintain evolutionary fitness (Helfat et al., 2007; Teece et al., 1997; Teece, 2007, 2012, 2014, 2014a, 2016).

In the recent establishment of the dynamic capability concept, the dynamic capability characteristics of sensing, seizing, and transformation are distributed between an “*organization’s managers, experts, and even line workers*” across organizational functions and hierarchies (Teece, 2016, p. 212). Hence, this PhD research learned that dynamic capabilities are not ad hoc activities, but are instead routinized actions of organizational resources. This is consistent with the earlier guidance from Sydney Winter (2003).

3.5 Dynamic capability Investigation Framework

The inconsistencies in the dynamic capability literature (highlighted in section 3.4.1) have been thought-provoking for this PhD study, which embraces critical realism-based retroduction research logic. Specific investigation of a generalized (ascribed) dynamic capability, PPMC, was first required to understand from the extant literature: (i) what are dynamic capability dimensions; (ii) what routines (and related activities) constitute a dynamic capability; and, (iii) what are the performance expectations from a dynamic capability? The answers to these questions are not elaborated upon in the extant literature, and thus are rather confusing.

For example, it is worthwhile to address confusion regarding the most peculiar features of dynamic capabilities: sensing, seizing, and transforming. Teece (2007) referred to sensing, seizing, and transforming individually as dynamic capabilities. Later in the same study (Teece, 2007, p. 1343), sensing, seizing, and transforming are mechanisms to direct resources. Recently, according to his most recent work (2016) sensing, seizing, and transforming are (i) processes; and (ii) routinized and non-routinized activities. Conducting a research on such contradictory, though complementing, arguments could have been an addition to the diverging scholarship of organizational capabilities.

Therefore, the case data analysis and thus the empirical findings of this PhD research (Segment III) have remained to the capability development process. This way a ‘*single-shot*’ approach of targeting performance outcomes adopted by most of the earlier scholarship on dynamic capabilities (also mentioned in Stefano et al., 2014) was avoided. Meanwhile, a reproduction-based dynamic capability investigation framework (Figure 11) development, therefore, remains a theoretical contribution of this PhD research and is an opportunity for future research.

Once more, the notion of ‘back to the basics’ was adopted to create a dynamic capability investigation framework (Figure 11) through literature synthesis. The following insights from the extant literature undergird this newly developed framework:

- Dynamic capabilities develop through resource positions, development paths, and organizational (signature) processes (Killen & Hunter, 2010; Teece et al., 1997; Teece, 2016).
- Dynamic capabilities determine the rate and direction of organizational assets (Teece, 2007; Winter, 2003)
- Sensing, seizing, and transformative activities are integral to the dynamic capabilities (framework) of an organization (Teece, 2007, p. 1344).
- Intended success from a business opportunity is a function of interdependent outcomes of sensing, seizing, and transforming (Teece, 2007, p. 1343).
- Dynamic capabilities have tripartite schema (three corresponding parts) of sensing, seizing, and transforming (Teece, 2016, p. 211).
- Dynamic capabilities are composed of three activity clusters of sensing, seizing, and transforming (Teece, 2014). These clustered activities are routinized and non-routinized (Teece, 2016).
- In practice, sensing, seizing, and transforming activity clusters can overlap but remain connected as interdependent loops (Teece, 2016, p. 212).
- Functions supported by “*routines and coordinated across all levels of the organization, are core elements of dynamic capabilities of firm*” (Teece, 2016, p. 208).
- This requires [business] context-specific development of dynamic capabilities (Barney & Felin, 2013; Felin et al., 2015; Helfat et al., 2007; Teece, 2016).

- Dynamic capabilities maintain the evolutionary fitness between organizational assets and business environments (Helfat et al., 2007; Teece, 2007).
- Dynamic capabilities view is rooted in a resource-based view of organizations. The foremost aim of the dynamic capability view of organization is to explain the basis of sustained competitive advantages of successful business organizations (Teece, 2007).

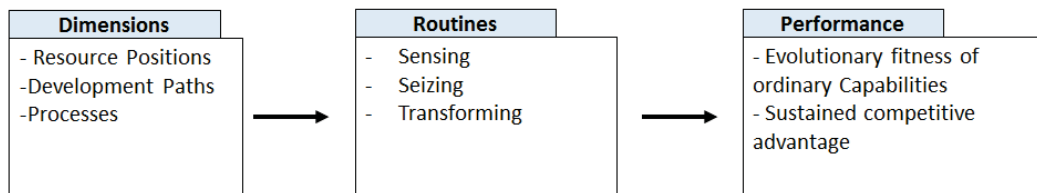


Figure 11. Retrodution-based dynamic capability investigation framework

Approaching the dynamic capabilities framework as a construct of interconnected routines is not new in the literature. A pioneering scholar of evolutionary economics, Sydney Winter, has contributed to developing the importance of routinizing dynamic capabilities (for example: Winter, 2003, 2012; Zollo & Winter, 2002). However, a little evidence of routinized dynamic capabilities (properties comparable with Table 6) is available in literature. Consequently, the routinizing scholarship diminished under the overwhelming influence of the best practice-based dynamic capability approach. According to Peteraf and colleagues (2013), the best practices school of dynamic capabilities followed a seminal paper by Eisenhardt & Martin (2000). Resisting the temptation to delve into the dominant dual and contrary concepts of dynamic capabilities (Peteraf et al., 2013), this PhD research continues its focus on the prime objectives and research questions.

The dynamic capability dimensions, routines, and performance-based investigation framework is explained in the proceeding sub-sections, with extended focus on the core activities (routines) of sensing, seizing, and transforming.

3.5.1 Dynamic capability dimensions

3.5.1.1 Resource positioning

Firm performance in terms of dynamic capabilities is dependent on its resources because the existing resource assets limit an organization's strategic position to react to endogenous- and exogenously-driven change needs (Teece et al., 1997). These resources include technological assets, complementary assets, financial assets, reputational assets, structural assets, learning assets, organizational boundaries, and market assets. However, most important are its VRIN resources (Barney, 1991; Teece, 2014). This PhD research could identify (through inferences from collected data, as no instrument for a meticulous evaluation was used) some of the VRIN resources in the researched case, Company Alpha. However, as these VRIN resources included assets with intellectual property rights (Barney, 1991; Teece, 2014), those are not discussed or analyzed for this PhD dissertation.

3.5.1.2 Processes (& signature routines)

The spirit of the dynamic capabilities generates from organizational processes driven by knowledgeable resources (Teece et al., 1997; Eisenhardt & Martin, 2000). Organizations learn through path dependence (Teece et al., 1997), and the resulting knowledge impacts sensing, seizing, and transforming activities (Teece, 2007). Organizations design signature processes to support dynamic capability activities (Teece, 2014), which develop heterogeneously and thus are imperfectly imitable (Teece et al., 1997; Barney, 1991). Therefore, these processes are not 'best practices'; however, these processes are continually learned over time (Teece, 2014). Teece and colleagues (1997) have identified three major mechanisms to be embedded in the organization's signature processes to support sensing, seizing, and transforming activities. Organizational learning, coordination/integration, and reconfiguration, combined with sensing, seizing, and transforming, streamlines the orchestration of organizational resources (Teece, 2007, p. 1341).

- i. *Resource coordination/integration*** promotes efficient and effective assembly of organization-wide activities. This is achieved by gathering, or what Sirmon et al. (2007) referred to as bundling resources into value creation processes. Coordination, therefore, is at the crux of competitive operations and sustained competitive advantage (Teece et al., 1997). Accordingly, the outperforming organizations strive to firm up the coordination between higher- level (strategic) and floor-level (operational) resources. It is important here to envision the *'congruence and*

complementarities' among the value-adding and administrative activities performed by resources.

- ii. **Resource reconfiguration** is only easier to accomplish if practiced frequently (Teece et al., 1997). Dynamic capabilities facilitate this continuous reconfiguration and transformation of ordinary capabilities. These changes can be incremental, as well as radical and discontinuous (McCarthy & Gordon, 2010). Mostly, organizations plan and realize changes through project management techniques (PMI, 2013c). Teece and colleagues (1997) favored decentralization and local autonomy-facilitated reconfiguration.
- iii. **Resource learning** retains the most important role for organizational capability development. Learning provides a common language (Grant, 1996, p. 116) to coordinate actions leading to reconfiguration and transformation of ordinary capabilities. Development of new capabilities, upgrading of existing capabilities, and their transferability is dependent on the historical learning. This PhD research accordingly includes a chapter dedicated to organizational learning.

3.5.1.3 Development paths

Dynamic capabilities are “*shaped by the legacy of the past and it also shapes the path ahead*” (Teece, 2014, p. 17). Organizational paths reflect the strategic choices (opportunities and constraints) made at a given point in time (Helfat et al., 2007, p. 116-120). Historical development may also narrow down the technological, industry, and market choice of the organization (Teece et al., 1997). Organizational history also outlines the learning choices made over time, maturity of capabilities, and development of competing routines, which increases organizational inertia and limits its ability to respond to the changing demands of customers and markets.

Does this mean that path dependence may lead to a *locked-in* state, leading to ultimate failure at some later stage? If not, then why is path dependence still important to the development of dynamic capabilities, whose prime role is to guide and direct the rate of organizational renewal (Winter, 2003). Later in this chapter, Section 3.6 includes discussion on the capability development paths. Earlier, this has not been clarified in the dynamic capability literature.

3.5.2 Dynamic capability specific routines

3.5.2.1 Sensing

Sensing refers to organizational capacity to identify opportunities that can be capitalized upon with controlled alteration and enhancement of the existing resource base. The cluster of sensing activities represents an ecosystem to search for opportunities while maintaining leadership in competition, and shapes the markets through differentiated products and services (Teece, 2009, p. 17). Teece (2016) claimed that in large organizations, the sensing and opportunity discovery process supported the established routines. Still, sensing opportunities is very relevant to the perception and attention of individuals (Helfat & Peteraf, 2015). It requires envisioning and interpreting the available information, and sensing weak signals mechanizing current market states and future possibilities (Feiler & Teece, 2014; Teece, 2007).

Sensing cultivates an entrepreneurial approach to searching for problems and then developing them into opportunities. The organizational aptitude towards opportunity recognition depends on learning customer relationships and then augmenting them. Opportunity recognition is to perform diagnostics (Teece, 2014a) and develop simple stories from complex situations (Rumelt, 2011, p. 81). It requires scanning, interpretative, and filtering skills at multiple organizational levels to sense the right opportunities and also make a collective sense of them. Therefore, sensing routines encompasses the complete value chain of an organization. It also implies that sensing is dependent on approaching customer needs (the customer value), learning possibilities, and developing and co-developing the firm's resources (Teece, 2014a).

3.5.2.2 Seizing

Seizing is about resource mobilization – a decision about the future customer value (Teece, 2014, 2014a) and the required knowledge to be assembled. Seizing selected opportunities with highest future value through resource orchestration necessitates decision-making skills (Teece, 2009, p.35). Seizing is about making the right decisions to balance and align future innovations with the existing abilities of organization by means of resources, processes, and structures. For seizing, it is important to collect and appreciate the most valuable opportunities, first by type-testing, and then by orchestrating resources accordingly (Teece, 2016). It is further recommended that these actions are supported by 'lean start-ups'. For example, in Company Alpha, it is done by 'failing fast' in technology

development and through ‘piloting’ in operational development portfolios. According to Teece (2014a), seizing activities are connected to both organizational guided policy, a “*method of grappling with the situation*” to apprehend the potential future actions (Rumelt, 2011, p. 84), and coherent actions that focus organizational energy (Rumelt, 2011, p. 87).

Organizational consensus-building through reasoning, problem-solving, historical performance, and analyzing future business risks are at the heart of seizing activities (Feiler & Teece, 2014; Helfat & Peteraf, 2015; Teece, 2007, 2012). Seizing requires investment of financial and physical effort put toward the sensed opportunities. Consequently, the decisions reached through seizing activities reflect the organizational strategic choices and its future market approach. Typically, seizing (or selecting) requires decisions about the following (Teece, 2007, p. 1329):

- i. The technological and functional features and the processes by which they should be incorporated in the product and service portfolio.
- ii. Business investments, cost structure, and revenue procedures to be designed and redesigned.
- iii. The customer value-capturing mechanisms, as well as the restructuring process involved to realize these mechanisms to be identified.
- iv. The evolved market segments after incorporating the selected technologies into customer solutions.

3.5.2.3 Transforming

Transforming is about strategy realization, which consists of performing actions and mitigating the associated risks (Feiler & Teece, 2014). Transforming activities aim at combing, synergizing, reconfiguring, and protecting organizational resources and adjusting the business models accordingly (Teece, 2007; Teece, 2009, p. 45). Respectively, dynamic capability driven transformation is about continuous organizational renewal (Teece, 2014a). Resource configuration in terms of “*appropriateness, timeliness, and efficiency*” is ensured (Pavlou, 2011, p. 243) to maintain evolutionary fitness of ordinary capabilities (Teece, 2007). Importantly, transformational activities respect organizational guiding policy and coherent action plans (Teece, 2014a).

Successful organizations endure transformation consciously and sub-consciously, and conserve structural and operational flexibility (Teece, 2016). Structural flexibility embraces innovation with minimal agency issues (Jensen & Meckling, 1976). Meanwhile, decentralized decision-making, empowerment, and co-specialization of tradable and non-tradable resource assets enhances organizational responsiveness (Prahalad & Hamel, 1994; Teece, 2007). According to Teece (2007), dynamic capability's transforming routines regulate the pace of resource reconfiguration, and preserve complementarities among organizational management systems, its assets, and business value contexts. Competitive advantage is sustained through complementarities, co-specialized assets, empowerment, and decentralized decision-making (Teece, 2007, 2016). In practice, transforming routines realizes long-term business sustainability (Teece, 2014a).

3.5.3 Dynamic capability performance outcomes

According to Barney (1991), ever-changing business environments can make VRIN resources less effective, and meanwhile organizational resources are always expanding. Business ecosystems, organizational capabilities, strategies, and business environments coevolve with this extension (Shen et al., 2014, p. 7). Organizations face varying levels of environmental dynamism in this evolution process (Eisenhardt, 2000), and the role of dynamic capabilities changes accordingly (Ambrosini & Bowman, 2009). Meanwhile, Helfat & Winter (2011) noted individuals' observation, expertise, and engagement-dependent apprehension of environmental dynamism. Whereas Klingebiel & Lange (2010) noted that environmental dynamisms and volatility for organizational actors is somehow static periods of varying length for strategic goals alignment (Mintzberg & Waters, 1985) and resource reconfiguration (Teece et al., 1997).

During these reconfigurations, dynamic capabilities ensure a good fit between strategy, VRIN resources, and business ecosystems (Teece, 2012). Dynamic capabilities achieve these reconfigurations in ordinary/operational capabilities through gauging their *technical fitness* and *evolutionary fitness* (Helfat et al., 2007; Teece, 2009, 2014). Through technical fitness, ordinary capabilities achieve higher operational, functional, and processual performances. Evolutionary fitness derives and maintains environmental alignment of planned performances with ordinary capabilities. A superior position in a dynamic environment not only enables the organization to provide benchmarking standards for its industrial boundaries, but also shapes the market requirements (Teece, 2007). Simply alternately, dynamic capabilities offer a collective inside-out and outside-in view

of the organization. Through this collective view, organizations renew their VRIN resources for long-term business success (Teece, 2014a).

However, the most compelling feature of dynamic capabilities is their ability to explain enterprise-level long-term competitive advantage (Teece, 2007), but as the historical analysis by Peteraf & Helfat (2013) suggests, dynamic capability performance outcomes are the most apparent junction in the diverging strategic management literature. Meanwhile, consensus remains limited with respect to dynamic capability's effect on the development of organizational resources and constituting ordinary capabilities (Winter, 2003). According to the literature analysis conducted by Eriksson (2014), only an indirect effect of dynamic capabilities on enterprise performance has been empirically supported.

3.6 Organizational Capability Development Paths

Organizational capabilities arise from historical developments and learning resources (Teece, 2014a). Organization-specific trajectories and the contingent development of organizational capabilities may lead to a '*sustained source of uniqueness*' and long-term value creation (Teece, 2007; Vergne & Durand, 2011) even in a quickly changing environment (Teece et al., 1997). According to Johnson (2007), the founding culture and its technological, economic, geopolitical, industrial and institutional resources limit organizations' future developments. Organizations realize their development within the limits of their existing culture and resources. Resulting capability development and trajectories, therefore, are always heterogeneous (Jacobides & Winter, 2012) and are constituted from ideosyncratic routines. Thus, capability performance outcomes' heterogeneity across different organizations is obvious, even though the development context (motivation) remains the same (Rahmandad & Repenning, 2016).

In the extant literature, the leading emphasis on capability maturity models is thought-provoking. As mentioned previously, Rahmandad & Repenning (2016) support that high performance is not achievable by only injecting best practices (already apprehended by Teece, 2012, 2014, 2014a), similar to the extant literature's characterization of project portfolio management capability (PPMC). However, the business-context specificity of capability development paths inscribes high-performing resource routines (Schreyögg & Snow, 2011; Teece, 2016). Therefore, path dependency remains the main feature of dynamic capability development (Eisenhardt & Martin, 2000; Helfat et al. 2007; Helfat & Peteraf, 2003; Jacobides & Winter, 2012; Teece et al., 1997; Teece, 2007, 2009, 2012, 2014, 2016; Winter, 2012).

This contradicts organizational capability development in that originally, the phenomenon of path dependence conceptualizes organizations' inability to adopt to new situations (Arthur, 1994). This contradiction between the continuous renewal of organizational capabilities and path dependence is well noted in the literature (Schreyögg & Sydow, 2011; Vergne & Durand, 2011). Meanwhile, it is also an opportunity to learn about capability development limitations, the context specificity of development, and motivation to attain resultant business outcomes. This PhD research understands that the capability investigation framework (Figure 10) based on capability dimensions, routines, and performance outcomes will be valuable in this regard.

Path dependence in its original conceptualization refers to a state where certain institutionalized routines become organizational behavior (Aaltonen, 2010; Schreyögg & Sydow, 2011; Sydow et al., 2009; Vergne & Durand, 2011). Hence, through path dependence, certain habits get locked-in as the organizational actors entrap in the system dynamics (Sydow et al., 2009, p. 691). However, this is not a single-shot effect, but rather a tri-staged temporal process of *pre-formation*, *formation*, and *lock-in* of organizational behavior (Schreyögg & Sydow, 2011; Sydow et al., 2009). During the *pre-formation stage*, many unpredictable action options are available for selection. A selection from these options “sets off” self-reinforcements for developing predictable patterns of action to follow (Sydow et al., 2009, p. 691). This is the start of the path *formation stage*, where self-reinforcements emerge from dominant action patterns. The temporal continuity of the formation stage makes the decision-making process irreversible until the lock-in stage is reached. In the *lock-in stage*, the action patterns become fixed through the ‘*deterministic characters*’ of increased commitment (Staw, 1984), which cause a loss of organizational flexibility (Sydow et al., 2009, p. 692). In fact, the path *lock-in stage* reflects the organizational intentions of making practices and routines more efficient over time. However, long-term preferences for similar actions will lead to a state where organizations struggle to adapt to changing market needs despite their willingness to do so.

Therefore, organizations are interested in avoiding the lock-in situations because of probable future inefficiencies, and must find a way to enable divergence and break their fixed paths. It is through changing organizational realities [according to the critical realist philosophical stance of this PhD research, mental models and shared vision are part of organizational realities], which provide exogenous shocks for alternate path formation (Garud et al., 2010; Sydow et al., 2009; Vergne & Durand, 2010, 2011).

In practice, these shocks are frequent and may lead to avoiding organizational lock-in (Vergne & Durand, 2011). Organizations through their resources vary in apprehending the rate and frequency of external (exogenous) shocks (Helfat & Winter, 2011). The most compelling of the apprehended shocks are then responded to through resource reconfigurations and transformations (Teece, 2007), leading to capability renewal, replication, or retrenchment (Helfat & Peteraf, 2003). However, shedding already developed capabilities (and routines) is least expensive through routinized actions (Helfat & Winter, 2011; Schilke, 2014; Winter, 2003). In this vein, the leading organizations routinize their ability to sense environmental conditions and seize resource commitments while transforming their future paths (Teece et al, 1997; Teece, 2007, 2016).

Thus, a continuous breaking of existing paths (Sydow et al., 2009) and creating new paths is an intentionally accomplished endogenous process (Garud et al., 2010). This intentional process is guided through the self-reinforcing mechanisms developed during the *path formation* stage. According to Garud and colleagues (2010) this intentionality requires learning-based self-reinforcement to establish a big picture about organizational activities, which is the virtue of the systems' thinkers (Garud et al., 2010, p. 764).

Self-reinforcement mechanisms are endogenously produced, automated stimuli to specific action patterns in any situation (Sydow et al., 2009, p. 326). Self-reinforcement mechanisms possess the dynamic capacity to generate positive feedback and negative feedback to the development of lock-ins (Alscher & Brauer, 2015; Garud et al., 2010). Awareness about the dynamics of self-reinforcing mechanisms (Sydow et al., 2009) directly impacts strategic choices along with organizational path development (Greve & Seidel, 2015). Thus, a learning-based (and actors' cognition-based) manipulation in the selection of self-reinforcing mechanisms should lead to avoiding lock-in situations while maintaining alignment with organizations' historical paths (Vergne & Durand, 2011).

3.6.1 Self-reinforcement mechanisms

Various descriptions of reinforcement mechanisms are available in literature (Sydow & Schreyögg, 2013; Vergne & Durand, 2011). However, the capability development path dependence discussion in this PhD dissertation is limited to the four categories of self-reinforcement mechanisms (Schreyögg & Sydow, 2011; Sydow et al., 2009) and, amongst these, the prime focus has been to elucidate the self-reinforcement through learning mechanisms.

- a. **Coordination mechanisms** of self-reinforcement generate efficient operations with lower costs. Coordination mechanisms reinforce path dependence through establishing unified rules to guide the behavior of organizational actors. More actors are willing to adopt and coordinate through rules due to certainty of reactions of the other actors. Organizations reduce the cost of operations through path dependence reinforcement from coordination mechanisms.
- b. **Complementary mechanisms** of self-reinforcement generate the economies of scope. Over time, organizations learn to exploit synergies between two or more of its resources, routines, and rules or practices. Organizations reduce the cost of their products and services through complementarity.
- c. **Adaptive expectation mechanisms** of self-reinforcement build interaction preferences in an organization. These mechanisms generate self-reinforcement to the normative behavior of following the same action patterns because of the prior performance of other individuals in the organizations.
- d. **Learning mechanisms** of self-reinforcement are central to the development of organizational capabilities, especially to those dynamic capabilities that are path-dependent in nature (Zollo & Winter, 2002; Eisenhardt, 2000; Teece et al., 1997) and cannot be bought directly from the markets (Teece et al., 1997; Teece, 2007, 2012, 2014). The degree of path dependence awareness has a direct impact on future strategic evolution (Alscher & Brauer, 2015; Greve & Seidel, 2015). According to Sydow and colleagues (2009, p. 703), learning mechanisms are most critical to path dependence. Their explanation is that the learned predictable actions are difficult to replace with other options because establishing new action choices may require additional learning investment to develop a newer pattern. However, these new action patterns may not be supported through other mechanisms of self-reinforcement. This PhD research understands that this approach to learning is driven by single-loop learning, whereas another study proposed to establish double-loop learning-driven capability monitoring to avoid the lock-in stage of path dependence (Schreyögg & Kliesch-Eberl, 2007). Similar guidance about path breaking through the double-loop learning is provided in recent research about multinational corporation investment decisions (Alscher & Brauer, 2015). In another study, Rockart and Dutt (2015) found that

capability development paths differ because organizations differ in their approach to learning.

This PhD research extends the role of learning mechanisms in term of path-dependent development of organizational capabilities. Therefore, this dissertation includes a dedicated chapter (Chapter 5) to understand organizational learning mechanisms from a system's view (Senge, 1990) and related constructs effecting path-dependent development of capability dimensions and routines.

3.7 Chapter Summary

This chapter synthesizes the extant literature on organizational capabilities. It has established that organizational capabilities always constitute from resource routines as a fixed pattern of response to attaining certain business outcomes. This led to the development of dimensions, routines, and a performance outcome-based capability investigation framework (Figure 10). In the following chapter, the utility of this capability investigation framework will be further demonstrated by explicating the dimensions, routines, and performance outcomes of project portfolio management capability (Chapter 4).

Furthermore, this generalized framework facilitated bridging the gap in the literature on dynamic capability conceptualization. This extant literature-based synthesis led to learning the tripartite routine schema of dynamic capabilities, and that these dynamic capability routines involve resources from different organizational hierarchies and knowledge domains. Consequently, this PhD research proposed a framework (Figure 11) for a deepened understanding of dynamic capability dimensions and routines.

At the same time, this chapter also conceptualizes the path-dependent process of organizational capability development. Apparently, path dependence reflects a state of limited organizational flexibility to respond to the internal and external environments. However, a tri-staged process approach to path dependence offers insight into self-reinforcing mechanisms developing from an organization's historical choices. The primary focus of this PhD research is to explain the capability development reinforcements resulting from learning organization mechanisms (discussed in Chapter 5). These mechanisms have the potential to break old paths to adopt altered or renewed paths of capability development.

4 PROJECT PORTFOLIO MANAGEMENT CAPABILITY (PPMC)

Project-based organizations (PBOs) carry out most of their business activities in projects while maintaining functional hierarchies (Hobday, 2000; Lindkvist, 2004; Melkonian & Picq, 2011). Industrial organizations operate in the multi-project environment as PBOs, and management of their business through portfolio management is of vital importance (Jerbrant, 2013). Organizational resource structuring, decision-making, and communication mechanisms in a PBO are critical for managing business performance outcomes (Jerbrant, 2013). These PBOs value flexibility (Jerbrant, 2014) as their resources are involved in the simultaneous management of several projects of different types, sizes, scopes, and priorities. This entails cross-functional business expertise (Hobday, 2000; Jerbrant, 2013) and capability development through ‘economics of repetition’ and ‘economics of recombination’ (Lobo & Whyte, 2017).

Large organizations offering multiple products and complex systems (CoPS) embody ‘project-based organizations’ (PBO) as well as functional structures – dual structures (Hobday, 1998, 2000; Melkonian & Picq, 2011) to respond to environmental shocks (Jerbrant, 2014). Therefore, the development of capabilities in a PBOs is a double-loop process constituting *top-down* (strategy to the individual project) as well as *bottom up* (each project requirement influences strategy development) approach (Melkonian & Picq, 2011). This approach, as explained by Melkonian & Picq (2011), concerns an interplay between *integration* (long-term development needs on an organizational level) and *differentiation* (short-term performance challenges of the individual unique project) through project-based activities managed as portfolios. PBOs cannot achieve these developments only through (ascribed) temporary organizing, as is recommended in the literature (Bakker et al., 2016; Lundin & Söderholm, 1995). Consequently, Bergman and colleagues (2013) found the simultaneous presence of permanent and temporary structuring of resources in PBOs supplying complex product systems (CoPS). In another study, Winch (2014) observed the dominating permanent structural form of CoPS supplier PBOs.

The literature also discusses complex product system-based P-form organizations (Söderlund & Tell, 2009). P-form organizations can be conceptualized through their project-based delivery mode of products and services (Söderlund & Tell, 2011). P-form organizations are PBOs whose most of activities, including change efforts, internal/operational development, product development, and customer deliveries are projects (Pemsel et al., 2016), The core benefit of P-form

organizations is their ability to develop novel solutions through knowledge integration mechanisms involving multiple functional units (Söderlund & Tell, 2009). The primary focus of such organizations is on “*knowing who knows what*” (Söderlund & Tell, 2011, p. 241), an important feature of the *transactive memory* of organizational routines (Argote & Ren, 2012; Miller et al., 2012). Individuals and resources in a P-form organization master entrepreneurial competences, technical competences, evaluative competences, and relational competences (Lampel, 2001). Meanwhile, their leadership competences are central to successful project operations (Müller & Turner, 2010; Müller et al., 2016). These multi-competences require organizational behavior orientation to value-based multi-system integration (Hobday et al., 2005), while project management capabilities enable operational flexibility during this integration (Hobday, 2000; Jebrant, 2014). As Söderlund & Tell (2009) noted, the two most apparent core capabilities of P-form organizations are multi-system integration and project management.

This led to the most recent focus of the literature on ‘organizational project management’ (OPM) to represent all organizational activities related to the management of projects, programs, and the portfolio of projects (Aubry et al., 2007; Aubry et al., 2012; Drouin & Jugdev, 2014; Drouin et al., 2016; PMI, 2013b). Aubry and colleagues (2007) defined OPM as “*a new sphere of management where dynamic structures in the firm are through projects in order to maximize value*” (Aubry et al., 2007, p. 332). In later research, Aubry and colleagues (2012) presented OPM as an organizational capability to establish ‘the fit’ of project management implementation with organizational context and strategy. Meanwhile, they (Aubry et al., 2012) highlight the importance of organizational development history in maintaining such a ‘fit’. Recently, Drouin and colleagues (2016) positioned OPM as an organizational capability for the ‘vertical and horizontal’ integration of all ongoing projects involving an organization’s hierarchies and activity networks. According to them (Drouin et al., 2016) OPM capability focuses on a unified project management approach as a ‘self-powered vehicle’ to strategically align the structure, processes, and project activities to business effectiveness. However, Aubry and colleagues (2007) referred to Hobday (2000) to caution about having only one unified approach to managing all organizational projects, as “*one size does not fit all*” (p. 330). It is because organizations carry projects of varying size, type, complexity, and nature. Management of these different projects and portfolios cannot be successful only through deterministically developed unified approached; it also involves agreeing on actions through decisions based on collective sense-making (Petit, 2011).

The presence of multiple portfolios in an organization is well recognized (PMI, 2006), and meanwhile, enterprise project portfolio management (EPPM) reflects

these multi-natured projects and their organizational grouping. A longitudinal research study (Petit, 2011) highlighted the presence of different portfolios and corresponding management requirements. Similarly, Young and colleagues (2011) observed the presence of multiple project portfolios and dedicated approach to their management. They further found that these enterprise-wide portfolios are interdependent and dynamically interact, and consequently the interrelationships between the portfolio components also change dynamically.

4.1 Project Portfolio Management and Maturity Models

Business interest in managing by projects has been increasing, as project operations are present in almost all organizations and fields of human activity (Donk & Molloy, 2008; Jerbrant, 2013; Killen, 2015; Turner, 2009). Meanwhile, project portfolio management (PPM) is an integrated approach to managing multiple projects and programs with common operational and strategic goals (Arto, 2001; Martinsuo & Killen, 2014). In a broader sense, the organizational motivation of doing ‘right projects and programs right’ is realizable through project portfolio management. According to PMI (2013a, p. 5), PPM is “*the coordinated management of one or more portfolios*” to achieve organizational objectives. Smaller organizations may have only one project portfolio, while bigger organizations manage multiple project portfolios to exhibit their strategic intent (PMI, 2013b). Accordingly, PPM fosters process-based decision-making (Rad & Levin, 2006) whereby a list of active projects is constantly updated and revised; new projects are evaluated, selected and prioritized; existing projects might be accelerated, killed or de-prioritized, and resources are allocated and reallocated to active projects. Therefore, the philosophy of PPM is oriented around organizational efforts to complete individual projects successfully while contributing to long-term organizational success. From an organizational perspective, project portfolio management (PPM) entails a five-step process (Turner, 2009, p. 328):

1. *Maintain a list of all current projects in a project database;*
2. *Report the status of all projects through a central project-reporting system;*
3. *Prioritize and select projects through a transparent system maintained centrally;*
4. *Plan and assign resources to all projects centrally; and*
5. *Evaluate the business benefits of all projects post-completion.*

The components of project portfolio possess similar characteristics (PMI, 2006, 2013a), mainly including organizational strategic orientation and business investment choices, resources, competences and knowledge requirements that can make the coordinated management possible, and integrated performance targets. Portfolio components include projects, programs, and other interrelated activities. Organizations evaluate, select, prioritize, and manage portfolio components to achieve corporate financial and non-financial objectives (Martinsuo & Killen, 2014; Thiry, 2006). In this vein, PPM has been widely understood as a tool for *'doing the right projects'* and methods for *'doing the projects right'* (PMI, 2013a). This dual posture of PPM directs the simultaneous achievement of operational and strategic organizational goals.

In practice, organizations need to systematize corporate responsibilities, business strategy and functional responsibilities, and decision-making processes of this multi-project management approach of PPM. Therefore, the ambidextrous nature of PPM to simultaneously achieve strategic and operational targets is fascinating; however, its realization is challenging. Foremost among these challenges include misalignment between project management practices and business strategy (Filippov et al., 2011), resource allocation at portfolio level (Kendall, 2003), management of portfolio level uncertainties (Martinsuo et al., 2014; Petit, 2011; Petit & Hobbs, 2010), inadequate definition of roles and responsibilities (Elonen & Artto, 2003), commitment and empowerment of resources (Jonas, 2010), definitions for project- and portfolio-level activities (Elonen & Artto, 2003), management support to portfolio-level activities (Jonas et al., 2014), inadequate information and resulting quality of communication (Elonen & Artto, 2003; Jonas, 2010), and capability-building through organizational learning (Artto, 2001). Ideally, project portfolio management (PPM) is an umbrella concept to uniformly respond to these challenges (PMI, 2013a).

In the extant literature, scholars have adopted different approaches to explain multi-project management in organizations. These approaches include P-form organizing, project-based organizations (PBOs), complex product systems (CoPS) project organizing, organizational project management (OPM), and enterprise project portfolio management (EPPM). Elonen & Artto (2003) observed that these different forms of multi-project management in an organization is actually a reflection of project portfolio management (PPM) practices, where some of the organizations follow PPM more obviously than others. In literature-known terms, the maturity of PPM practices varies greatly among organizations.

Rather, the position of this PhD research is that the management of multiple projects, programs, and related activities is researchable through studying project

portfolio management capability (PPMC) dimensions, routines, and the performance outcomes framework developed in this dissertation's section 4.2. Meanwhile, it was also relevant to briefly discuss the above-mentioned research approaches to project portfolio management and their relevance to this PhD research.

Further, the literature offers substantial guidance for implementing project portfolio management (PPM) practices in organizations. These include well-recognized best practices-based capability maturity models (for example, mostly cited are 'OPM3 by PMI' (2013b) and 'P3M3 (2010) developed by the P3O of Government in UK'). These maturity models simultaneously focus on project management, program management, and PPM maturity assessment. There also exists guidance on improving particular areas of practicing PPM such as governance through a four-step cyclical process of *assess, plan, implement, and improve* (PMI, 2016). Backlund and colleagues (2015) examine the attainable success factors through capability maturity models. Later, Görög (2016) recaps the three primary roles and potential value of such maturity models: assessing the current state of capability maturity, which provides performance value to an organization; offering guidelines for future development, which provides strategic value; and the possibility of benchmarking, whether industry, market and/or competition assessment value.

There also exists scholarship supporting the benefits of project management improvement initiatives and the comparison of such initiatives through maturity models. For example, Backlund and colleagues' case study (2015) demonstrates the maturity assessment process to evaluate organization-wide project management capability. Earlier, Quin Shi (Shi, 2011) proposed a value-adding path map (VAPM) approach by considering the 'soft' and 'hard' system configurations for project management competence development. Taking a step forward, Fernandes and colleagues (2015) studied the project management practices embedded in the organization through a process involving *diffusion, dissemination, implementation, and re-utilization*. They considered that organization-wide project management implementation could be successful once the practices are routinized in various organizational functions, departments, and structures. Their scholarship (Fernandes et al., 2015) also included a list of project management implementation initiatives and routine embedding factors. Given this rich body of scholarship, why is this PhD research significant?

It has been consistently recognized that organizational project management capability maturity models and standards are not free from challenges (Brookes & Clark, 2014; Görög, 2016; Mullaly, 2014; Viana & Mota, 2016; Williams et al.,

2014), and even their gained benefits mostly remain ‘short-term’ (Torres, 2015). It has been demonstrated that a maturity model suitable to one organization may not be beneficial in the longer run. It is due to the commitment of internal and external resources (Backlund et al., 2015), contingencies, contextual evolution (Mullaly, 2014), and the path-dependent nature of organizational capabilities (Eisenhardt & Martin, 2000; Teece et al., 1997). Therefore, it is pertinent to list some of the reported pitfalls of capability maturity models.

At first, these gap analysis-based maturity models do not reveal much about actual capability expertise-gained outcomes (Perry, 2011, p. 88-92). Secondly, the capability maturity model school of thought has overwhelmingly advocated a ‘one size fits all’ approach– the unification of project management methodologies throughout the organizations (for example: Kerzner, 2013, p. 42-45). This unified and singular approach for success in action, as already cautioned by Danny Miller (1993, p. 116), “*may trigger an ultimate failure*” in organizations. The disposition of Miller’s study (1993) relates to a famous quote ascribed to Albert Einstein that “*everything should be made as simple as possible, but not simpler*” (Investigator, 2017). Thirdly, the best practices-based maturity models ignore contextualization and the effect of organizational behavior (Killen & Hunt, 2013) through which an organization manages its work (Aubry et al., 2012). Lastly, as noted by Mullaly (2014), most of the capability maturity models focus on short-term performance outcomes and ignore the significance of intangible assets.

Ultimately, capability maturity models bring the process control-based mechanistic view of organizational capabilities (Görög, 2016; Pasian, 2014). Therefore, and as implicitly mentioned by another recent research (Viana & Mota, 2016), most of the capability maturity models underemphasize organizational attention to value-focused decision-making (Keeney, 1996). Therefore, implementation of such best practiced-based maturity models, originally made for project management practices, will not enhance the performance of PPM, whose primary focus is on business value management by combining short-term and long-term benefits (Martinsuo & Killen, 2014).

To the contrary, this PhD research recognized the existence of such maturity models that include guidance (at least on paper) to eliminate most of the abovementioned shortfalls. For example, the OPM3 maturity model (2013b) includes best practices to utilize captured lessons learned (best practice # 3030), customization of methodologies (best practice # 5260), the integration of methodologies with strategic, operational, and tactical processes in an organization (best practice # 5270), creating leadership for organization-wide project management (best practice # 7005), adopting a suitable organizational

structure (best practice # 7065), managing holistic views about a project (best practice # 7105), storage and reuse of intellectual capital (best practice # 7375), defining, developing, verifying, measuring, and analyzing portfolio success matrices (best practice # 7315 → 7355), and developing a strategic portfolio plan (best practice # 8620).

Consequently, this literature synthesis revealed another more significant cause of complaints about capability maturity models. One concern is that capability maturity models' applications are based on cross-sectional data recorded through short-period observations (Backlund et al., 2015). Based on their short-period observations, the implementers propel the four-phase quality management cycle of plan-do-check-act. For example, according to PMI, their capability maturity model (2013b) aims to nurture continuous improvement cycles (PMI, 2013b, p. 46). Wherein, the quality management efforts are adaptive learning (Senge, 1990), which cannot lead to long-term organizational success.

Therefore, among several proposed improvements to the existing maturity models, there has been a focus on the measurement of knowledge management at the project level (Görög, 2016) and organizational learning at the project portfolio management level (Killen & Hunter, 2010, 2013; Pasian, 2014). Even Dr. Edwards Deming, the referred scholar for plan-do-check-act based quality management, cautioned about the short-term benefits of quality management without a focus on system-based learning (Berry, 2016). In a systems perspective (Senge, 1990), organizations learn through three learning mechanisms of single-loop, double-loop, and triple-loop learning (discussed in Chapter 5 of this dissertation).

Finally, this PhD research recognizes the importance of maturity models during the capability development process because the maturity models can be useful only to outline an external view of the current state of capabilities. This can be important for extending the leadership view about the needed refinements, reconfigurations, and transformations (Mullaly, 2006). However, the externally-acquired maturity models will not be considered as a solution to ceasing organizational growth (Penrose, 1959).

4.2 Project Portfolio Management Capability (PPMC)

Project portfolio management (PPM) literature has inherently focused on the selection, prioritization, and balancing of portfolio components (Petit, 2011). The review of selected projects is carried out periodically, assuming the portfolio only tackles the already mapped environmental challenges in the beginning. Renowned practice standards (for example, PMI, 2013a) identify the two organizational

challenges related to PPM. At first, organizations must perform periodical reviews of portfolio components. These portfolio components interact (Vakkayil, 2010) and mutually affect the business outcome (PMI, 2013a). Secondly, portfolio reviews should take into consideration the ever-changing business environment and reconfigure the organizational processes and routines accordingly (Petit, 2011).

However, reconfiguring to novel situations in the internal or external environment is business as usual in PPM, as manifested by the temporary nature of portfolio components (projects, programs, and related activities); the management of project portfolios is thus inherently the management of ever-changing organizational realities. For example, earlier research (Petit, 2011, referring to Leifer et al., 2000) recognized PPM's ability to prepare organizations for technical uncertainties, market uncertainties, organizational uncertainties, and financial uncertainties. Still, it is not well known how organizations simultaneously manage these uncertainties from a PPM perspective (Martinuso et al., 2014) and remain successful.

What is unanimously agreed upon in the literature is that PPM establishes a dynamic decision-making process whereby a list of active projects is constantly updated and revised; new projects are evaluated, selected and prioritized; existing projects might be accelerated, killed, or de-prioritized; and resources are allocated and reallocated to active projects. Therefore the philosophy of project portfolio management is oriented toward organizational efforts to complete individual projects successfully while contributing to long-term organizational success. However, the nature of PPM as 'a whole whose sum is greater than its individual components' requires more investigation (Killen et al., 2012; Martinsuo et al., 2014; Martinsuo & Killen, 2014).

Like other research on organizational capabilities, guidance on the nature of project portfolio management and its role in organization's business success is divided among various concepts. For example, the scholarship focusing on business performance outcomes considering PPM as organizational practice, recently by Patanakul (2015). Then, it is most common in the literature to refer PPM as a management process (Kock & Gemünden, 2016) and a decision-making process (Rad & Levin, 2006) to select, prioritize, and execute projects (PMI, 2013b). The other group of scholars also observed the expanding contribution of PPM activities through multi-functional resources (Martinsuo et al., 2014; Rad & Levin, 2006). These studies conceptualized PPM as a management system. Accordingly, developing PPM through best practices and capability maturity models is common in the literature. However, the extant scholarship only focused

on PPM programs to systemize project selection, prioritization, and execution (for details see: Bible & Bivins, 2011; PMI, 2013c; Rajegopal, 2013).

In the meantime, only a few studies discussed PPM as an organizational capability (for example, Killen & Hunt, 2013; Killen et al., 2012; Martinsuo et al., 2014; Perry, 2011; Petit, 2011). This sparse scholarship recognized project portfolio management capability (PPMC) as a strategic organizational capability (as earlier consolidated by Killen et al., 2012). Relatedly, Catherine Killen and the co-authors have furnished a series of scholarship regarding PPMC as a generalized dynamic capability (see: Killen, 2008, 2015; Killen et al., 2008, 2012; Killen & Hunter, 2010, 2013). Another further step on PPMC research has been taken by Petit (2011, 2012) who focused on sense-making mechanisms through PPMC. In between, Killen and colleagues (2012) published research relating PPMC to the resource-based view (RBV), the dynamic capability view (DCV), and the absorptive capability view of a business organization.

In their founding research, Killen & Hunter (2010) focused in detail on organizational processes, structure, and people and other resources to highlight the development of PPMC. Their proposed PPM dynamic capability necessitates the strategic alignment of a project portfolio, maintaining its balance and ensuring that the portfolio's resource capabilities (processes and routines) are sufficient to achieve organizational success through each of the portfolio components (Killen & Hunt, 2010). Accordingly, PPM dynamic capability enables an organization to sense, seize, and reconfigure organizational resources (Killen et al., 2008; Killen & Hunter, 2010). Resulting alterations to the resources propels building and reconfiguring organizational capabilities at various functional and hierarchal levels (Killen et al., 2008). In a later study, Killen & Hunter (2013) extended their advice on PPMC dynamic capability development and proposed learning investment based capability maturity model for PPMC. Their proposal is to invest on the organizational learning outcomes, naming *experience accumulation*, *knowledge articulation*, and *knowledge codification* (see: Zollo & Winter, 2002).

Another founding contribution to the PPMC literature is from Yvan Petit (Petit & Hobbe, 2010; Petit, 2011, 2012). In these studies, Petit adopted a dynamic capabilities framework (Teece, 2007) and studied sensing, seizing, and transforming as the organizational processes to manage uncertainties related to project portfolio decision-making. According to Petit, sensing refers to "*organizing mechanisms to identify, filter and interpret changes and uncertainty which might affect the project portfolio*" (Petit, 2011, p. 141). The frequency of sensing mechanisms depends on the environmental dynamism or uncertainties derived from the individual projects (Petit, 2011). Meanwhile, seizing includes

“organizing mechanisms for deciding changes to project portfolio once a potential need for change has been sensed” (Petit, 2011, p. 142). It involves changing the portfolio business model, governance rules, and decision-making protocols. According to Petit (2011), reconfiguration and transformation include the mechanisms to ensure continuous alignment and realignment of organizational resources to portfolio performance targets. It includes structuring the portfolio to balance resource allocation, re-prioritizing the project(s) scope, and transforming the organizational process and decision-making authority. Therefore, PPM dynamic capabilities involve introducing new processes and portfolio governance structures to manage resources in dynamically changing the business environment (Petit, 2011, 2012).

Interestingly, Feiler & Teece (2014) wrote about decision-making for capability development and maintaining dynamic capabilities for the portfolio of business projects. Their approach is very similar to project portfolio management (PPM). Although they (Feiler & Teece, 2014) did not exclusively mention the PPMC, their terminologies are very much related to PPMC routines. For example, they have repeatedly referred resource management, decision-making, accountability and open communication, and enterprise risk anticipation as the key dynamic capabilities. Meanwhile, this PhD research limits its data analysis and results to the fact that PPMC is an organizational capability whose development is path-dependent and whose performance is business context-specific. Therefore, the position herein is that the utility of resources and capabilities is dependent on the organization’s perception of itself (Penrose, 1960).

It is because *‘doing the right projects’* and methods for *‘doing the projects right’* through project portfolio management (PMI, 2013a) resonates with the combined performance focus of ordinary capabilities and dynamic capabilities (see: Table 6). According to David Teece, ordinary capabilities are about *‘doing the things right’*, while dynamic capabilities focus on *‘doing the right things’* (Teece et al., 1997; Teece, 2014, 2014a).

Subsequently, this PhD research idealizes PPMC as having the potential to fulfil the criteria for both types of organizational capabilities. This echoes an implied, observation by Martinsuo and colleagues (2014), who recognized the need for the business context-dependent development of project portfolio management capability (PPMC) before it becomes an organization’s dynamic capability (Martinsuo et al., 2014, p. 744). Consequently, the current PhD research discourages the idea of absolute ranking of organizational capabilities to a generalized dynamic capability. According to Peteraf & colleagues (2013), the

scholarship following Eisenhardt & Martin (2000) inspires such declarations about certain organizational capabilities as generalized dynamic capabilities.

This research understands (compare: Helfat & Winter, 2011) that PPMC has the ability and intent to operate resources simultaneously at operational as well as at strategic organizational levels. Metaphorically, such a disposition will qualify PPMC as an organizational capability echelon (Hambrick & Mason, 1984; Hamerick, 2007). However, in practice, this intent is realizable only if routines constituting a capability (Winter, 2003) encompass multifunctional resource activities (and capabilities) distributed across organizational hierarchies. Investigating such a spread-out collection of activities has been challenging, especially when the literature offers contradictory constructs. Such an apparent and consistently referenced research gap signifies the utility of the capability investigation framework (Figure 10) developed over the course of this PhD research.

Accordingly, project portfolio management capability (PPMC) is developed in three organizational dimensions of processes, structures, and people (and resources). Organizations routinize portfolio management activities through PPMC dimensions. These routinized activities lead to certain performance outcomes through PPMC. For the purposes of case data analysis and the presentation of results, the PPMC development investigation framework was extended (Figure 12) from the generalized framework (Figure 10) developed in Chapter 3.

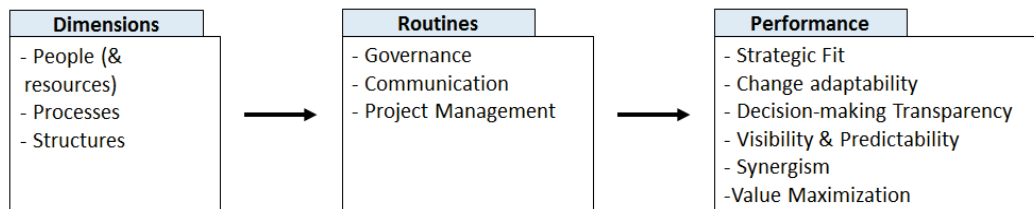


Figure 12. Retroduction-based PPMC development investigation framework

Importantly, this framework does not possess ‘all-inclusive’ details of PPMC. To connote a few possible inclusions, program management related activities could be part of a PPMC investigation framework. Similarly, there are certain other performance outcomes identified in the literature, including improved project success rate, which could be included in this framework. Still, the effort put forth for this dissertation is unique in the literature, and subsequent future extension is under consideration (discussed in Chapter 11 of this dissertation).

This critical realism-based PhD research commenced from idealizing PPMC as a generalized dynamic capability, in line with the available guidance in the literature. During the course of this retroduction-based case study research, sufficient “*good reason*” (Popper, 1959, p. 32) could be collected to condemn the notion of generalized dynamic capabilities, at least for PPMC. However, this research still conjectures through congruence (George & Bennett, 2005, p. 181-187) and interpolation (Andersen & Kragh, 2011) that it is possible for an organizational capability, including PPMC, to undertake dynamic capability characteristics (Table 6).

In practice, it will be realizable during the path-dependent capability development process. It will involve establishing the tripartite schema routines of sensing, seizing, and transforming within the dimensions of structures, processes, and people. For example, PPMC as a dynamic capability will also include sensing, seizing, and transforming in the list of constituting routines. A subsequent future extension to this PhD research is expected with extended data collection and analysis (discussed in Chapter 11 of this dissertation).

4.3 PPMC Dimensions

4.3.1 PPMC structures

Multi-project activities are networked throughout an organization’s functions and structural hierarchies (Aubry et al., 2012). Therefore, organizational structure for the delivery of multiple projects is an extensively discussed topic in the literature (for example, Bakker et al., 2016; Hobday, 2000; Hobday et al., 2005; Kaiser et al., 2015; Kendall, 2003; Kerzner, 2013; Müller et al., 2014; Turner, 2009; Winch, 2014). It is unanimously agreed that matrix structures with functional and project organizing foster the performance of complex product system (CoPS)-based multi-project organizations (Müller et al., 2014). Functions are a part of the permanent structure, including the project management office (discussed in the following subsection), while an individual project’s structuring can be temporary in nature. The balance between temporary organizing (e.g. projects and programs) and permanent organizational structure makes efforts to focus on individual activities and their value understanding (Bakker et al., 2016, p. 1704), helping to develop shared mental models.

A longitudinal study by Geraldi (2009) established the need for an adjustable “*degrees of flexibility*” in the mechanistic and organic structures of organization, referred to as ambidextrous structures where order (efficiency, control, and

clarity) and chaos (trust, ambiguity, uncertainty, and creativity) coexist at all levels of project organizing. The improved connectedness of personnel (resources) is an outcome of these ambidextrous structures. Similarly, Jensen and colleagues (2009) identified that formal and informal structures (ambidextrous structures) enable the organization to fulfill consistent and varying business demands. Their findings suggest that *cross-functional integration* mechanisms (Jansen et al., 2009, p. 807) based on trust and reciprocity are equally critical for the structurally ambidextrous organizations.

It is also apparent that business success is dependent on the alignment between organizational structure and the nature of the project portfolio (Kaiser et al., 2015). It implies that the project, program, and portfolio management structuring mechanisms play an important role in accommodating the dynamically operated project portfolios of multi-project business organizations (Jerbrant, 2013). This PhD research established that the following three categories of organizational structures are essential for PPMC development:

1. Project Portfolio Management Offices (PPMO) or project management office (PMO)
2. Project portfolio governance and review boards
3. Enterprise-wide communities of project management practices

4.3.1.1 Project portfolio management office (PPMO)

The significance of the project portfolio management office (PPMO) or the project management office (PMO) as a formal structure in multi-project management environment is indisputable and is a widely studied subject (Aubry, 2015; Aubry et al., 2007; Aubry et al., 2008; Crawford, 2006; Hobbs et al., 2008; Kendall, 2003; Levine, 2005; Pennypacker & Retna, 2009; Rad & Levin, 2006; Rajegopal, 2013; Turner, 2009; Unger et al., 2012). Aubry (2015) proposed that PMOs are also part of temporary organizational structure. That study (Aubry, 2015) also showed that PMOs transform with the organizational context. It has also been observed that PPMO's structural existence is on the verge of permanent and temporary structures of project organizing (Bakker et al., 2016). Meanwhile, in PBOs, where the management of the multi-project environment is a norm, PPMO is part of the permanent organizational structure.

In the extant literature, project portfolio management office (PPMO, or alternatively PpMO) is studied as project management office (PMO), project office

(PO), and enterprise project portfolio management (EPMO). As clarified by Rad & Levin (2006, p. 45-51) these different acronyms reflect the organizational maturity in project portfolio management and also its implementation in an organization. In the context of this PhD study, the term project portfolio management office (PPMO) is used to represent organization-wide structure representing project management offices (PMOs) at the business-division level.

The formal task of a PPMO is to standardize *“the project-related governance and facilitate the sharing of resources, methodologies, tools, and techniques”* (PMI, 2013). According to Kendall & Rollins (2003, p. 30-33), this task involves attention to the *“right tool (and processes), right people, right data, right implementation”*. A fully matured PPMO supports decision-making for project, programs as well as at the executive level (Rajegopal, 2013, p. 149). Shan Rajegopal (2013, p. 154) highlighted the success criteria for PPMO operation: focus on organizational objectives; executive sponsorship; leadership role; tailored approach – flexibility; maturity to evaluate the alignment of PMO with organizational environment and culture; lean approach; and successful communication. Therefore, the ‘people’ dimension of PPMC to be most important to PPMO success (Rajegopal, 2013).

The PPMO role thus is significant in designing a portfolio governance system and its continuous development (Too & Weaver, 2014; Unger et al., 2012). PPMO strive to develop governance policies, processes, and procedures in order to ensure the efficient flow of information throughout the organizational hierarchies (Too & Weaver, 2014). It is required to improve the decision-making transparency and the accountability of actions (Müller, 2009). Similarly, PPMOs are structured as a center for performing project management related activities at the tactical, strategic, and operational levels (Rajegopal et al., 2007, p. 39-41). The detailed benefits and functions of a PPMOs are well documented (for example, by Shan Rajegopal, 2013, p. 130-145). Therefore, PPMOs hold a significant mandate to uphold organization-wide stakeholder interests while maintaining strategic goals (Unger et al., 2012). However, the delegated authority of PPMO (from executive leadership) limits its contribution to PPMC routine development and performance outcomes (Müller et al., 2014).

From a business value perspective, the role of PPMO is more integrative in nature (Artto et al., 2011). Artto and the fellow researchers (2011) further identified that PPMO(s) executes the integration of portfolio activities through various mechanisms such as coordination, information systems, stakeholder communication, and formal lateral roles in teams and committees. Accordingly, the PPM literature has identified varying roles of PPMO based on organizational context and provided authority (Aubry, 2015). Based on a study by Unger and

colleagues (2012), PPMO are expected to provide three distinguishable roles in PPMC routines and performance outcomes:

In its '**coordinating role**', PPMO focus on resource allocation quality with directions from executive leadership. In this regard, PPMO takes the lead in cross-functional cooperation for multi-project resource collaboration. Coordinating requires a mediating role of PPMO to resolve resource-related conflicts between project managers. This coordination of PPMO successfully impacts the management of project portfolios with improved coordination and resource allocation. However, the degree of coordination will vary depending on the complexity of project portfolios (Aubry, 2015). In the context of this study, the coordinating role of PPMO primarily targets single-loop and double-loop learning.

The **controlling role** of PPMO requires establishing information management (generating, gathering, preparing, and disseminating information) support for decision-making at various stages of projects' lifecycle and portfolio management. Important here is the reliability and accuracy of available information, and also the measurability of results in order to establish stakeholder trust, which further improves information-sharing between the distinct entities of an organization. For trustworthy information management, PPMO design milestones and terminologies to ensure stakeholder interactions and understanding of organization-wide performed activities. PPMO positions itself in a more active and authoritative role of coordinating. The controlling role of PPMO has also been found to improve the PPM success by enhancing information quality. In the context of this study, the controlling role of PPMO primarily targets single-loop and double loop learning.

With its **supportive role**, PPMO provides services to project leaders with the main aim of cultivating knowledge-sharing and transferring practices across divisions, departments, and functions (Pemsel & Wiewiora, 2013). This is achievable by training and educating individual teams or functional members about the methodologies and best practices, which results in improved performance at the individual project level. In the context of this study, the supporting role of PPMO primarily targets single-loop learning.

4.3.1.2 Portfolio governance bodies (steering committee, performance review, and governance boards/ Councils)

The eminent literature discuss different types of portfolio governance bodies (PPGBs) including portfolio steering committees, project portfolio management teams, portfolio review boards, and portfolio governance boards or councils, etc.

These PPGBs perform different tasks (Figure 13) related to portfolio decision-making (McGrath & Whitty, 2013). The relevance of certain types of PPGB and their responsibilities are recorded in the project portfolio governance system. These PPGBs are the permanent and temporary structures of executive sponsorship (Chandler & Thomas, 2015), and are important to “*leave money on the table*” to exercise project portfolio activities (Kendall, 2003, p. 156). PPMO seeks continuous guidance from portfolio governance bodies (PPGB) in translating strategy into action (Levine, 2005, p. 54). Categorically PPGBs are expected to (i) communicate and consolidate the progress of ongoing activities; (ii) negotiation the inclusion of new components in portfolio, prioritization, and termination of existing components; and (iii) made timely decisions through various quantitative techniques or sense-making (Marnewick, 2015; Mosavi, 2014).

Nevertheless, it is already established that these structural bodies contribute to the business value of individual portfolio components (Chandler & Thomas, 2015). Meanwhile, there is confusion about the composition of these PPGBs (Mosavi, 2014). In this regard, this PhD research seeks guidance from Lechler & Cohen’s (2009) proposal for a five (5) component-driven PPGB composition:

- i. **Configuration** provides information about the constituency of participants from different functions and hierarchical levels.
- ii. **Responsibility** is the level and depth to which a committee pursues cross-functional coordination for project level definitions and outcomes.
- iii. **Decision Authority** refers to the exerted control over the portfolio components and resource-related decisions. This PhD study observed that this decision authority is a dynamic component that varies with the deterministic and voluntary compositions of portfolio governance systems.
- iv. **Organization** refers to the spatial and temporal presence of this governing body, whether *ad hoc* or a permanent component.
- v. **Committee Process** refers to the established routines and their frequency in performing defined tasks for a governing body.

Accordingly, there exists more than one type of such governing structure to oversee the activities of one single portfolio of projects. The aim of establishing these structures is to bring together the leadership of involved stakeholders from temporary (projects and programs) and permanent (across functions and business divisions) components of the organization. These PPGBs seek to establish a relational mechanism for knowledge-sharing across the organization (Murphy et

al., 2017; Pemsel et al., 2016). Herein, the essence of success is to jointly understand problems and seek common interest-based solutions. The presence of PPGBs therefore ensures that relevant decision-making levels are defined and known to all stakeholders, which maintains discipline and transparency. Such an act of connectedness can be instrumental in balancing vertical and horizontal leadership in an organization (Müller et al., 2016).

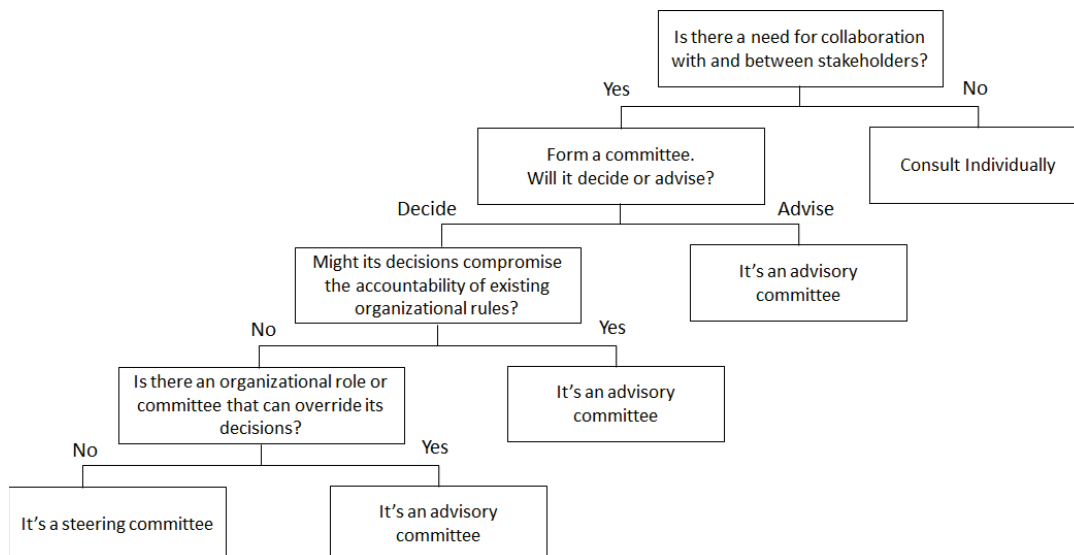


Figure 13. Generic illustration of PPGB type and role [adopted from McGrath & Whitty, 2013]

4.3.1.3 Communities of practice

Communities of practice are “*born of learning*” (Wenger, 2000, p. 230). These are formally developed informal organizational structures that are temporary in nature. The communities of practice mainly establish relational mechanisms for knowledge sharing and integration across the organization (Pemsel et al., 2016). Wenger (2000’s) guidance for organizations is to recognize themselves as social learning systems. The participants’ belonging to the learning system is achieved through engagement (taking actions together), imagination (interpretation of participation), and alignment (joint action remaining effective in emergent situations) (Wenger, 2000). The communities of practice will provide this sense of belongingness to the participants. The success of a community of practice is the strong identity of the participants’ connectivity, the expansiveness of their experiences, and the effectiveness of their actions. However, it requires continuous effort and dedication through formal PPMC structures (PPMO and PPGBs) to

provide needed infrastructure and also monitor the learning achievements of these informal structures.

In organization-wide PPMC communities, the autonomy, belongingness, and expert competence improve knowledge-sharing for collective problem-solving (Lee-Kelly & Turner, 2017). Lee-Kelly & Turner's (2017) study also highlighted the transition from the topic of sharing best practices to the extension of sharing 'know-how' (best practices, tools & techniques—single-loop learning), to 'know-what' (managing complexity through understanding the needs of updating the existing practice—double-loop learning) and then sharing 'know-why' (understanding about the need for certain actions and able to make choices from available options—single-loop as well as double-loop learning processes). The medium of virtual meeting platforms [*“the fabric of connectivity”* (Wenger, 2000, p. 232)] provides support for community discussions and a repository to record the community learnings [IT based archive and retrieval system – *“the artifacts”* (Wenger, 2000, p. 232)], which are of great significance for the PPMC success (Lee-Kelly & Turner, 2017).

4.3.2 PPMC processes

A range of PPM processes is discussed in the extant literature. However, there is no consensus on what constitutes PPMC. For example, Killen and Hunter (2010) who formally mentioned the PPMC's dimension of organizational processes have discussed them on a generic level. Seemingly, because the PPMC processes discussed in best practices based standards are only for guidance, and organizations should modify them according to their suitability for the portfolio (PMI, 2008, 2013a). This PhD study explores the business context-dependent development of PPMC processes where the PPMC governance system target a suitable balance between formality and flexibility of these processes (Keegan & Turner, 2001; Turner et al., 2010).

Generally, PPMC processes will strive to fulfill the following organizational goals (PMI, 2013a, p. 9):

- i. Strategic alignment of each component through short- and long-term portfolio performance targets;
- ii. Financial resource allocation through portfolio component prioritization;
- iii. Human resource (people) allocation through portfolio component prioritization;

- iv. Tangible asset (material, equipment, space etc.) allocation through portfolio component prioritization;
- v. Performance measurement of portfolio components to ensure the realization of planned benefits and goals; and
- vi. Risk and uncertainty management of each portfolio component through internal and external environmental monitoring.

Meanwhile, developing context-specific PPMC processes is to establish a link between strategic and tactical actions across the organization. Because, project portfolio management includes a set of complex processes with cross-functional decision-making based on stage-gate models (Cooper, 2005, 2008; Crawford et al., 2009). This research, therefore, employs the organizational perspective (Meifort, 2016) of PPMC, which pursues multi-process integration (Arlt, 2010, p. 217). It implies that through project portfolio management capability (PPMC), all the organization-wide inter-functional as well as cross-functional processes, including project management processes, program management processes, portfolio decision-making, and performance auditing processes are interwoven. Discussed later in this chapter that through PPMC, organizations can realize a duplex layer of governance, the ambidextrous governance system, in which the first layer of corporate governance pertains to compliance and discipline, and the second layer of PPMC governance to empowered stakeholder coordination and their knowledge integration.

Hereafter, organizational commitment to PPMC entails the path-dependent learning to bring forth and handle hybrid process development. This study understands that this is not attainable before shared vision, mental models, and shared leadership are built into the DNA of an organization or that of one of its business division. For the performance outcomes presented in this chapter, at a minimum, PPMC processes should integrate at the business-division level. For a capability system to perform the role of dynamic capability, it especially should be able to sense internal and external environmental changes. The sensing routines cover the spatial dimension of an organization where a resource-based view (Barney, 1991) bonds with competitive market positioning (Porter, 1985), company strategy formation accommodates transformations (Mintzberg & Waters, 1985) and companies continuously develop new markets and niche market segments (Kim & Mauborgne, 2015).

However, due to the varying nature and/or type of investigated project portfolios in the literature, there are diverging views as to what processes should be used to observe PPMC. A recent example of this divergence is an interesting study

(Padovani & Carvalho, 2016) that establishes eleven (11) process sets (or groups) by reviewing published on PPMC practices. On careful examination, one can identify a vast mix of activities in these proposed sets. Though, these process activities (see: Padovani & Carvalho, 2016) are always performed for organization-wide projects which are either managed singularly (Blichfeldt & Eskerod, 2008) or through literature-guided PPM practices. Another such example is a renowned standard for portfolio management practice which advises sixteen (16) processes collected in three (3) cyclically interacting groups (PMI, 2013a, p. 31). Such examples reflect dominating behavior to deterministically implement PPM as best practices instead of developing it as a path-dependent organizational capability by integrating processes, structures, and people (and resources).

This PhD research understands that for any given organizational context, PPMC processes can be arranged in the following four (4) process groups. Depending on the business context, existing organizational processes can also be included and integrated within these process groups.

1. Portfolio decision criteria definition processes
2. Ideation, screening, and selection processes
3. Prioritizing and approving processes
4. Monitoring and performance auditing processes

Furthermore, the extant literature focused on the cyclic interaction of PPMC process (for example, PMI, 2013a, p. 33). However, through such interaction, PPM processes become inflexible and may remain limited as intermittently adopted organizational practices, and while not routinized to integrate resource activities at various organizational levels. Therefore, this PhD research establishes the presence of dynamics affecting the mutual interaction between all four process groups discussed in the proceeding sub-sections. Organizations develop and deploy various tools and techniques to support decision-making relevant to these process groups. In the extant literature, there is vast guidance available on decision-making tools and techniques (for example, in Cooper et al., 1999; Levine, 2005; Rad & Levin, 2006). In the presence of already existing guidance, this PhD research excludes them from this synthesis.

4.3.2.1 Portfolio decisions criteria definition processes

The development and maintenance of strategic alignment for each portfolio component is at the heart of these processes. The periodic review of portfolio criteria definition processes will be synchronous with governing system review and update activities. This is a process of firstly strategically defining the role of the portfolio governance system at the enterprise level and secondly customizing for each individual portfolio type. These processes aim to outline the decision-making boundaries for long-term expectations and strategic value, performance measurability matrices, risk management, auditing schemes and timelines, internal and external stakeholder identifications and their contributions to portfolio value propositions, dedicated and part-time roles with their authority levels, people competence requirements, auditing mechanisms, and communication routines and infrastructure. Active participation of concerned stakeholders in the criteria definition process ensures engagement and empowerment of the climate and culture. It is the phase of making portfolio management culture either democratic or bureaucratic, defining organizational behavior towards managing portfolio(s). The PPMC governance system will facilitate stakeholder participation in defining decision-making criteria.

4.3.2.2 Ideation, screening & selection processes

These processes assume the responsibility of generating options for business value creation. This responsibility encompasses the front end of portfolio activities, starting from ideation (Heising, 2012), to be integrated into portfolio component selection frameworks (Archer & Ghasemzadeh, 1999). It means that the candidate proposals will be evaluated against predefined decision criteria. This screening results in a list of potential candidates for the designated portfolio, which should be updated regularly as an inventory list. This portfolio component inventory list is further categorized based on value composition against the contribution to strategic, financial, and customer-related targets. There are several tools & techniques used for this categorization, including balanced scorecard, earned value analysis, net present value, cost/benefit analysis, productivity index, expected commercial value, risk-reward bubble diagrams, etc. (Rajegopal et al., 2007, p. 110-112). As risk and uncertainty management is at the heart of project portfolio management (Petit, 2011), the portfolio inventory list will also include the risk identification and evaluations against the predetermined criteria for screening and selection. The activities covered under this process group generate a pipeline of project that will be prioritized and approved on a case-by-case basis.

4.3.2.3 Prioritizing & approving processes

Project (as portfolio component) prioritization include processes to balance and/or optimize the project portfolio. Portfolio balancing is a decision-making process for short-term and long-term gains from invested resources (Crawford et al., 2009). In terms of organizational ambidexterity, this involves combining knowledge exploration and exploitation opportunities. It means that portfolio balancing is an act of developing a big picture of the value proposition of portfolio components and strategic intent of the business (Rajegopal et al., 2007, p. 113). A value proposition lens enables stakeholders and decision-makers to understand synergies between portfolio components to avoid overlapping or redundant projects; otherwise, such projects may become a ‘resource drain’ later. The portfolio balancing process also further categorizes the projects, into ‘*mission-critical projects*’, ‘*highly-desirable projects*’, and ‘*desirable projects*’ (Rajegopal et al., 2007, p. 115). This also reflects that portfolio balancing and optimization concerns commercial, non-commercial, and technical aspects of business value (Martinsuo & Killen, 2014, p. 58).

Subsequently, project lifecycle analysis based on the portfolio resources (and competences), supply and demand, and investment payoffs are required to be performed before the project is ready for approval. Additionally, depending on the decision-making criteria, the portfolio optimization analysis is re-performed. Portfolio optimization is driven by the motive of maximizing the financial benefits by prioritizing the least risks involved during portfolio execution. It means that optimization prefers a balance between portfolio components to maximize the exploitation of existing resources and knowledge assets. Portfolio optimization is driven by a combination of the three strategies of balancing, financial value maximization, and strategic bucketing with anticipated future business trends. Portfolio optimization with an ultimate focus on financial outcomes should be discouraged (Martinsuo & Killen, 2014, p. 57). Strategic orientation of portfolio decision-makers also impacts their choice of balance between short-term goals and long-term preparedness for the future. Focus on future preparedness requires sacrificing the short-term benefits, a willingness to cannibalize (Rank et al., 2015). A portfolio governance system will address these possible shortcomings of excessive financial value-driven optimization. The prioritized projects will be updated in the portfolio plan and are ready for funding approval.

Therefore, it is equally possible that if a project is approved and authorized for resourcing, it still may or may not be prioritized over another ongoing portfolio components in which the organization has already invested. Such a preferred prioritization entails that a project under execution may face delays, holds, or even

exclusion from the portfolio. These decisions are difficult and require transparency and leadership courage. Shared vision and mental models about the long-term meaning of such decisions provide a bonding effect for shared leadership. Iterating the importance of decision-making criteria selection process will lead to the involvement of stakeholders in this very important process as well, a process which will define the future of organizational capabilities for enabling its business choices.

4.3.2.4 Monitoring & performance auditing processes

The authorized projects remain queued for monitoring the performance of portfolio components under execution. Depending on the organizational culture (Unger et al., 2014), this waiting may become either a battle for the survival of the fittest or acknowledgment of multi-functional value synergy; as the performance of already progressing projects effects the success of the portfolio (similar to Teller et al., 2012). Subsequently, portfolio monitoring and performance-auditing processes involve project health checks (famous three colors: red-yellow-green signals) and consequent '*go/kill/hold/fix*' decisions. From this perspective, the project risk evaluations and mitigations are ensured, resource allocations and cash flows are evaluated against baselines, project lifecycle progress analysis are reviewed, etc.

It is important to mention that the execution of these projects does not by-pass the organizations' business processes, and generally appreciate stage-gate model for distributed decision-making throughout the project lifecycle (Cooper et al., 2000; Cooper, 2005). The categorization of projects during portfolio component selection and balancing help the decision makers to ensure that '*mission-critical projects*' and '*highly desirable projects*' are not axed out due to the selected earlier decision-making criteria during monitoring & performance auditing. It means that another challenging task for leadership is the problem diagnosis and resolving active portfolio conflicts (Rajegopal et al., 2007, p. 118) through daily communication routines (Curlee, 2015, P. 215). Therefore, people (& resource) dimension is equally important for this fourth process group of PPMC.

4.3.3 PPMC people (& resources)

PPMC originated from portfolio theory, whose focus is on the maximized return on invested resources (Rad & Levin, 2006, p. 25). The development of resources from historically learned management practices is important to the development of PPMC (Killen & Hunt, 2010). At first, PPMC monitor the resource demand-

supply in a pursuit to answer: “*are we optimizing our capacity?*” (Pennypacker & Retna, 2009, p. 53-55). Secondly, PPMC will focus organizational attention on resource capacity building and coordination of other organizational capabilities (Artto, 2001). According to Petit (2012), the following actions are essential:

- Comparisons between all projects on basis of resource supply and demand. A detailed comparison may include studies related to resource demand variations with varying project characteristics; for example, project size, complexity, culture, success in achieving strategic objectives (tangible and intangible).
- Estimation of the portfolio resource costs and budgeting.
- Identifying the external resources required for portfolio success.
- Development, transfer, or shedding of the available competences, ensuring short-term and long-term perspectives.

Project portfolios are characteristically dynamic and require constant planning, monitoring, and controlling of organizational resources (Petit, 2012). It entails the routines of performing resource supply-and-demand analysis (Pennypacker & Retna, 2009; Perry, 2011). Similarly, other studies suggest that management practices for a balanced allocation of resources in a multi-project environment in itself is a dynamic capability (Eisenhardt, 2000; Helfat et al., 2007; Kuuluvainen, 2011). Such a capability (resource management) obliges the strategic alignment of PPM by maintaining resource demand and supply balance (Rajegopal et al., 2007, p. 107). It also ensures that resource capabilities are sufficient to accomplish each project to which the organization is committed (Killen & Hunt, 2010).

Continuous evaluations of portfolio resource allocations require building and reconfiguring the competences from an individual resource to organizational level. The literature offers considerable guidance on project portfolio resource allocation processes (for example, by Project Management Institute, (PMI, 2013a)). However, there is no one single perfect way (namely the PPMC resource management process) but to periodically review the resource requirements at the portfolio level (Turner, 2009). This PhD research recognized the abundant advocacy of the bottom-up approach to allocating resources at the individual project level and then aggregate it at portfolio level (for example, Turner, 2009; Kerzner, 2013). Investigating an R&D project portfolio, MacMillon & McGrath (2002) concluded that tracking resources allocation at the micro- or activity level will create more difficulties in balancing resources at the portfolio level.

On the other hand, the extant literature supports PPM as a top-down management practice (Perry, 2011, p. 10) to enhance departmental/functional performance through all available resources (Pennypacker & Retna, 2009). In more recent research, Kokshagina and colleagues (2016) highlighted the important role of cross-application managers in technology development. Another study (Abrantes & Figueiredo, 2015) considers the context-based resource allocation process for new product development (NPD) project portfolios. These authors' position is that the available guidance on resource allocation on portfolio level is too strict, and consequently organizations lose flexibility to adopt context-based resource planning, allocating, and balancing at the portfolio level.

One of the possible reasons, as this PhD research found, is the above-mentioned bottom-up resource aggregation approach. The extant scheduling techniques are only good for optimizing resources at the project level (see: Abrantes & Figueiredo, 2015, p. 1275; Yaghootkar & Gil, 2012). These techniques limit project managers'/leaders' focus on the successful completion of their assigned projects and ignoring the changes required due to the dynamics of the portfolio itself. Accordingly, there are considerable gaps in the literature regarding the PPMC's people dimension. The most relevant gaps for this PhD research is discussed in the proceeding sub-sections.

4.3.3.1 PPMC characteristics of people (and resource) dimension

Project portfolio management involves the simultaneous operations of projects at any unique stage of their lifecycles. These projects of different types, natures, goals, and degrees of complexity share identical resource pools and organizational management systems (Zika-Viktorsson et al., 2006). It results in more standardized and structured organizational routines and processes of resource management (Cohen et al., 2004). This combination of standardized processes with unique and non-unique project characteristics involve important aspects of the people (and resource) dimension of PPMC. Related insights from Abrantes & Figueiredo (2015), Killen & Hunter (2010), Payne (1995), and Zika-Viktorsson and colleagues (2006) includes:

- a. **Resource capacity** is important to the availability and appropriateness of resources to perform multiple simultaneous projects. Organizations do not intend to keep the resources idle or utilize them under capacity, when the result is the over-utilization of portfolio resources. Factors resulting in resource overloading includes task resemblance, leading resource allocation to an increasing number of projects; misalignment between

functional and project management processes; psychological stress due to multiple time pressures; multi-tasking resulting in reduced efficiency; and no opportunities for recuperation between projects.

- b. **Resource conflicts** are common in a multi-project management environment. There are four commonly observed resource-related conflicts. First, people's personality clashes (functional specialist rivalry issues are also part of these issues), or difference in work requirement understandings of project managers and resource managers. Secondly, systems-related issues such as priority scheduling, work scheduling processes, and reward and compensation processes. Thirdly, organizational issues arise as most of the project-based organizations are in matrix form and thus suffer from functional bias/prioritization. The fourth issue is related to the reliable resource information, which includes current workload, future expected workload, competence level evaluations, and future development targets. This in return necessitates the synchronized sharing of cross-functional information. PPMC communication routines will be designed to effectively resolve these issues on a day-to-day basis (Curlee, 2015, p. 215).
- c. The organization's **commitment** with any of its project depends on its size or importance or its expected outcomes. This varied level of commitments will affect more than one project in these organizations, as the other projects with same resources may suffer from less attention. Balancing of resources and the organizational commitment for such projects (neglected and over-emphasized) is least discussed. Another related issue arising from multi-project commitment is psychological stress due to simultaneous resource allocation and reallocation among the different projects of the portfolio (Blichfeldt & Eskerod, 2008).
- d. Portfolio **contexts** include culture, procedures, and norms of organizational behavior. Organizational culture remains in steadily changing condition, as does the individual project culture (Butt et al., 2016). An organization's culture affects the culture of the project portfolio too. The norms of people behavior and procedures of resource handling are also observed to change along with portfolio performance and organizational expectations.
- e. Project portfolio **complexity** is related to multiple project interfaces and the impact of each new project included in the portfolio (Teller et al., 2012; Saynisch, 2010). Resource dependencies and prioritization increase portfolio complexity in terms of cultural impact, technical impact,

structural impact and economic impact. Similarly, cancellation or on-hold state of any of the ongoing projects impacts resource-sharing between other projects and how the costs of such complexities are absorbed at the portfolio level. The variation of project sizes in term of duration and capital investments, their urgency in terms of time or required outcome, as well as the required skill and technology levels, all contribute to defining the complexity of projects.

- f. People **engagement** from different organizational hierarchies and the synergy of their competences (knowledge) is at the heart of PPMC performance. Portfolio activity coordination (Jonas, 2010; Teece et al., 1997), people integration (Heising, 2012, p. 590), and engagement mechanisms underpin functional knowledge synergies between portfolio components (Rank et al., 2015). Considering PPM as a top-down approach will lead to a situation where decisions are not communicated to the brains at the operational level (projects, programs, and functions).
- g. **Empowerment** concerns all portfolio stakeholders. People should understand their responsibility, authority, and accountability to perform portfolio tasks and routines. Lacking this sort of empowerment, the PPMC governing bodies become dysfunctional and remain bound to the limited vision of their functional targets. Apparently, people are only interested in learning best practices to improve their departmental/functional key performance indexes. Therefore, instead of empowering a particular role (as discussed in Jonas, 2010), PPMC will seek empowerment across all organizational levels and hierarchies. Portfolio governance system will complement an empowered climate through accurate and efficient information- sharing, 'autonomy through boundaries', and accountability (Seibert et al., 2004).
- h. Project portfolio management is about channeling people's interactions, and an essential outcome of these social interactions is **learning** new knowledge (Crossan et al., 1999; Nonaka et al., 2001). What people learn and which learning mechanisms are activated in an organization are important to PPMC success. These learning mechanisms are also important to the path-dependent development of its capabilities. The degree of utilization of three learning mechanisms discussed in this dissertation (Chapter 5) is relevant to understand the organizational focus on short-term objectives and limitations of the long-term capability development context.

4.3.3.2 PPMC people and leadership

Project portfolio management (PPM) has been considered as a practice done by top leadership (Pennypacker & Retna, 2009). Accordingly, most of the PPM literature is dedicated to investigating and guiding the role of higher-level managers and teams (see: Hermano & Martín-Cruz, 2016; Jonas, 2010; Jonas et al., 2013; Kloppenborg & Laning, 2012). The resulting impression is that the PPM leadership role remains stagnant between portfolio governance bodies and executive leadership; this is referred to as vertical leadership (Müller & Turner, 2007; Pearce, 2004). It results in project managers also exercising vertical leadership due to the constraints of fixed outcome objective (Müller et al., 2016). In their recent study, Müller and colleagues (2016) have confirmed that most of the project management literature advice is vertical leadership conduct-based. Furthermore, for project managers, the transactional leadership style (task performance-focused conduct) is preferred over transformational leadership (behavior-focused conduct) (Keegan & Hartog, 2004).

According to a recent study (Müller et al., 2016), there is an urge to understand horizontal leadership at the portfolio level, relatedly term 'shared leadership' (Pearce, 2004), which supports coordination through empowerment, shared mental models, and learning. Müller and colleagues (2016) also suggested to investigate the right balance between vertical and horizontal leadership required for project success. Similarly, Perry (2011) has written about situational leadership characteristics during the different phases of PPM program implementation. Another rare exception is the study by Kissi and colleagues (2013), who found that the transformational leadership of a portfolio manager has a positive impact on project success. Otherwise, there is a significant literature gap in terms of people leadership in PPM.

Project portfolios are dynamic in nature, always changing due to internal components (projects, program, and related activities), value propositions, stakeholders, and business targets. This PhD research establishes that with the current stream of mechanistic approaches to vertical leadership, project portfolio management may remain only as an organizational practice. At the same time, the leadership literature is rich with different leadership approaches that may be suitable for PPMC research, namely shared leadership (Drescher & Garbers, 2016; Müller et al., 2016; Pearce, 2004), contextual leadership (Havermans et al., 2015), data analytics-based automated leadership (Parry et al., 2016), and collectivistic leadership (McHugh et al., 2016). There is also an opportunity to establish the leadership framework for PPMC and further test it empirically, but that is beyond the scope of this PhD research.

4.3.3.3 Project portfolio stakeholders

Project portfolios have internal as well as external stakeholders, as do individual projects (Beringer et al., 2013; Littau et al., 2010; PMI, 2008, 2013a; Wyzalek, 2015). Portfolio components can create business value through the mechanisms of integrating knowledge assets possessed by its stakeholders. The portfolio performance is greatly dependent on these stakeholder integration mechanisms (Artto et al., 2016). Meanwhile, PPM has an inherent tendency of empowered stakeholder engagement for problem-solving and decision-making. Therefore, stakeholders are important, as the strategic value proposition of a portfolio is dependent on stakeholder knowledge contributions; this way, the portfolio and its stakeholders reciprocally affect each other (Freeman, 1984). The evolving stakeholder relationships, as those are dynamic in nature (Butt et al., 2016; Missonier & Loufrani-Fedida, 2014), affect project success and hence the portfolio performance outcomes (Heising, 2012; Martinsuo & Lehtonen, 2007).

Management of stakeholder expectations and the impact of their engagement (Beringer et al., 2013) to business value creation are discussed at length in the strategic management literature (Freeman, 1984; Harrison et al., 2010). However, the literature includes only scant examples of investigating PPM stakeholders. One area of concern is that available research has focused only a few of portfolio-specific roles (for example, Beringer et al., 2013; Blomquist & Müller, 2006; Hermano & Martín-Cruz, 2016; Jonas, 2010; Jonas et al., 2013), or otherwise on the governance of portfolio stakeholders (for example, Müller, 2009; Müller & Lecoivre, 2014a; PMI, 2013a). This literature synthesis has, therefore, identified a fundamental need for research on project portfolio stakeholders (as done by Wyzalek, 2015), their interactions and expectations, knowledge integration mechanisms, and engagement at various organizational levels and functions. The PPMC investigation framework developed in this PhD research will also benefit such future research.

4.4 PPMC Routines (& activities)

Routines are fixed response of organizational resources for a defined stimulus or motivation, i.e., the existence of a business organization. Investigations on organizational capabilities will remain incomplete without observing their constituting routines (Nelson & Winter, 1982; Teece, 2012). PPMC research-based scholarship is infrequent, and studies like this PhD research are rare, which distinguishes PPM capability routines from its dimensions of people (and resources), processes, and structures. Bringing forth the capability dimensions,

routines, and performance-based thinking has been very exciting, as it is offering more potential for future research.

Routines penetrate resource positions, processes, and structures of organizations (Felin et al., 2012). The investigation will become even more demanding if the capability routines (its constituting activities) are spread across multiple knowledge and competence domains and administrative bodies. Consequently, distinguishing PPMC routines from each other as well as from other organizational capabilities has not been straightforward until the coordination action patterns of resources were closely monitored over a longer period. Still, it will remain over the cognitive limit of (an) individual(s) to recognize all the action patterns formalized as PPMC.

Consequently, this dissertation limits itself to the following three “*repetitive, recognizable patterns of interdependent actions*” (Felin et al., 2012, p.1355) as organizational routines forming PPMC. It is not claimed that these three routines are all the activities coverable under the PPMC umbrella. The omissions need further investigation and hence are left for future research.

1. PPMC governance routines
2. PPMC communication routines
3. PPMC project management routines

4.4.1 PPMC governance routines

In a literal sense, governance is “*the way*” an entity “*is controlled by the people who run it*” (Merriam-Webster, 2017). In this regard, corporate governance is providing structure for objective-setting, action realization, and monitoring performance outcomes (OECD, 2015). In a business organization, PPM governance is a subset of corporate governance (Biesenthal & Wilden, 2014; PMI, 2016; Müller et al., 2015; Müller et al., 2016a; Too & Weaver, 2014). It involves “*the framework, functions, and processes that guide portfolio management activities in order to optimize investments to meet organizational strategic and operational goals*” (PMI, 2016, p. 4). According to another influential work on project-related governance, PPM governance covers “*value system, responsibilities, processes and policies that allow projects to achieve organizational objectives and foster implementation that is in the best interests of all the stakeholders, internal and external, and the corporation itself*” (Müller, 2009, p. 4). In practice, PPMC governance routines provide guidance as well as

operationalizing to coordinate project, program, and portfolio management activities in an organization (PMI, 2016, p. 12). PPMC governance routines perform four functions related to the management of a project portfolio (PMI, 2013a, p. 11).

- Oversight and guidance on PPMC processes, structures, and resource (people's) competence requirements.
- Perform quality control functions.
- Continual integration of PPMC processes and their alignment with corporate governance.
- Defining accountability and delegating decision-making authority.

PPMC governance routines also continuously gauge the performance of projects with strategic value (Too & Weaver, 2014). It involves overseeing project alignment, risk management, and project performance (PMI, 2016, p. 49), as well as defining the roles and responsibilities of organization-wide PPM stakeholders (Biesenthal & Wilden, 2014). PPMC governance needs dedicated communication routines for decision-making transparency and accountability of actions (Müller, 2009), so problems are addressed in a timely manner and by the right discussion and decision-making forums (PMI, 2016, p. 41). It requires that PPMC governance routines are linked with other governance bodies in the organization (for example, IT governance boards) and establish “*integrated governance processes*” through a collaborative group of executives, managers, and other organizational stakeholders (PMI, 2016, p. 45-48).

PPMC governance routines are also required when considering the varying nature of individual projects and its stakeholders, processes, competences (of resources) and organizational structures (Turner & Keegan, 2001). These routines inspire stakeholders' behavior of knowledge integration. Meanwhile, corporate governance promotes control mechanisms to protect shareholder wealth. PPMC governance routines thus represent an organizational balance between behavioral and control orientation towards shareholders and stakeholders (Müller et al., 2014; Müller, 2009). Earlier, Müller (2009) noted a four paradigm-based PPM governance approach:

- i. ***Conformist paradigm***: Maximizing return on investment with rigorous compliance with existing procedures and policies. The motives of cost efficiency through quality improvement projects are driven through behavioral control mechanisms with a focus on shareholders.

- ii. ***Flexible economist***: Maximizing return on investment with enhanced learning efforts to enhance competences to improve cost efficiency by selecting the best processes driven through outcome control mechanisms with a focus on shareholders.
- iii. ***Versatile artist***: Satisfying a wide range of user requirements in diverse market segments. People competences are important in working with “*flexible and creative*” methodologies to portfolio value creation driven through stakeholder outcome control mechanisms.
- iv. ***Agile pragmatic***: Focus is on the time-phased usability of products and services. Agile approaches are used to introduce enhanced features to the earlier releases of products and services driven through stakeholder (user) behavior control mechanisms.

Later on, Müller & Lecoivre (2014) noted the applicability of more than one paradigm to an enterprise managing multiple businesses and related portfolios. These authors found that the preference of governing paradigm changes with the type of projects and investment size (2014a, p. 1355). One clear distinction, though not explicated there, in their study that shareholder orientation is focused on business results with higher investment and short-term progress targets. Meanwhile, the long-term competence/operational development projects are focused through stakeholder paradigms.

PPMC governance routines reflect organizational efforts to minimize inconsistencies and conflicts in organizational processes, structural responsibilities, and resource/role assignments (Müller, 2009, p. 2). However, even as the guidance on PPM governance is increasing, there is still confusion about the level of governance an organization should idealize for PPM success (PMI, 2016). Project portfolios are inherently dynamic, complex, and promote organization’s change adaptability. Whereas corporate governance promotes stability through behavioral control mechanism of fixed policies, procedures, and processes. This is a clear contradiction between order established by corporate governance and project portfolios’ chaotic nature. PPMC governance routines will reconcile this order and chaos with a flexible approach (Geraldi, 2009). Otherwise, the PPMC governance routines remain insufficient and result in the following commonly reported problems (Too & Weaver, 2014; Elonen & Artto, 2003):

- Portfolio decision ignores the availability of competences and resources
- Decision-making roles and responsibilities are inadequately defined

- Overlapping projects in different portfolios
- Not all the achievements of individual projects are integrated into the other portfolio components (projects, programs, and sub-portfolios)
- Portfolio-level progress feedback is not transferred to project level
- Project termination is avoided even it is beneficial for the organization

There have already been efforts to shift the extant literature's deterministic focus on project-based governance to the system perspective of PPM governance (Locatelli et al., 2014). It requires an appropriate consideration to "*communication, intersubjective complexity, and interpretation*" (Locatelli et al., 2014, p. 1401) of human-related actions through which systems learn (Checkland, 2000). These considerations require flexibility in planning and controlling project activities by taking into account the equifinality of different solutions, especially in complex situations (Kapsali, 2011). PPMC governance routines will be responsible for maintaining this flexibility (Müller et al., 2014), for example, through flexible PPMC processes and alternative tools to support these processes. This approach is similar to Gelardi's claim that flexibility is creating a "*range of possibilities that the organization allows one to choose*" for managing projects (2009, p. 152).

PPMC governance-supported flexibility also includes idiosyncrasy at the individual project level, organizational structures' ability to accommodate the soft aspects (of system thinking), and 'self-controlled neo-liberal' management approaches (Müller et al., 2014, p. 1317). Instead of mechanistically implementing governance policies, procedures, and processes, an organization's leadership promotes shared visions and business value concepts (Müller et al., 2014, p. 1318). It is concerned with "*people's mind-set*" (2014, p. 1318) and "*cognitive flexibility*" (Müller et al., 2015, p. 848). The resulting shared practices establish stakeholder trust and understanding about the short-term and long-term business value (Biesenthal & Wilden, 2014; Müller et al., 2013; Müller et al., 2014a; Müller et al., 2016a).

Müller and colleagues (2014) further stressed responsible organizational behavior and incentive systems to promote PPMC-guided flexibility. Still, the flexibility in governance is not ad hoc problem solving; it is simply modifying and contextualizing already learned practices, processes, and policies (Müller et al., 2015). PPMC thrives with a balanced focus between change adaptability and stability (Farjoun, 2010) through its governance routines— earlier referred as ambidextrous governance (Müller et al., 2015) supporting organizational ambidexterity (Farjoun, 2010; Gibson & Birkinshaw, 2004).

According to Müller and colleagues (2015) three categories of organizational enablers support ambidextrous governance: *'regulative enablers'*; *'normative enablers'*; and *'cultural-cognitive enablers'*. According to their case study findings (Müller et al., 2015, p. 842), regulative enablers reflect organizational *"willingness to adopt regulations"*, a deterministic view of governance. The normative enablers develop a common language (earlier suggested by Grant, 1996, p. 116) and collective sense-making about the essentiality of certain social behavior typical for successful multi-project management (PPM). The cultural-cognitive enablers establish mental models for doing business as projects. The combination of these three enablers is a source of path dependently developing PPMC governance routines.

4.4.2 PPMC communication routines

Communication can be understood as a process of exchanging information *"through a common system of symbols, signs, or Behavior"* (Merriam-Webster, 2017a). Purposeful communication is part of our social interaction and a significant element of human living. There is considerable guidance on the significance of project communication (Kerzner, 2013; Turner, 2009). Project leaders utilize push-pull and interactive communication to ensure that the intended message is well understood (Kerzner, 2013). The primary focus is on the coordination of tasks performed by multiple stakeholders. Effective and efficient project communication will lead to maintain stakeholder interest, trust, and engagement throughout the project lifecycle (Butt et al., 2016). Meanwhile, it is prudent to ask if the portfolio communication is to be considered as a summation of project communication, or if it is more than that, especially when PPM is to be developed as an organizational capability. There is no straightforward answer to this question.

However, worth mentioning is the consensus in the literature that the portfolio communication routines underpin the collaboration that goes beyond the structural boundaries of organization (Jonas, 2010; Pennypacker & Retna, 2009, p. 188; PMI, 2013a; Rajegopal, 2013, p. 76). It refers to PPMC communication routines involving more than process-based functional communication. PPMC governance comprising processes, policies, etc. will not help in collaboration until contextualized communication routines are practiced (Abubrée-Dauchez, 2015), as it requires synchronized information flow of portfolio-wide activities (Müller, 2009, p. 49). The quality of information (accurate, relevant, complete, up-to-date and well-presented) and its availability to the concerned stakeholders affect portfolio decision-making (Cooper et al., 2000; Jonas, 2010) as well as the new

knowledge learned (Artto, 2001). Therefore, PPMC communication routines are planned, purposefully structured, and coordinated to make sure that everyone is on the same page (Pennypacker & Retna, 2009, p. 187).

Is there something more special about PPM communication? Yes; PPMC communication routines concerns executive leadership as well as each of the individuals (resources) working on unique portfolio components and integrating their expert knowledge (PMI, 2013a, p. 107). Herein, the transparency of decisions made at various organizational levels and visibility of the corresponding actions is required for stakeholder engagement. Therefore, PPM communication routines are designed to encompass formal as well as informal networks for stakeholder interactions (Abubrée-Dauchez, 2015, p. 199).

It is understood that project portfolios are structurally complex, first due to the interdependencies within their components that interact with the business environment, and secondly due to its own dependence on multiple realities of the organization (Arlt, 2010; Geraldi & Arlt, 2015, p. 7). Hence, complexity is embedded in any portfolio (Abubrée-Dauchez, 2015, p. 196), and PPMC is about managing complex and multidimensional problems in an organization. However, these complexities are also emergent in nature (Dakakni, 2015, p. 282) and require that PPMC communication routines serve these multiple interdependencies and emerging complexities (Locatelli et al., 2014). These interdependencies will remain until the performance outcomes of portfolio keep affecting the organizational business. This is not the case when planning project-wise communication, even for an ultra-complex project.

A project portfolio is complex and interdependent, and so the problems related to PPM are multidimensional. Developing PPMC is striving for a long-term coordinated response to multidimensional problems where each individual (resource) is equally important. In other words, it is about transferring the sense of complexity and interdependence of actions to more and more organizational stakeholders. However, this PhD research notes the limited guidance in the literature regarding PPM communication which is still based on the stakeholder models used for project communication (for example, the referenced studies in this sub-section). Thus, PPM communication remains limited to the financial numbers and matrices based on short-term business outcomes, and communication related to portfolio components (both projects and programs) remains disconnected within PPM governing bodies.

There is one (relatively) recent study on PPM communication (Geraldi & Arlt, 2015) that directs our attention to the limitation of human cognition in making portfolio management decisions (Geraldi & Arlt, 2015, p. 6-7). These authors

offered the use of 'visual language' to facilitate PPM communication. However, they also cautioned about the trouble with plain communication (Geraldi & Arlt, 2015, P. 25-26), which in most organizations is based on financial matrices (Dakakni, 2015, p. 300). An earlier study proposed to establish a systematic analysis of portfolio interdependencies (Arlt, 2010, p. 225), which would clarify the portfolio communication requirements (PMI, 2013a, p. 117). Another experiment-based study found that visualizing portfolio interdependencies through network mapping techniques improves portfolio decision-making (Killen & Hunt, 2013) and hence performance outcomes of PPMC. An earlier study (Killen & Kjaer, 2012) modelled deliberate communication processes (herein PPMC routines) to improve the understanding of interdependencies between portfolio components.

It will be considerably challenging to manage multi-stakeholder dynamic interface-driven data collection and its misinterpretation (Dakakni, 2015, p. 267) in the age of big data (Williams et al., 2014). In this regard, PPMC routines control the acquisition of information, its dissemination, the development of shared interpretation of this information, and the development of organizational memory (Tippins & Sohi, 2003). PPMC therefore uses a common language system (Grant, 1996, p. 116) based on project management terminologies.

Organizations' procedural memory, declarative memory, and transactive memory (Chen & Miller, 2015) establish the coordination of activities as organizational routines, and an organization's knowledge resides in these routines. It refers to the duty of PPMC routines to connect and engage people in knowledge collaborations (Abubrée-Dauchez, 2015, p. 203). This duty is not within the scope of project-level communication. Additionally, PPMC communication routines improve the project communication, because they are designed to lead to the routinizing of cross-functional knowledge collaboration in order to achieve the success of all other portfolio components. Failure of one such collaboration will result in changed functional routines for other portfolios and their components. It is rare in the extant literature that such details are presented with explicit logic and theoretical underpinning. Meanwhile, there are some initial attempts under the subject of knowledge governance in project-based organizations (PBOs), where scholars attempted to explain strategies for knowledge collaboration and the relevant roles of people, structures, and processes (Pemsel & Müller, 2012; Pemsel & Wiewiora, 2013; Pemsel et al., 2016).

The importance of communication infrastructure, especially for information and communication technologies (ICT), is undeniable. The synergy between human actions and technology is attaining ever-increasing importance in this 'age of big

data' (Williams et al., 2014). Herein, the PPMC communication routines are supported through ICT-based collaboration platforms, referred to as portfolio management information systems (PMI, 2013a, p. 25). Portfolio management information systems (PMIS) include tools and techniques to bring visibility of matrices and indicators as input for decision-making, to perform the analysis for decision-making, to disseminate the decision results leading to anticipated action, and to obtain portfolio performance status indicators (portfolio KPIs). Notable advice on PMIS adoption is available in the literature (for example, in Bible & Bivins, 2011; Rajegopal et al., 2007).

A very common problem in IT-driven collaborations is the incompatibility between multiple IT-based systems, which turn bigger organizations into a “*technical Jungle*” (Rajegopal et al., 2007, p. 213). Such incompatibility contributes to disconnected decision-making based on incomplete, irrelevant, incorrect, functionally detached or otherwise delayed information. This is not helpful in developing shared interpretations (Tippins & Sohi, 2003) and collective sense-making (Petit, 2012) of stakeholder actions. Consequently, PPM governance routines become less adaptive as the leadership strives for more control and stability in portfolio performance figures—i.e., a short-term business orientation. Such a situation will shift the balance of a project portfolio and so forth.

4.4.3 PPMC project management routines

Project management is a core capability for developing engineered solutions and delivering complex product systems (CoPS) (Lampel, 2001; Söderlund & Tell, 2011). Attraction in managing by projects is focused on the “*delivery of goals*” (Morris, 2013, p. 6). It reflects organizations' future action alignment approach to accommodate emerging situations. Such an approach is distinguishable from the traditional management of business activities in distinct functions. Today, management by projects is common, in one form or another, in almost all business organizations (Turner, 2009). Therefore, project management literature is considerably vast (see: Kerzner, 2013; Morris et al., 2011; Morris, 2013a; PMI, 2013; Turner, 2009) and this body of knowledge is still expanding. However, as our apprehension of reality remains imperfect, similarly, the project management literature has yet to answer the engendering questions as its significance in achieving business outcomes is increasing (Bannerman et al., 2013; Morris, 2013a; Padalkar & Gopinath, 2016; Saynisch, 2010; Söderlund & Maylor, 2012).

Project management concerns a wide range of organizational activities (as reflected in Figure 14). This literature synthesis, valuing the presence of prominent

scholarships on the project management development process in organizations (for example, Midler, 1995; Söderlund & Tell, 2009), does not necessitate to present a detailed discussion on project management activities (& routines). Meanwhile, it is learned that PPMC development entails modification and upgradation to the project management processes and related practices (Cooper et al., 2000; Turner et al., 2010).

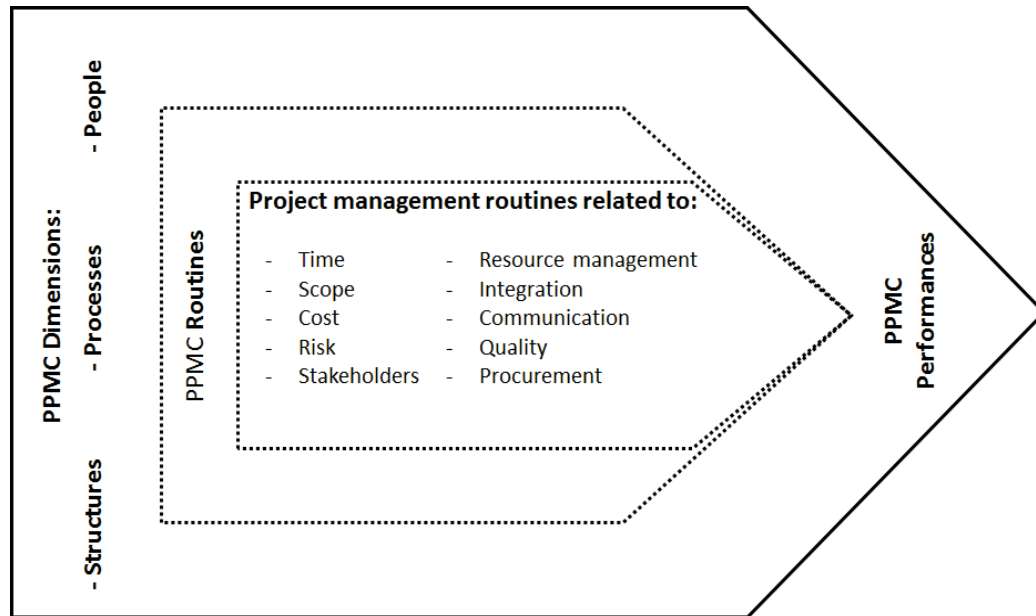


Figure 14. Typical representation of organizational project management related actives in the context of this PhD research (modified from Morris, 2013)

Individual project outcomes impact its portfolio's performance (Martinsuo & Lehtonen, 2007). Whereas, the practices, methodologies, processes, and tools designed for single project management are not sufficient for managing projects in portfolios (for example, explained in Teller et al., 2014; Martinsuo et al., 2014; Yaghootkar & Gil, 2012).

Traditionally, there has been a tendency in extent literature to adopt guidance from individual project management to the management of portfolios as well. Amongst other, a reason for this increasing tendency is to control project outcomes and ignoring the potential opportunities and threats in novel situations (Lenfle & Loch, 2010). However, there is an urge on focusing 'management of projects' (For example, Morris, 2013, 2013a) rather than single project focused 'management' approach. The crux of organizational management of projects is in developing a business environment based value approach for stakeholder success (Morris, 2013).

4.5 PPMC Performance Outcomes

Similar to the literature disparity of project portfolio management (PPM) conceptualization as an organizational process, management system, practices, and a capability, its contribution to organizations' success has been studied under different research subjects. Most such scholarship reported PPM contributions under three main topics: (i) project portfolio success (for example, Kock et al., 2016; Meskendahl, 2010; Voss & Kock, 2013), (ii) portfolio management efficiency (for example, Martinsuo & Lehtonen, 2007), and (iii) project portfolio management effectiveness (for example, Patanakul et al., 2013; Patanakul, 2015). The current PhD study considers the reported benefits under the abovementioned topics to be collectible as PPMC performance outcomes. In an earlier study, Cooper and colleagues (1999) used performance metrics to represent the benefits of PPM.

Project portfolio management efficiency is understood as *“the organizational members' estimate of the degree to which the projects together, as a portfolio, succeed in fulfilling the portfolio objectives being strategic alignment, portfolio balance and value maximization”* (Martinsuo & Lehtonen, 2007, p. 59). Similarly, Patanakul and colleagues (2013, p. 31) defined PPM effectiveness in more detail as *“the organizational capability to 1) form and govern a project portfolio such that the portfolio aligns with the organization's strategic direction, addresses risks and opportunities, and is adaptive to the internal and external changes in order to provide short and long-term value or benefits to the organization, and 2) the ability to manage projects in the portfolio to promote transparency, process consistency, visibility and predictability of projects in the portfolio, and to promote integrity, cohesion, and the morale of the project community”*. However, Patanakul (2015, p. 11) recently recognized that effectiveness and efficiency dimensions of PPM constitute PPM success. More recently, Kock and colleagues (2016) established that along with effectiveness and efficiency, the timeliness of PPM is a third dimension of portfolio management success. The timeliness of PPM, as explained in another study (Kock & Gemünden, 2016), is about accomplishing right-time decision-making through business-wide coordinated systems.

Most of the acclaimed PPMC scholarship has focused on proving that it is a dynamic capability (for example, Killen et al., 2008; Petit, 2011). Consequently, these studies focused on analyzing the organizational sensing, seizing, transforming, and reconfiguring achievements of PPMC. These studies presented sensing, seizing, and reconfiguring and transforming activities as the performance outcome of PPMC. According to such scholarship, the organizational capabilities contributing to sensing, seizing, and transforming activities are dynamic capabilities. Another similar example is a study (Patanakul, 2015) that segregated

PPMC performance outcomes into two, some as strategic features and others as operational attributes of performance.

This current PhD research avoids separating the performance outcomes of PPMC and avoids stating that PPMC is a generalized dynamic capability. Herein, the position is that PPM is an organizational capability, and the research aspires to understand the path-dependent nature of organizational capabilities. The subsequent sub-sections succinctly present the performance outcomes of PPMC as discussed in the extant literature. In practice, these performance features are intermingled and interdependent. Consequently, the order of their presentation does not reflect the order of their significance. The organizational utility of its capabilities is business context-dependent, as are the contributions of these capabilities to business success. Restating the critical realist position of this research, not all possible performance outcomes of PPMC could be included in this dissertation.

4.5.1 Decision-making transparency

‘Doing right projects’ and ‘doing projects right’ (PMI, 2013a) have become synonymous with project portfolio management (PPM). It reflects the decision-making oriented process approach of PPM (Kock & Gemünden, 2016). In this regard, PPMC will facilitate decentralized decision-making (Kester et al., 2009) with the involvement of empowered and accountable stakeholders. Stage-gate process models (Cooper et al., 2000) are cited for their ability to facilitate decentralized decision-making. PPMC includes a set of complex processes with decision-making supported through company-specific stage-gate models (Cooper, 2008; Crawford et al., 2009). Organizations tailor stage-gate process models according to the project types and categories. In short, PPMC equips the organization with a decision-making hub reinforced by a common language to reduce communication gaps between functional and project operations (Levine, 2005, p. 90-91). However, this alone is not enough.

Common grounds (criteria) are also required for stakeholder acclaimed decision-making and transparency. Along with such criteria, PPMC further furnishes tools and mediums to maintain this transparency with accurate, relevant, complete, up-to-date and well-presented information (referred as information quality) for stakeholders (Jonas, 2010). Information quality also impacts stakeholder perception of an uncertain situation as either opportunity or threat and guides their actions impacting portfolio components (Martinsuo et al., 2014). A project portfolio governance system maintains decision-making criteria and links them

with the project communication requirements and information quality—for example, through visuals (Geraldi & Arlt, 2015). Well informed and acknowledged criteria undergird the transparent information and establish stakeholder consensus through collective sense-making about actions (Patanakul, 2015), further promoting the shared mental models to tackle unique situations. This decision-making transparency supplements PPMC contributions to business success (Jonas et al., 2013).

In the literature, there are also dedicated ready-to-use tools and written guidance to support project portfolio management as a decision-making process (for example, by Bible & Bivins (2011)). Through a case study research, Kester and colleagues (2009) found that PPM decision-making is driven by three approaches, namely intuition, integration, and formal quantitative criteria. Meanwhile, Petit (2011) recognized that in the presence of these approaches, organizations still need to deploy interpretation mechanisms to make sense of multi-interdependency-driven portfolio uncertainties. Also, Jerbrant & Gustavsson (2013) noted sense-making and improvisation-based decision-making in project-based organizations (PBOs). Relatedly, it is also established that individual portfolio components require diversified approaches to decision-making (Naaranoja, 2015). It is because the project teams tackle diversified challenges, which are unsolvable using only one problem-solving approach and mechanistically developed tools (Geraldi, 2009).

4.5.2 Visibility & predictability

Limited information complemented with information filters blurs the organizations' "*perception of actual project performance*" (Oorschot et al., 2013, p. 285). Therefore, an important performance feature of PPMC is its ability to establish project visibility and hence project outcome predictability (for example, using a stage-gate process model for project management). Portfolio visibility is "*the degree of exposure of a project to its stakeholders*" (Patanakul, 2015, p. 1091). PPMC communication routines upfront realize this visibility of the relevant information and maintain a climate for stakeholder engagement (Jonas, 2010).

This satisfies the needs to maintain project visibility through up-to-date information about project performance and analysis to predict the project outcomes. Project visibility connected with its outcome impacts on the project portfolio (ultimately on the business) will lead to 'better support the stakeholders' (Patanakul, 2015). Project performance predictability and its visibility at the portfolio level will affect and be affected by cross-functional knowledge

integration. However, Patanakul (2015) has identified the limitation of the PPM literature on the topic of project visibility. This PhD research considers that this limitation is relevant to the scant research on project portfolio stakeholders (section 4.3.3.3).

Of considerable importance to the performance of PPMC is the strategic orientation and timeliness of decisions (Kock & Gemünden, 2016) because the timeliness of decisions reflects the agility of organizational adjustment in accordance with business environmental dynamics (Sirmon et al., 2007; Sirmon, 2011). Empowered and engaged stakeholders make the decisions whose short-term and long-term effects are collectively sensed. These stakeholders hence reach to the right decisions at the right times, and such decisions are realized through right actions.

4.5.3 Strategic fit (and alignment)

Strategic fit and strategic alignment of project portfolio(s) are terms that are used interchangeably in the extant literature, although strategic fit is included as one of the scoring criteria used to support portfolio component selection and prioritization (PMI, 2013a). In practice, this is one of the PMCC performance outcomes, targeting that portfolio components should reflect strategic priorities (Kock et al., 2016), as well as the evidence of successful implementation of strategic initiatives (Patanakul, 2015). Herein, PPMC will ensure that each resource invested in the portfolio components should serve both short-term and long-term strategic business value targets (Martinsuo & Killen, 2014).

Inherently, PPMC should establish this fit between internal routines and processes, customer needs, business partners, and business environments (compare: Teece, 2014a), resulting in a strategic fit between firm capabilities (*technical fitness*) and operating environment (*evolutionary fitness*) (Helfat et al., 2007, p. 7-8). Such an extended fit nurtures the organization's capability reconfigurations (Pavlou, 2011) fostered through continuous learning (Siggelkow, 2002). This is achievable with PPMC-guided organizational operations (Killen & Hunt, 2013). In this manner, PPMC governance and corporate governance system are important to monitor changes to business strategy (PMI, 2013a, p. 44). Consequently, stakeholder response from multiple organizational levels should maintain such a strategic fit.

The extant literature has also identified the need for more research to understand how such a fit between the portfolio implementation context, management practices, and strategy is realized (Chandler & Thomas, 2015; Aubry et al., 2012).

Meanwhile, this PhD research establishes a platform to support others' and later to extend the current investigation(s) on this front of attained strategic fit, which leads to long-term competitive advantage (Barney, 1991; Teece, 2007).

4.5.4 Business value maximization

Originating from portfolio theory in finance (Rad & Levin, 2006), the expectation of PPM is maximization of business value (Martinsuo & Lehtonen, 2007) through optimized resource utilization. Traditionally, project portfolio value is calculated from the contributions of its individual components. Practically, such value expectation, realization, and calculation are important for project ideation, screening, selecting, and prioritization processes. Organizations use various weighting factors to evaluate project values. The trade-off between various weighing factors reflects the strategic intent of organization and hence will affect the project portfolio balance—i.e., what an organization considers a 'balanced portfolio'.

Project portfolio value and the valuable contribution of individual projects (and programs) can be divided into monetary and non-monetary revenues (Martinsuo & Killen, 2014; Voss & Kock, 2013). A literature review on the strategic value of PPM (Martinsuo & Killen, 2014) established learning and knowledge development outcomes with a focus on long-term organizational goals. However, Martinsuo & Killen (2014) noted a tendency of converging attention paid to the financial side (monetary revenues) of project value contributions through PPM. Such a narrowed value maximization might even undermine the potential gains from PPMC as an operational (ordinary) capability; subsequently, its apprehension as a dynamic capability is beyond reachable.

PPMC serves the prime goal of business satisfying customer value expectations (Voss & Kock, 2013) through the exploitation of existing knowledge assets. Meanwhile, the PPM literature is limited to presenting the actual value of managing projects as a portfolio and how that value "*should be assessed*" (Martinsuo & Killen, 2014, p. 64). Similarly, it has noted (for example, in Patanakul, 2015) that even the value realization of individual portfolio components is difficult to measure. Moreover, the value anticipated during project selection and prioritization processes may not reflect actual value contributions once the project is complete (Martinsuo et al., 2013). Worryingly, this reflects a serious limitation of the extant literature.

4.5.5 Synergism

One of the most resonant impressions from the PPM literature, as well as data interpretations of this PhD research, is “*synergy*”. Linguistically, synergy is the “*interaction of elements that when combined produce a total effect that is greater than the sum of the individual elements’ contributions...*” (Dictionary.com, 2017). PPMC, through its ability to foster activity coordination, fosters synergy between the cross-functional and cross-structural knowledge integration (Harrigan, 1984). PPMC-guided synergy is also related to knowledge integration mechanisms and further support organizational knowledge-sharing (Pemsel et al., 2016). PPMC dimensions and routines consider stakeholders’ understanding of the synergy potentials of ongoing cross-functional activities; at the same time, management routines’ similarities undergird the realization of chosen synergies (Larsson & Finkelstein, 1999).

Importantly, these possible resource combinations (Sirmon et al., 2007; Sirmon, 2011), and knowledge synergies are learned from collective sense-making about the interdependencies (Weick, 2009, p. 55) in a project portfolio (Haapalainen, 2007, p. 80; Meskendahl, 2010; Voss & Kock, 2013). Learning about structural, relational, and cognitive network features affects the business value contribution from each portfolio component (Matinheikki et al., 2016). The similarities in management routines and processes gained from a PPMC governance system improve this synergism.

A thorough investigation of the extant PPM literature highlights the importance of understanding the potential synergies, however, limited to the projects and programs within a single portfolio (for example, Arlt, 2010; Jonas et al., 2013; Meskendahl, 2010; Rank et al., 2015; Voss & Kock, 2013). These studies focused on understanding and exploiting the relationships, including interdependencies and similarities in resources, technological platforms, stakeholders, and market dynamics etc., between ongoing projects in a single portfolio. Meanwhile, this literature synthesis recognizes that project portfolio synergism can enhance business value generation and transcend strategic fit (Voss & Kock, 2013) between organizational performance targets and the business ecosystem (similar to Teece, 2012).

Accordingly, PPMC synergism should encompass more than a single project portfolio. This reproduction-based reflection of the current research is rarely reported earlier in the literature. For example, Petit (2011, p. 97) study mentioned a project portfolio specifically planned and managed to develop synergy between the product and technology outcomes of other portfolios in the organization.

4.5.6 Change adaptability

Organizations deploy PPM to manage planned changes (PMI, 2013c) as well as unplanned changes (Petit, 2012). In fact, business-level (project) portfolios are complex, dynamic, and multiple interdependent systems that continuously change (Jonas, 2010, p. 820; Unger et al., 2012, p. 612). The need for regular change is a part of each portfolio component, involving knowledge contributions from several inter-organizational and intra-organizational stakeholders. It involves a four-tiered organizational complexity (Saynisch, 2010) that requires PPMC-driven change adaptability: structural complexity, or the relationship between individual portfolio components and organizational realities; technical complexity, which refers to designing and assembling the multifunctional expert knowledge, products and services; directional complexity, which refers to invisible targets and unshared business vision; and temporal complexity, which covers external environmental factors.

Winter (2003) sees such change implementation as embedded in organizational routines, not as ad hoc problem-solving. Success in this continual adoption at varying rates of change (internally and externally) necessitates that successful business organizations *'engineer their mutation'* (Teece, 2014a, p. 336). Avoiding path lock-ins (Snow et al., 2009; Schreyögg & Snow, 2011), this mutation demands making endogenous and exogenous changes to organizational routines (Wilhelm, 2014) for reconfiguring and transforming other operational capabilities.

According to a dynamic capability view-based study (Petit, 2012), PPMC fosters change adaptability by contributing to the sensing, seizing, reconfiguration and transforming activities (meaning routines). Earlier, Petit explained (Petit, 2011, p. 82) change sensing as *"organizing mechanisms to identify, filter and interpret changes and uncertainty which might affect the project portfolio"* component. The frequency of sensing mechanisms depends on the apprehension of environmental dynamism. PPMC-supported seizing includes *"mechanisms for deciding changes to project portfolio once a potential need for change has been sensed"* (Petit, 2011, p. 83). These related activities include changing the portfolio business model, governance rules, and decision-making protocols.

PPMC-supported reconfiguration is *"to continuously align and re-align the resources assigned to the project portfolio"* (Petit, 2011, p. 84). It includes structuring the portfolio to balance resource allocation, re-prioritizing the project(s) scope, and transforming the organizational process and decision-making bodies related to the project portfolio. 'Transforming' is related to (i) the improvement of sensing-seizing-reconfiguring mechanisms, (ii) enhancement of PPM processes, routines, and structures to match environmental challenges, and

(iii) improving knowledge management and organizational learning processes (Petit, 2012).

4.6 Chapter Summary

Management of projects is present in almost all business organizations. These organizations manage their projects and programs individually or collectively as portfolios. The extant literature offers a plethora of scholarship focusing on PPM practices, methods, tools, and techniques. The literature mainly focused on the best practice-based development of PPM operations. Their dominant advice is to implement PPM best practices from capability maturity models and perform a gap analysis to seek a higher proficiency. It is well established that maturity model-based best practices restrain the potential performance of organizational resources. On the other hand, a few notable studies conceptualized and investigated project portfolio management (PPM) as an organizational capability (PPMC).

This chapter has first established the need for a more detailed investigation into the nature of PPMC. Then, PPMC conceptualization is formalized (Figure 12) by extending the capability investigation framework developed in Chapter 3. Accordingly, PPMC has three dimensions of structures, processes, and people, and organizations develop resource routines from these three dimensions. The resulting PPMC routines lead to the desired performance outcomes. A detailed description of PPMC dimensions, routines, and performance outcomes has been established by synthesizing the extant literature. Through a retroduction-based critical realist stance, some literature limitations have been identified in terms of examining PPMC as an organization-specific dynamic capability in future.

5 ORGANIZATIONAL LEARNING

Organizations are the collectives of the learning individuals (Argyris & Schön, 1996, p. 3). Individuals create new knowledge and manage this knowledge through cognitive and situational learning (Nonaka et al., 2006; Prencipe & Tell, 2001; Sense, 2008). In a business context, learning involves acquiring, processing, and storing information from the operating environment (Argyris & Schön, 1996, p. 3; Crossan et al., 1999). Organizational learning is thus a time-bound process (Argote & Miron-Spektor, 2011) of developing new knowledge from human experiences for future utility. Learning results in developing new organizational routines and refining those already adopted routines (Kasvi, 2003). There is a consensus in the literature that learning is rooted in organizational survival. Organizations survive and thrive by gauging the performance of its resources, routines, and capabilities (Argyris & Schön, 1996). Through learning, a business organization becomes an evolving system to maintain strategic fit with the operating environment (Siggelkow, 2002), a system in continuous evolution. This sustainable success is a result of organizational learning.

Neither theory nor a well-established definition of organizational learning is present in the extant literature (Argote & Miron-Spektor, 2011; Crossan et al., 2011). The “*conceptual confusion and terminological ambiguities*” (Visser, 2017, p. 54) about organizational learning remains in the literature; however, there have been promising attempts at refinement (for example, Brandi & Elkjaer, 2011). On the one hand, the extant literature is uniform in presenting learning as a process, and knowledge as the product or content of this process (Easterby-Smith & Lyles, 2011, p. 4). On the other hand, ‘chicken or egg’ debates about knowledge and learning are (also) ubiquitous in literature. Without going into those details, there also exists scholarship that has established a causal relationship between organizational learning and knowledge management (for example: a recent study by Jain & Moreno (2015)), and then linked it to the development of organizational capabilities (for example: Vera et al., 2011).

For organizational learning, the importance of new knowledge and exploitation of existing knowledge is indisputable (Crossan et al., 1999, p. 523; O’Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008). According to Zollo and Winter (2002), there can be a recursive and co-evolutionary relationship between the exploration and exploitation of knowledge. Previously, O’Reilly and Tushman (2008) advised separating organizational structures and resource competences for a simultaneous realization of knowledge exploration and knowledge exploitation, referred to as structural ambidexterity through spatial separation between

exploration and exploitation activities. Alongside the structural separation, there is also requirement for temporal separation (Brown & Eisenhardt, 1997) when organizations prioritize either exploration or exploitation of knowledge. Meanwhile, Mom and colleagues (2007) observed the possibility of synthesizing structural separation and temporal separation for knowledge coevolution. Such synthesized coevolution of knowledge exploration and knowledge exploitation is observed in organizations possessing 'contextual ambidexterity' (Gibson & Birkinshaw, 2004) or 'harmonic ambidexterity' based on integrative mechanisms (Simsek et al., 2009). Nevertheless, maintaining such an organizational state is a continuous dynamic task (Raisch & Birkinshaw, 2008). Despite considerable scholarship on organizational ambidexterity its original and ideal conception, what March (1991) identified as 'what drives long-term organizational (business) survival', is yet to be realized (O'Reilly & Tushman, 2013).

According to Nonaka and colleagues (2014, p. 138), separating knowledge exploration from its exploitation disregards the importance of the environment or business context for which the knowledge was originally created. Accordingly, the processes of learning through which an organization relates its existing knowledge to operating environment to exploit and explore new knowledge, is least stressed in organizational ambidexterity scholarship. That is one reason why the prominent scholars of organizational ambidexterity (for example, O'Reilly & Tushman, 2013) are recognizing cases when literature-qualified ambidextrous organizations failed to obtain the knowledge required for their business survival.

In practice, organizational learning takes place at and between different levels (Crossan et al., 1999). Learning at the individual level contributes to the learning of teams and groups in a business organization (Marquardt, 1996; Nonaka et al. 2006, p. 1179). Therefore, organizational learning is a combination of four (4) continual processes of intuiting, interpreting, integrating, and institutionalizing (Crossan et al., 1999). These four processes interact dynamically through feedforward and feedback loops to ensure the transfer of knowledge among the individual, group, and organizational levels (Figure 15). These feedforward and feedback loops of learning connect resources' (in routines) performance outcomes to the strategic renewal of the organization (Crossan & Berdrow, 2003).

Individuals learn intuitively. **Intuiting** involves learning from experience and preconscious recognition, which aspires individual actions and interactions with other individuals. Intuition-based learning establishes the individual's ability to expertly repeat actions learned through experience, and to entrepreneurially analyze those actions to adapt to new situations. For business organizations, expert intuition concerns exploitation of existing knowledge, while entrepreneurial

intuition discerns the exploration of new insights (exploration at an individual level). Intuition-driven learning is a matter for the individuals until they start relating this learning from intuiting to their operating environment.

This involves collecting data and **interpreting** meanings. Interpreting thus is a conscious learning process through which individuals develop cognitive maps of their environments. Language and prior (expert) knowledge restricts an individual's choices when interpreting a constant flow of information from the environment. Therefore, individuals operating in the same environment interpret a given situation differently, at least in its details. Meanwhile, the presence of equivocal interpretations urges group interactions for developing shared understanding and a coordinated response. This entails learning by integrating the cognitive maps held within individual brains.

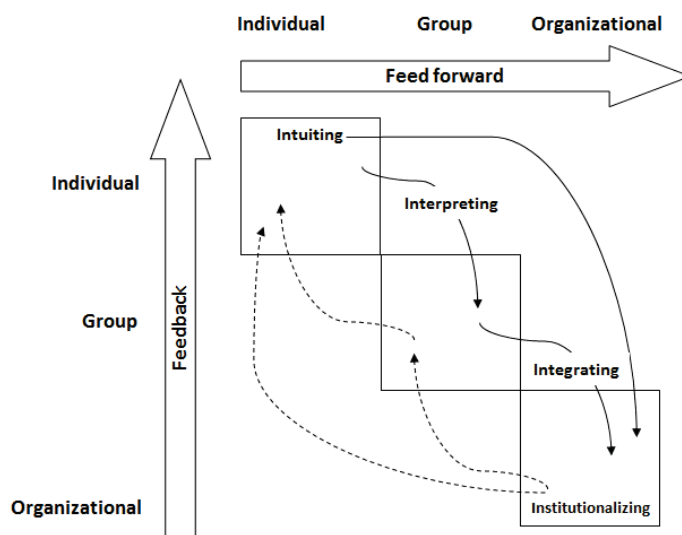


Figure 15. Dynamic processes of organizational learning (Crossan et al., 1999)

Integrating develops 'mutual adjustments' and negotiated actions as an outcome of their shared understanding and meaning of the situation at hand. Shared meanings are revealed through dialogue, a collective thinking process between the individuals and groups (Isaacs, 1993). The development of common language through interpretation plays a critical role in meaningful discussions, in the dialogue between consciously participating individuals. The integration learning process establishes links between knowledge held by individuals and groups. This linkage provides a platform to develop options (resource schemes) for variation (Van-De-Ven, 1995) in organizational competence base (Heimeriks, 2010) and to select development paths for existing capabilities or otherwise develop new capabilities.

Institutionalizing involves “*capturing the patterns*” of individual and group learning and embedding them as organizational memories (Crossan et al., 1999, p. 529; Crossan et al., 2011). Institutionalizing involves formalizing routines, procedures, and policies (Crossan et al., 1999) for organizational management control systems (Simons, 1994). These formal systems may lead to organizational inflexibility in adopting and generating new learning because individuals base their interpretations on available information in their operating environment. These formalized characteristics have diverse consequences to the learning at other levels (individual and group learnings). For example, it results in delayed knowledge transfer between individuals, groups, and organizational systems, and the newly learned knowledge at these levels may also be omitted from organizational memory. This will lead to disconnection between the learning feedback and feedforward loops (Figure 15). Herein, organizations remain limited to adopting incremental changes and decreasing business success rate.

5.1 Organizational Learning, Knowledge, and Capabilities

Organizational capabilities evolve through the collective learning processes of its resources (Teece, 2012). Organizational learning is thus a critical dimension for the development of organizational knowledge and capabilities (Grant, 1996; Spender & Grant, 1996; Teece, 1998, 2014a; Zollo & Winter, 2002). Path-dependent development of knowledge resources fundamentally restricts an organization’s choices regarding growth (Penrose, 1960). It is because organizational knowledge resides in resource routines, and these routines constitute various organizational capabilities (Nelson & Winter, 1982). Cautiously stating, the guided involvement of individuals (resources) will create and extend their knowledge related only to certain tasks (routinized activities in the form of organizational capabilities). In this way, organizational capabilities (resource deployment for today’s tasks) latently effect long-term knowledge creation and its relatedness to the future aspirations; this is a known reason for organizational capabilities and their performance outcomes being path-dependent in nature. This is also relevant to Peter Senge’s explanation (1990, p. 70-78) of circular causality in human-based organizational systems.

Organization-specific (idiosyncratic) assets, including knowledge, are developed through collaborative learning (Teece, 2014) in the integrated routines (Teece, 2012) of cross-functional experts (Prieto et al., 2009; Schiller & Perera, 2012). Consequently, the extant organizational capability literature persuaded several frameworks and extended conceptualizations based on organizational learning

and knowledge processes. For example, strategic learning (Kuwada, 1998; Mintzberg & Waters, 1985) is a related conceptualization devised for organizational learning in the strategic management literature, and it concerns development as well as the transformation of organizational capabilities (Ambrosini & Bowman, 2009; Sirén et al., 2016). Strategic learning is “*organizational learning whereby basic assumptions underlying corporate-level knowledge are reframed and lead to a renewal of the organization’s strategic capability*” (Kuwada, 1998, p. 719). Strategic learning includes strategic knowledge creation (Ben-Menahem et al., 2013; March, 1991), knowledge dissemination (Jerez-Gómez et al., 2005; Valle-Cabrera, 2005), knowledge interpretation (Daft & Weick, 1983), and knowledge implementation (Huber, 1991; Nonaka & Takeuchi, 1995; Walsh & Ungson, 1991).

According to a bibliometric review by Vogel & Güttel (2013), organizational capability scholarship is converging on the strategic learning processes as microfoundations and antecedents to the dynamic capabilities [bearing in mind the intimating guidance by Barney & Felin (2013) about microfoundations]. Similarly, Eriksson (2014) synthesized knowledge processes (accumulation, integration, utilization, and reconfiguration of knowledge) as the elements constituting dynamic capabilities. It is because Zollo & Winter (2002) undertook *experience accumulation, knowledge articulation, and knowledge codification* as learning mechanisms for developing organizational routines and dynamic capabilities. Their study (Zollo & Winter, 2002) provided an opportunity for varied conceptualization of organizational capability development, especially the deceptively appealing dynamic capabilities. Recently, Verreyne and colleagues (2016) also noted the significant impact of Zollo & Winter’s (2002) conceptual model on the preceding scholarship on learning and knowledge-based antecedents of organizational capabilities.

Another genre of learning- and knowledge-based scholarship focused on the development of certain higher-order organizational capacities (also referred to as capabilities) – for example, ‘absorptive capacity’ (Wang & Ahmed, 2007), which is “*a firm’s ability to utilize external knowledge through the sequential processes of exploratory, transformative and exploitative learning*” (Lichtenthaler, 2009, p. 822). Exploratory learning refers to knowledge acquisition, while transformative learning refers to knowledge retention and assimilation, and exploitative learning refers to the transmutation and application of assimilated knowledge (Biedenbach & Müller, 2012; Lichtenthaler, 2009, p. 824-826). According to Lichtenthaler (2009), these three types of learning are complementary to superior organizational performance. Furthermore, it is also

common in literature to refer to absorptive capabilities as dynamic capabilities (for example, Wang & Ahmed, 2007).

5.2 Organizational Learning, Projects, and PPMC

Business management by projects outlines unique learning activities to be later capitalized on its organization-wide project portfolios (Bresnen et al. 2003). Even some organizations undertake new projects for fast-track learning in new markets (Schindler, 2003; Sense, 2008). Herein, each project can significantly stimulate knowledge acquisition and business innovation (Nonaka & Konno, 1998). According to Andrew Sense (2008), project team members realize project learning and knowledge flow through two generic processes: knowledge *codification* (technical dimension) and knowledge *personalization* (socio-cultural and socio-environmental dimensions). A multi-project involvement of these resources further stimulates learning at individual, group and organizational levels (Crossan et al., 1999; Payne, 1995). In the contemporary literature, learning in projects consists of three multilateral and imperceptibly distinguishable processes of *experience accumulation*, *knowledge articulation*, and *knowledge codification* (Prencipe & Tell, 2001). Again, the focus of such studies remained to the outcomes and content of learning processes, rather than the processes themselves.

Like other areas in management literature, organizational learning and knowledge-related processes are also studied in relation to project portfolio management (Biedenbach & Müller, 2012; Brady & Davies, 2004; Keegan & Turner, 2001; Killen et al., 2008; Killen & Hunter, 2010, 2013; Medina & Medina, 2015; Prencipe & Tell, 2001). Most of this scholarship has remained limited to the learning involved in organizational project management routines. That is why dedicated research on PPMC development through organizational learning is rare.

Meanwhile, most of the available research is led by Catherine Killen, who advises on the critical role of learning mechanisms in PPMC development. However, following the multitude, Killen's scholarships utilized Zollo & Winter's (2002) framework of learning-based capability development through the *experience accumulation*, *knowledge articulation*, and *knowledge codification* processes. Lately, Killen and Hunter (2013) discussed organizational ambidexterity based on knowledge exploitation and knowledge exploration. Without going into the detailed positions of the research referenced in this dissertation, the organizational learning literature limitations on the PPMC development are evident, and similar findings are highlighted in Martinsuo and Killen (2014).

Moreover, this PhD research differentiates itself from the extant literature in that it does not consider ‘*experience accumulation*’, ‘*knowledge articulation*’, and ‘*knowledge codification*’ as learning mechanisms. Rather, the position herein is that these are the products and outcomes of earlier discussed four learning processes (intuiting, interpreting, integrating, and institutionalizing). Furthermore, these knowledge outcomes are important constituents of PPMC routines instead of being the learning mechanisms. Relatedly, learned from Prencipe & Tell (2001), some examples of these outcomes are presented in Table 7. These examples will be useful for establishing readers’ understanding of the research case findings.

Table 7. PPMC routine activities concerning knowledge learning through projects (modified from Prencipe & Tell, 2001)

Learning Levels\ outcomes	Experience Accumulation	Knowledge Articulation	Knowledge Codification
Individual Level	On-the-job training; job rotation; specialization; re-use of expertise.	Figurative thinking; thinking aloud; scribbling notes.	Reporting systems; work diaries; individual systems design.
Project / Group Level	Person-to-person communication; developed group thinking; informal encounters and limitations.	Brainstorming sessions; formal project reviews; debriefing meetings; ad-hoc meetings; intra-project correspondences; lessons learned meetings.	Project plan/audits; milestones/deadlines; meeting memos; project history files; intra-project lessons learned database.
Organizational Level	Formal and Informal organizational routines, rules and selection processes; communities of practice.	Project manager camps; knowledge retreats; professional networks; knowledge facilitators and managers; inter-project meetings and correspondences.	Process maps; project management processes; program management processes; project portfolio management governance systems; lessons learnt database, etc.

5.3 Capability Development and Learning (organization) Mechanisms

Organizational systems perform business transactions through capabilities based on the idiosyncratic routines of their knowledge resources (Collis, 1994). Knowledge is the 'content' in organizational capabilities involving resources, processes, and structures, whereas learning is the process to rejuvenate this content (Vera et al., 2011). Organizations as complex social systems (Schreyögg & Snow, 2011), along with their resources, routines, and capabilities, continuously evolve (Nelson & Winter, 1973; Orton & Weick, 1990; Weick, 1976) through learning processes (Cyert & March, 1992). These learning processes of intuiting, interpreting, integrating, and institutionalizing connect organizational development at various levels through feedforward and feedback loops (Crossan et al., 1999). These four processes are continual in an organizational system. A system needs collective learning, shared vision, refined mental models, and the work proficiency of parts to realize their potential (Senge, 1990, p. 5-14). This PhD research assumes the development of organizational capabilities from the system's viewpoint (Senge, 1990).

The research objective was to extend the apprehended reality (Morais, 2011; Sayer, 2000) about capabilities within the authentic whole of an organizational system, where the whole entity is apprehended through the dynamics of its parts (Scharmer, 2009, p. 157-159). However, one should not expect the complete reality to be revealed (Sayer, 2000), but only a farther elaboration about the emerging relationship between the distinct levels of this reality (Checkland, 1981). The system's view-based approach to this PhD research provided an opportunity to study capabilities as individual entities, however interdependently interacting, as parts or components of an organizational system.

A system demonstrates its ability to influence the behavior of its parts and their outcomes only in the form of observable events, whereas the underlying structures of system are not observable (Senge, 1990, p. 40-44). However, the structure of a system actuates mechanisms for generating contingent outcomes as observable events (Sayer, 1992, p. 107). Therefore, approaching the research problem through a system's thinking lens is an opportunity not only to understand the historical events, but rather the relationships between system entities (Senge, 1990). Critical realism-based system's thinking allowed this PhD research to understand the complex and multiple causes of behaviors (Henning & Chen, 2012) of capability development in the organizational system of TCA (the research case).

The need for system's thinking-based PPM research is well recognized (for example, Crawford et al., 2009; Pourdehnud, 2007). PPMC development through system's thinking will lead to the incorporation of hard and soft system elements into the process, policies, methodologies, and routines (Locatelli et al., 2014). This in turn provides flexibility in PPMC governance routines. System's thinking also brings integrative learning from project-based activities while developing a shared vision for all stakeholders (Pourdehnud, 2007). In this way, the system's thinking perspective is valuable for understanding the complexity of interactions in multiple projects (Sheffield et al., 2012; Teller et al., 2012), and thus is important for developing organizational culture for PPM (Crawford et al., 2009, p. 57 & 156). However, a recent systematic literature review (Meifort, 2016) focusing on innovation portfolios revealed the disconnections between the PPM research approaches. Meanwhile, a system's view and system's thinking of PPM as an organizational capability remained invisible.

Organizational investigation from the system's view is common in the literature (Henning & Chen, 2012). Mostly, the business organizations ('firms') are studied as open systems (Banathy & Jenlink, 2004) or, according to Checkland (1981) as 'human activity systems or soft systems'. Organization as an open system has a better chance of being sustained in the external environment, which is dynamic in nature (Brynteson, 2006, p. 22). Organizations are thus systems of interdependent choices to select from (Siggelkow, 2001, 2002), to maintain existing capability operations (Boulding, 1956), and coevolve with the operating environment (Banathy & Jenlink, p. 45). For this purpose, an organizational system develops mechanisms to predict changes in the environment and prepare itself with the available energy, resources, and resources bundles/coordination, reachable by all its members/parts/components (Henning & Chen, 2012). Otherwise, organizations that do not develop such mechanisms remain unable to integrate "*diverse functions and talents into a productive whole*", and are thus prone to dysfunctional operations (Senge, 1990, p. 69). However, a learning organization can avoid such dysfunctions by "*continually expanding its capacity to create its future*" (Senge, 1990, p. 14).

A learning organization continuously creates the business realities to not only survive but also thrive for a long-term success. This entails developing a learning culture and empowering individuals to understand their learning needs in both the internal and external environment (Marsick & Watkins, 2003). According to a system's view (Senge, 1990), learning organizations focus on learning to attain personnel mastery, learning as teams, and the development of mental models through a shared vision across all organizational levels. In learning organizations,

people continuously enhance their capacity to create the desired results; they are thus aspired to learn collectively (Senge, 1990, p. xvii).

Collective learning aspires to foster success in a larger perspective (Scharmer, 2009) by avoiding the hassles of individual outcomes. Collective learning develops mental models (Senge, 1990, p. xvii) leading to actions based on the understanding of internal capabilities and their alignment with the business environment – understanding how collective actions and their effects extend mental models. This seeks openness and unified ways to apprehend the business environment and develop a shared vision of a future state where resources (individuals) understand historical development paths and its future effects. Through such a shared vision, an organization fosters the long-term commitment of its VARIN resources (Barney, 1991). Meanwhile, this shared vision and openness brings decision-making transparency, which is an eminent feature of PPMC.

Organizational capabilities have been previously researched from a system's perspective (O'Connor, 2008). However, the majority of these studies remained segregated because of their inability to understand the role of organizational capabilities and their interactions within the various parts of an organizational system. This is due to Senge's warning (1990, p. xvii) that implementing best practices without understanding how the parts of an organizational system work together limits organizational innovativeness. On the other hand, resources in a learning organization understand the skills, knowledge, and capability development paths of their organizational system (Senge, 1990, p. xvii).

Distinguishing between 'organizational learning' and a 'learning organization', Tsang (1997, p. 73) argued that organizational learning focuses on the process of "*how does an organization learn*" new knowledge, whereas the focus of a learning organization is "how should an organization learn". The answer to the first question has given by Crossan and colleagues (1999), who introduced four learning processes connecting various levels of an organization through feedforward and feedback loops. The second question was already answered by Senge (1990, p. 14), who discussed the presence of adaptive and generative learning mechanisms in learning organizations.

Today, the organizational learning literature (Argyris & Schön, 1996) establishes the presence of three (3) discernible learning types in any organizational system: single-loop learning, double-loop learning, and triple-loop learning. These three learning types can simultaneously coexist in an organizational system and undertake different approaches to the development of organizational knowledge, hence routines and capabilities. This PhD research takes these three learning types as mechanisms for path-dependent development of organizational capabilities.

These mechanisms, combined with the capability investigation framework (Figure 10), will reveal the differences in the capability development paths. Accordingly, PPMC development process in the case company is learned through observing the context-specific actuation of these mechanisms during the three periods of this longitudinal process research (details in section 2.2.2).

5.3.1 Single-loop learning

Single-loop learning mechanisms focus on error detection and rectifying mismatches between actions and expected outcomes (Argyris & Schön, 1996, p. 21). The actuation of single-loop learning mechanisms is based on the performance feedback of “*doing things right*” (Crossan et al., 2013; Romme & Witteloostuijn, 1999). Accordingly, single-loop learning mechanism promote adoptive learning (Senge, 1990), and their focus is to increase the efficiency of existing routines (Cybert & March, 1963, 1992). In this regard, the aim of single-loop learning is survival, although the capability routines keep improving endogenously (Pentland et al., 2012). Existing norms, procedures, policies, and organizing structures guide these incremental improvements driven by single-loop learning mechanisms.

Routine specialization (Crossan et al., 2013) and upgrading the methods and tactics of problem-solving (Kwon & Nicolaidis, 2017) are facilitated by single-loop learning mechanisms. Firms continue exploiting existing knowledge assets (March, 1991) to do routine work well (Argyris, 1999, p. 69) because the returns on invested resources for knowledge exploitation are “*proximate and predictable*” (March, 1991, p. 85). In this way, single-loop learning mechanisms favor stability-enabled change (Farjoun, 2010) during organizational evolution (Van-De-Ven, 1995). This PhD research revealed that single-loop learning mechanisms reinforce the need to maintain an organization’s key performance targets against the budgeted resources without changing the capability dimensions of resources, processes, or structures.

5.3.2 Double-loop learning

Double-loop learning mechanisms facilitate organizations with enhanced criteria to measure performance errors. These mechanisms aspire to change the norms and values that “*govern their theory-in-use*”; it requires altering the links between strategies and actions (Argyris & Schön, 1996, p. 21-22). Further established by Argyris & Schön (1996), double-loop learning is an agency-guided inquiry process of a social system based on the intentional adaptability of the external environment. The consequent locus of double-loop learning is ‘*doing right things*’

(Crossan et al., 2013). Such learning requires exploration (March, 1991) of adoptive options (Gibson & Birkinshaw, 2004; Mom et al., 2007) for long-term effectiveness (Argyris & Schön, 1996, p. 118). The returns on the resources invested in this exploitation are considered “*uncertain and distant*” (March, 1991, p. 85). March (1991) further argued that a sole focus on exploration of possibilities and options is an expensive choice due to the potential waste of newly developed knowledge (March, 1991).

Therefore, the mechanisms of double-loop and single-loop learnings are to be complementary in practice, establishing a generative learning system (from Senge, 1990). Such a combination was also studied as transformative learning (Burke & Litwin, 1992 and Lichtenthaler, 2009). A generative learning system will advocate open inquiries to the norms and beliefs adopted for defensive routines (Argyris & Schön, 1996, p. 99-101; 119-120). The social behavior of a generative learning system encourages self-reflection and self-examination in the pursuit of freedom of choice (Argyris & Schön, 1996, p. 120). Cooperation between top- and low-level agents establish reinforcement to avoid a condition in which errors become uncontrollable due to incomplete or deceptive information and defensive routines, and in the win-lose games (Argyris, 1999, p. 87; 107-108) between functions and hierarchies.

Double-loop learning mechanisms undergird change-enabled stability (Farjoun, 2010). According to Visser (2017), double-loop learning mechanisms are responsible for both learning and unlearning (Easterby-Smith et al., 2004; Huber, 1991) the knowledge gained from resource-guided activity combinations (capability routines). Forgetting and unlearning rules for migration to a future path (Teece, 2014a) resonates with the phenomena of constructive destruction (Schumpeter, 1934). It implies that double-loop mechanisms maintain a fit with the business environment by actuating reconfigurations (Pavlou, 2011) in the resource architecture (Helfat & Peteraf, 2003) and routines of an organizational capability. Resultantly, the organization should be able to adjust its capability structures and processes for aligning and realigning resources (Petit, 2011, p. 84) to existing routines, as well as developing new routines.

5.3.3 Triple-loop learning and deutero-learning

In a learning organization, single-loop learning mechanisms care about ‘*doing things right*’, double-loop learning concerns ‘*doing things right*’, and triple-loop learning aspires to ‘*doing right things right within a right timeframe*’. According to Romme & Witteloostuijn (1999), tripple-loop learning mechanisms ascertain

system actors having opportunities/options for selection (Van de Ven, 1995; Crossan et al., 2013) of the right things to learn and the competence/knowledge to keep doing the selected things correctly. In a broader sense, triple-loop learning mechanisms focus on 'learning the organization's learning system' (Argyris & Schön, 1996, p. 29). With this focus, knowledge renewal is fostered (Crossan et al., 2013) while maintaining both the business context and environmental change rate (Bateson, 1973; Visser, 2007).

From the extant literature, one can alternatively conceptualize triple-loop learning mechanisms as 'deutero-learning' (Visser, 2007) and 'Learning III' (Bateson, 1973). Meanwhile, Tosey and colleagues (2011) discussed the commonalities between these three conceptualizations; however, there is no consensus as to whether all conceptualization are combinable within triple-loop learning. They found (Tosey et al., 2011) that the limited operationalization of this 'higher-order learning' was an obvious reason for a lack of consensus. Herein, this PhD research avoids detailing this lacking consensus and, meanwhile, conceptualizes triple-loop learning as mechanisms for learning the context of the capabilities. For example, organizations modify their capabilities learned in one business context, and efficiently extend them to become usable in a different or changing business context; this is a simplified example of operationalizing triple-loop learning mechanisms.

In practice, triple-loop learning mechanisms concern the development of contextualized new principles for organizational transformation (Tosey et al., 2011). Triple-loop learning mechanisms actuate the "*process for generating mental models and goals*" (Snell & Chak, 1998, p. 339). It fosters the collective mindfulness of individuals (Snell & Chak, 1998) to create the strategic choices and remain informed about the consequences of those choices (Romme & Witteloostuijn, 1999). According to Visser (2007), this is realizable through the shared perception of organizational practices, policies, procedures, routines, and rewards. Meanwhile, empowered individuals co-invent new behavioral structures by inhibiting the prevailing norms in the organization (Snell & Chak, 1998), connecting the past with future by selecting choices for today (Scharmer, 2009). In this regard, triple-loop learning, on a broader scale, unconsciously propels continuous learning processes in learning organizations.

This literature synthesis considers collective mindfulness (Snell & Chak, 1998) through triple-loop learning mechanisms that are conceptually very similar [if not exact due to the terminological differences and their operationalization] to Nonaka's teachings regarding a multi-layered social network, the '*Ba*' (Nonaka & Konno, 1998; Nonaka et al., 2000; Nonaka et al., 2001; Nonaka & Toyama, 2003;

2015; Nonaka et al., 2014). Nonaka's scholarship prominence is due to the fact that '**Ba**' continually emerges in space and time nexus through interactions between actors and between the actors and their environment. This multi-layered social network, which is considered collective mindfulness, a shared vision, facilitates knowledge conversations by providing energy, quality, and structure for future interactions in a social system. The interactions of empowered individuals develop a shared context in which a common stream of meanings emerges. Thus, the role of triple-loop learning mechanisms is to realize this shared context place, a platform, a multi-layered social network of collectively sensing, actuating, reconfiguring, and transforming individuals and resources.

5.4 Chapter Summary

Organizational learning is a process of renewing and extending knowledge of an organizational system. This learning takes place at different organizational levels to support the capability development process. However, the capability performance focus of the extant literature has remained limited in explaining the capability development process due to difference in learning. It is because the most referenced scholarship has excessively promoted outcome-focused (knowledge) investigation. Alternatively, this PhD research is focusing on learning processes has identified three self-reinforcing mechanisms responsible for the path-dependent development of organizational capabilities.

Single-loop learning mechanisms focus on endogenously correctable errors in existing organizational routines to ensure 'doing things right'. With the goal of 'doing right things', double-loop learning mechanisms target the criteria for measuring the errors detected by single-loop learning. Meanwhile, triple-loop learning directs an organization's attention to knowledge renewal with focusing on learning the learning system. A context-dependent actuation of these mechanisms will lead to differentiable paths of capability development.

SEGMENT III: THE RESEACH CASE, CONTEXT AND FINDINGS

6 THE RESEARCH CASE

Describing the research case context provides readers with “*neutral pathways*” (Susan, 1999, p. 5) and a framework for comprehending the research findings presented in the next three chapters of this dissertation. Although the research case context presented in this chapter does not constitute the results of research *per se*, rather it establishes the surrounding conditions, the situations, and stable settings under which the research findings remain logical (Johns, 2006; Stake, 2010, p. 50-52). It is because the organizational context restrains as well as facilitates the way organizations learn and progress temporally (Argote & Miron-Spektor, 2011). According to the critical realist philosophical stance of this PhD research, these surroundings are part of an investigated reality (see: Harrison & Easton, 2004).

‘The Company Alpha’ is the pseudonym for the case organization examined in this PhD research. Pseudonyms are also used for the two investigated business units of The Company Alpha (TCA), which are ‘Sigma Business Division’ (SBD) and ‘Delta Business Division’ (DBD). The following sections briefly describe the external and internal context of TCA, DBD, and SBD.

According to Argote & Miron-Spektor (2011), external context includes the market environment outside organizational boundaries. Meanwhile, the internal context can be divided into the latent organizational context and the active context (Argote & Miron-Spektor, 2011). Latent context includes the interaction of organizational resources under defined rules and policies (for example, organizational governance). Meanwhile, the active context refers to the knowledge embedded in phenomenon under investigation. The active context and the investigated phenomenon for this PhD research is PPMC development at TCA, SBD, and DBD.

6.1 The Company Alpha (TCA)

The Company Alpha (TCA) is a multinational engineering and technology innovation-driven business corporation, and is a globally renowned original equipment manufacturer (OEM). Its legacy as an original equipment manufacturer (OEM) has a long historical background. Since its emergence as an industrial organization, TCA has been establishing, collaborating, and acquiring manufacturing facilities and technologies in the Americas, Asia, and Europe. Its global operations are spread over all continents with a focus on localized operations guided through the corporation’s global governance policy. These operations are performed by thousands of its expert resources connected through

the network companies of TCA. The yearly business transactions of TCA are worth billions of euros. These transactions primarily include products and services designed for CoPS-based global infrastructure development and operations.

Infrastructure development has been the strategic business focus of TCA's products and services. TCA's aspiration for strategic renewals (Crossan & Berdrew, 2003) has been customer value extension with lifecycle support. Furthermore, this aspiration sets up the basis for internal synergies between TCA's business units and functions. Meanwhile, individual business units (herein referred as divisions) are independently responsible for the development of products and services for their dedicated industry and market segments. In addition, some of the business units are divided into sub-units (herein referred as business-lines). These sub-units focus on certain type of product or/and service business. Similar to the business unit, its sub-units are independently responsible for their business performance, and hence possess the authority to develop new products and services for their designated market segment(s).

Globally, TCA has embraced functional organizational structures and strongly focuses on enhancing functional excellence in its specialized knowledge domains. It implies that TCA business is supported through common functions at the corporation-level, as well as each business unit having its own specialized functions. These functions are interwoven with defined responsibilities according to TCA's corporate governance and related policies. Each function at the corporation and business unit levels is responsible for the development of skills and competences of its resources assigned to globally defined roles. The development targets for these functions are agreed upon at the corporate level as well as the business unit level. These strategic development plans are channeled through a specialized function responsible for the development of operations at the TCA level, and then at the individual business unit level. Consequently, day-to-day activities at TCA are routinized to perform work in multi-layered matrix structures (detailed guidance in Kerzner, 2013). A simplified depiction of The Company Alpha's legacy structure is outlined in Figure 16.

During real-time case data collection, there were approximately two thousand (2000) active projects in TCA's business units and functions, constituting approximately half of TCA's business operations. There are already developed processes, tools, and methodologies to manage these projects independently, in programs, and as well as the portfolios of projects. These guided project-based operations are routinized with activities performed by a couple of thousand individual resources. Each sixth of these resources is a certified project management professional, and otherwise all these resources have been

continuously trained for the application of corporation-wide project management practices, methods, tools, and techniques. For this purpose, there is a dedicated portfolio of project, program and portfolio management training led by the human resource (HRM) function. These trainings are also customized to individual business units' needs. In order to maintain competence advancements, these training programs are continuously upgraded with help from external vendors, consultants, and institutions.

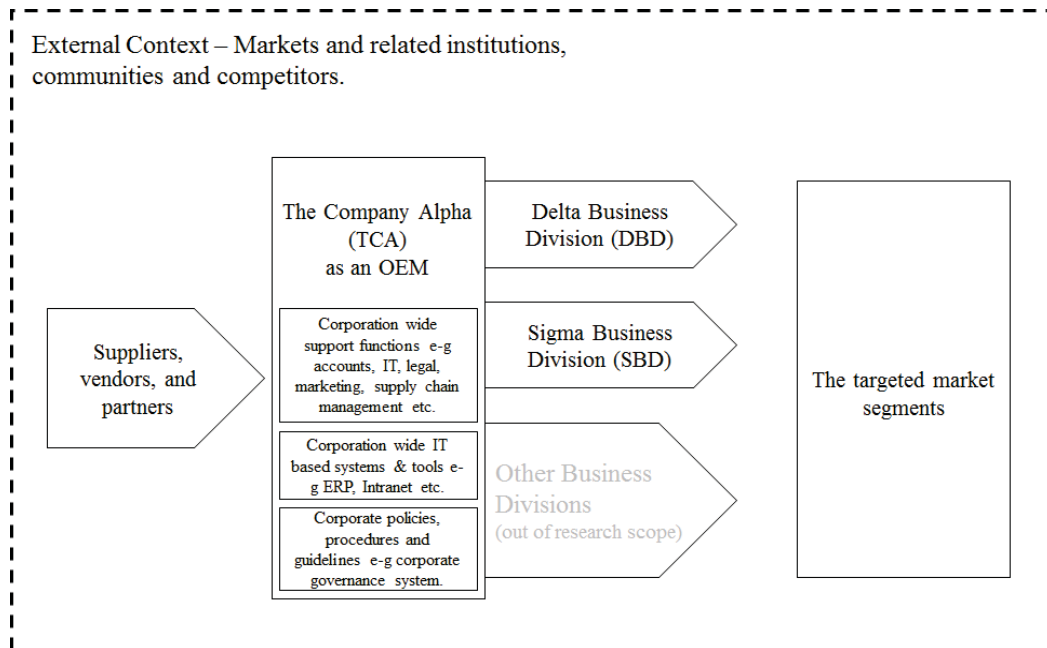


Figure 16. Simplified depiction of The Company Alpha's legacy structure

TCA exhibits the characteristics of a P-form enterprise (Söderlund & Tell, 2009). Projects, managed as portfolios, are the core business operations of TCA. These projects are divided into three categories: product and solution (P&S) projects, business projects, and internal development (ID) projects. These projects are further categorized according to the possible outcome and complexity of their scope deliverables. For example, ID projects are sub-categorized between new processes, management and IT systems, capacity enhancements, and restructuring. Similarly, P&S projects can be related to R&D, product development, and the management of product portfolios. The third category of business projects is sub-categorized specifically for individual business unit operations. These three categories of projects can be then further classified as complex, moderate, or business-as-usual projects. Accordingly, there is business unit-specific guidance available to govern these different project categories and classifications.

TCA has developed corporation-level processes to manage these three category projects and portfolios (anonymously known in TCA as “*PPM governance*”). These processes, customized for project categories and sub-categories, are operationalized through stage-gate models (see: Cooper, 2000). The resource actions are routinized by developing specific methodologies, procedures, and best practices for each stage-gate model. All the methodologies, processes, and tools are proposed, agreed on, and approved by dedicated governing bodies in the business units and at the corporation-level, where needed. These governing bodies include PPMOs, governance boards, committees, business management teams, and communities of project management practices. Relatedly, there are developed PPM governance models to facilitate related decision-making.

A dedicated project management information system (PMIS) was specially developed for the management of corporation-wide projects with a PPM approach. This PMIS, being developed during the case data collection periods, has the capacity to perform analysis and generate reports to support portfolio decisions at various hierarchical levels. It is noteworthy to mention the achieved integration of this tool with the other IT based systems at TCA, for example with ERP system, CRM, and document databases. However, the case evidence as verified by interviewed experts highlighted a notable number of individual projects and a few programs, as well as some project portfolios, being managed, without the aid of this corporation-wide PMIS. Meanwhile, in some parts of the organization, there were ongoing efforts to integrate PMIS with other IT-based systems.

6.1.1 Sigma Business Division (SBD)

The Sigma Business Division (SBD) globally competes in its dedicated market segments of offshore infrastructure development industry. For this purpose, SBD has designed its operations as a system integrator (compare: Hobday et al., 2005) of diverse products and services. The development and manufacturing of these diverse products is the responsibility of independent sub-units (referred to as business-lines in the report) of SBD. Most of these business-lines were engendered from the extensively acquired businesses before and during the data collection periods. These business-lines are independently developing very diverse products and related services. Due to these acquisitions, SBD product portfolios could serve the most extended customer demands (special market segments) that none of its competitors could serve individually. It also means that these acquired businesses, now independent business-lines, have different legacy paths and consequently different mental models for their business success.

SBD has been following the strategy of selling complex product systems (CoPS) through the knowledge integration of these business-lines, according to the theoretical positioning of this PhD research. SBD's aspiration has been to routinize cost-efficient integration of its product systems. A simplified structural depiction of Sigma Business Division (SBD) is given in Figure 17.

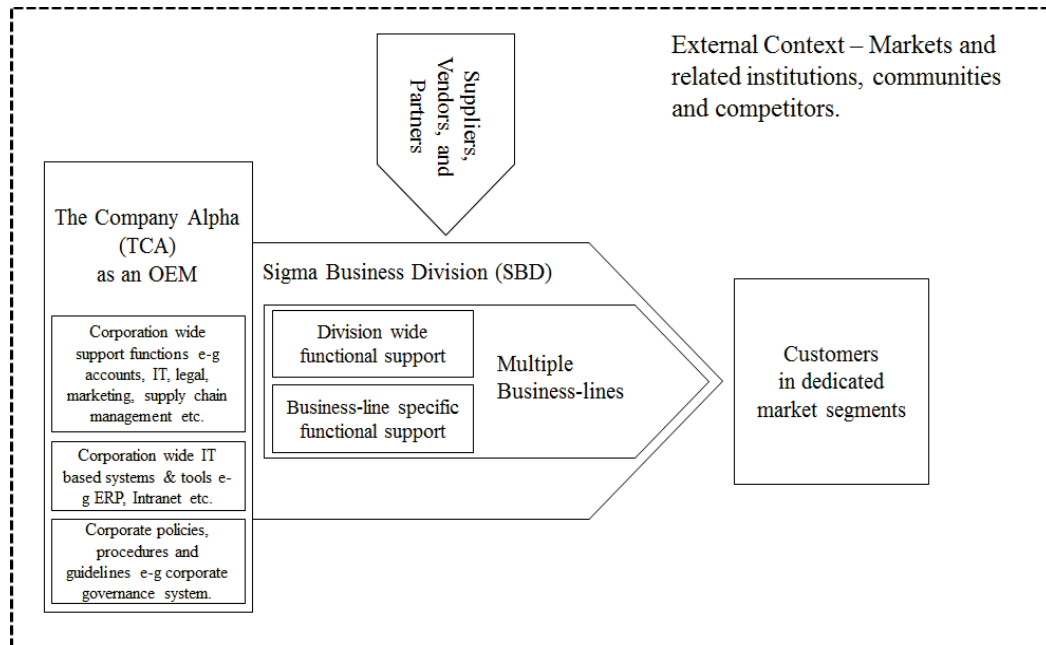


Figure 17. A simplified structural depiction of Sigma Business Division (SBD)

Therefore, the management of business projects is part of day-to-day operations in SBD. The value range of these business projects is between a few thousand to tens of millions of euros. Theoretically, the governance of such diverse valued business projects could require customized project management processes, best practices, tools, and techniques. To the contrary, the SBD approached a uniformly developed project, program, and portfolio management processes and tools mainly adopted through benchmarking. As a result, there were formal structures, processes, and resources to support PPMC routines especially related to ID project portfolios and P&S project portfolios in the older businesses-lines (these older business-lines originate from the parent company TCA, not from acquired businesses).

A related observed reality regarding SBD's business projects is that even though its product and service portfolios are most complete compared with competitors, however, it serves only, though an important, part of a bigger infrastructure complex. These vast product portfolio-based business project transactions do not qualify SBD as a sole leader for developing infrastructure projects (in its

specialized market segment). Thus, SBD remains as an OEM and a key supplier of CoPS-based integrated solutions for its customers. In most of SBD's business projects, the major scope of responsibility is completed once the integrated solutions are engineered, products are manufactured (in one or more of its business-lines), and have been shipped/transported. Afterward, the only remaining responsibility is the final testing of supplied equipment in their operative environment. With this market disposition, engineering and manufacturing are the two most dominant functions in SBD.

6.1.2 Delta Business Division (DBD)

Delta Business Division (DBD) globally competes in the special segments of infrastructure development. DBD has successfully dominated its market segments with technological leadership (see: Teece, 1998), packaged with a few services organically developed in-house. Through the system integration of its products and services, DBD has extended TCA's core technology capabilities from a supplier of complex product systems (CoPS) to a value integrator of "*system of systems*" (Hobday & colleagues, 2005, p. 1112). Inherited from the parent corporation, TCA, DBD's strategic focus remained on its core business-line until the past decade, when other business-lines were promoted due to changing market dynamics and the expected domination of newly developing technologies and their effect on world infrastructure development projects.

Essentially, DBD's organizational capabilities and their constituting routines formed, refined, and matured as organizational behavior within the inherited single business context: one same 'test bench' and 'testing fielding' for all the endogenously and exogenously motivated organizational routine formations. With a clear vision of single business value enhancement, it had been relatively easier to motivate different functional stakeholders to participate in realizing capability development requirements. This behavior of encouraging participation has been observed in ongoing developments related to a new business-line developed during the real-time data collection period (Period III).

Unlike SBD, the establishment of new business-lines in DBD had not been motivated through a focus on developing new products from existing base technologies or business acquisitions. Instead, these business-lines were instigated by DBD's business successes as a value integrator of the system of systems (compare: Hobday et al., 2005). Verified by an expert interviewee; DBD's understanding of business value chain risks and the essential need for developing services for the management of those risks has been a core competence for

developing new business-lines. Accordingly, DBD contributes only to the technology developments for principal equipment (the core OEM technology used in TCA); otherwise, it does not control the manufacturing units of TCA. A simplified structural depiction of Delta Business Division (DBD) is provided in Figure 18.

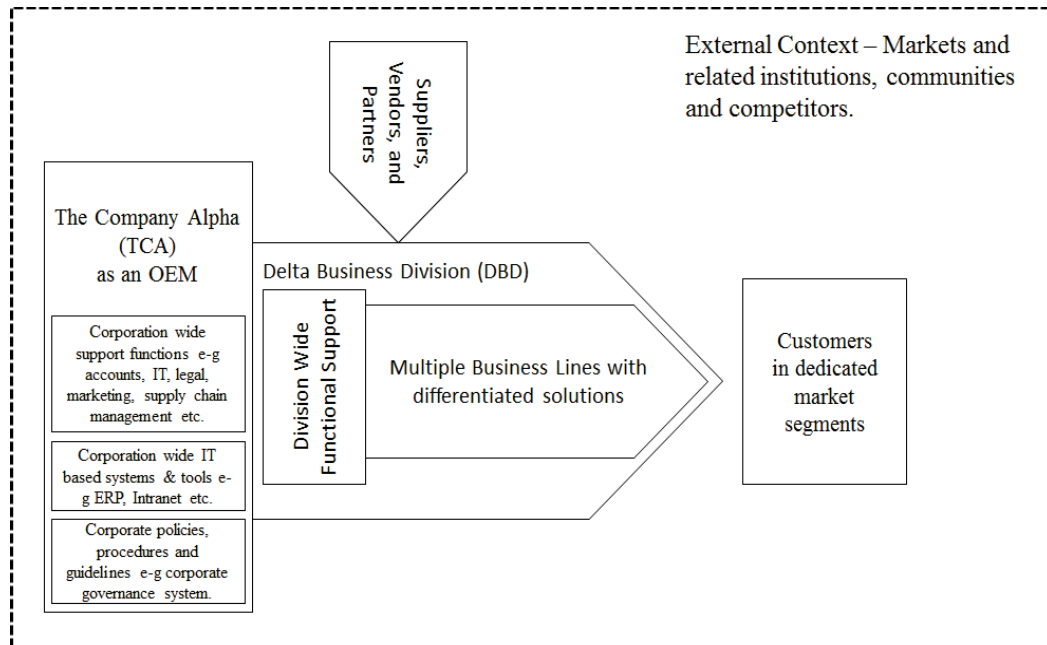


Figure 18. A simplified structural depiction of Delta Business Division (DBD)

Larger-scale business projects are in the business DNA of DBD, with business value ranging from a few million euros to multi-hundred million euros, and the management of projects is in its culture. This PhD research revealed that almost all of TCA's project management related development received considerable guidance from DBD. There is evidence that DBD's PPM practices were organically developing from the management of business projects, and that these developments were already maturing before the case evidence collected over 9 years. However, these practices have been formalizing as PPMC during more recent years.

6.2 Presentation of Research Findings

This critical realism-based research strives to present the case study findings through temporal bracketing strategy (details in section 2.3.3). Distinguishing from the extant literature on organizational capability development, this research refrains from declaring PPMC as an operational capability or dynamic capability because the line between dynamic capabilities and operational capabilities "is

unavoidably blurry” (Helfat & Winter, 2011, p. 1243). Therefore, the focus has instead been on explaining the context and the actuated self-reinforcing mechanisms of the path-dependent capability development process, in particular, the three learning mechanisms (discussed in section 5.3) affecting the development of PPMC dimensions and routines (Figure 12). Accordingly, these research findings are presented in the next three chapters. Each of these chapters is dedicated to a single period (with respect to the periodization in section 2.3.3) of PPMC development in TCA, SBD, and DBD.

The findings from Period I are ordered so that the PPMC development context is explained separately for TCA and each of its business units. Whereas for Periods II and III, the capability development context is explained collectively for TCA, SBD, and DBD in the beginnings of their respective chapters. A dedicated section highlighting capability development in the subsequent period of data collection is included at the ends of each of the three chapters. The chapter summaries also identify the contextually actuated self-reinforcing mechanisms observed at TCA, SBD, and DBD during the subsequent period. Meanwhile, PPMC performance outcomes are succinctly presented only for contextualizing purposes.

The priority in presenting the case findings has been the anonymity of the case company and the interviewed experts. Therefore, this dissertation refrains from directly quoting specific experts from the case company. However, in a few necessary places the text from the case data is included in *italics* after making the mandatory adjustments required for anonymity. For readers’ convenience, the research findings are corroborated by including a few snapshots as figures from the case data. Here again, these figures were masked after seeking additional approval from the case company. In addition, it is relevant to mention that PPMC-related terminologies used in the case company are not exact as those used in this dissertation.

7 CAPABILITY DEVELOPMENTS PERIOD I

This chapter outlines the PPMC development during Period I. For this period, the capability development context is separately presented for TCA, SBD, and DBD. This segregation is essential to enlink prior historical successes with the data collection periods. It is because the significance of the past cannot be neglected in this research focusing on organizational capability path dependence.

7.1 PPMC Development at TCA

The Company Alpha (TCA) has inherently been an original equipment manufacturer (OEM) and has developed a technology-oriented culture by strengthening expert knowledge of its powerful functions. Apparently, the business results of TCA were observed to improve after the implementation of ERP system and the supporting business processes during the early 2000s. The ERP system development program was completed prior to the data collection periods of this PhD research. With a functional ERP system, the TCA leadership focused on growth through internal developments and acquiring new businesses around the globe. The importance of focusing on knowledge management processes (compare: Eriksson, 2014) was already well known. Prior to the start of Period I, leadership realized that knowledge accumulation, articulation, and codification were accomplished at varying rates in different business divisions and functions in TCA. Resultantly, limitations to integrating knowledge resources between business-lines and functions were evident.

Further, leadership at TCA realized that business divisions with a higher success rate in managing projects were also relatively better at knowledge integration. The leadership was convinced that proficiency in project management was resulting in effective knowledge integration and for business success. Therefore, it was decided to uniformly develop management by project approaches that focused on benchmarking successful divisions and external best practices. It was required to 'rethink' project management capabilities and configure those capabilities to accommodate a larger business perspective, an approach similar to that of the project portfolio management (PPM) approach discussed in Chapter 4. Relatedly, a corporation-wide initiative to develop the project management information system (PMIS) was already under consideration. This PMIS was intended to offer a common platform with necessary tools to facilitate corporation-wide formal project management.

To progress as planned, a corporation-wide project management ‘*best practices based maturity survey*’ was launched at the beginning of Period I. An external consulting firm mapped the strengths and weaknesses related to project management with a primary focus on understanding *organizational perspective, human perspective, business perspective, tools, techniques and methods*, and, *project portfolio management (PPM) perspective* of organizational project management at TCA. The results of this external survey further highlighted the lower maturity of less successful business divisions and functions.

Corporation-wide PPMC development ‘*kicked-off*’ during Period I, as detailed in the following sections and sub-sections of this chapter. Later, at the end of Period I, a second survey (similar to the first survey) on project management maturity was conducted. The second survey results indicated a noticeable increase in project management maturity throughout the organization, however, with considerable difference in maturity growth rate between different business divisions and functions. Accordingly, the support functions at TCA were maturing more quickly than most of the business divisions—for example, corporation-wide IT functions.

During Period I, the ambitious targets for a corporation-wide unification of project management practices were progressing well. However, the business divisions, the first to be affected by market dynamics, were lagging behind the development pace. During the second half of Period I, the business environment for all the business divisions at TCA observed rapid changes, leading to increasing uncertainty due to the global financial crisis (the Great Recession). Consequently, an altered and more tentative decision-making approach of the TCA leadership was notable at the very end of Period I.

7.1.1 PPMC dimensions

7.1.1.1 Structures

The first formal accomplishment to develop PPMC in TCA was the establishment of a corporation-wide project management office (EPPMO). This EPPMO included representatives from all business divisions and support functions under the corporation (for example, HR and IT). A five (5) year strategic roadmap was authorized, and action plans were developed. Accordingly, the EPPMO’s actions concentrated on taking basic steps to lay a foundation on which PPMC could be routinized across the corporation. It required the EPPMO to control and ensure the implementation of an organization-wide uniform project management methodology, a training program for project management competence

development, harmonizing the project gate-models and developing project reporting, developing unified project and portfolio management processes, and developing a corporate-wide project management information system (PMIS).

The leadership hoped that the authorized roadmap for project management and project portfolio management capability (PPMC) would guide innovations to develop products and services to lead existing market segments and open new market segments. This PhD research understands that such a corporate-level vision would have led to the enterprise-wide dynamic capability for an entrepreneurial organization (compare: Teece, 2014, 2014a, 2016). Therefore, in the beginning of Period I, EPPMO had succeeded in gaining top-echelon support. EPPMO was coordinating the development of business division-wise PPMOs and pursued the development of project management competence development initiatives. For the readers' reference, these planned and initiated actions (5-year roadmap) were prior to the effects of the financial market crash becoming apparent.

Another structural development was related to portfolio governance bodies. Historically, The Company Alpha had learned how experts with diverse knowledge and leadership could be combined in decision-making teams and steering committees. Prior to Period I, these practices were already established, which helped in developing steering committees and management boards to make operative decisions at different hierarchal levels. EPPMO controlled the development of these governance structures, and business division-wise PPMO's took responsibility for ensuring the representation of concerned stakeholders in these decision-making boards.

7.1.1.2 Processes

The Company Alpha (TCA) had recently, prior to Period I, decided to upgrade its corporation-wide business processes. Having been upgraded during a program for implementing ERP system, these processes were specialized to support coordination between functions. Each business division was attuned to corporation-level business processes according to institutionalized mental models of the most efficient delivery of its offerings to existing markets. Business divisions also controlled the ERP system's development according to their own business suitability. Henceforth, during Period I, the mandate and leadership's energy to readjust these business processes was observed to be notably reduced. It is pertinent to mention that at TCA organizational project management processes were a part of corporation-wide quality management processes.

A major achievement regarding PPMC process development at the corporation-level was therefore limited to the gate-model development adjusted within the existing business processes and to the supporting systems, including tools and techniques. For example, a project for developing PMIS was initiated to support business deliveries with disciplined project management. In this regard, minor adjustments to the project management processes could be accomplished. However, the major driver behind these developments were the increasing resource competences (project management) and project management role descriptions/definitions. Another related development was defining classifications according to project complexity and developing methodologies and templates to support routinizing project management (Figure 19).

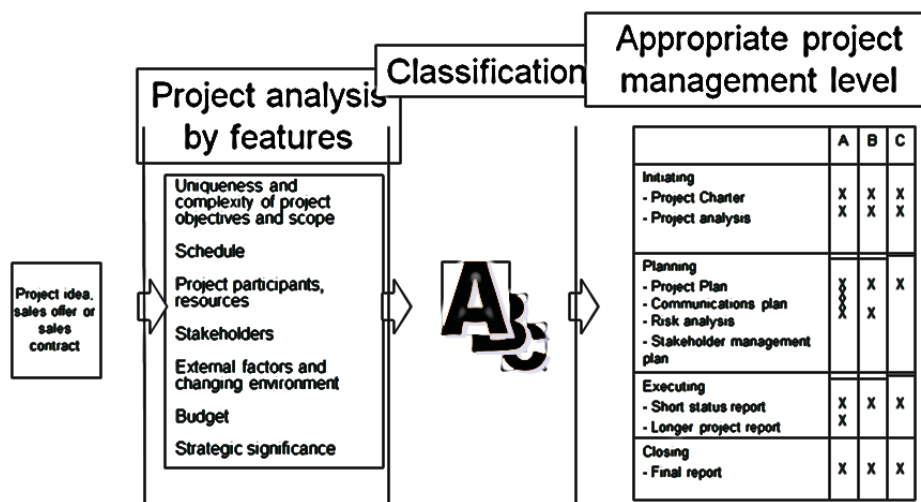


Figure 19. Project classification and management level (Source: Case company; masked for this PhD report)

According to the second aforementioned survey, TCA was on its way to formally developing and deploying PPMC processes, but certain critical developments were still needed. Ideally, a coordinated development of PPMC processes supported through PMIS was required. It was decided during the second half of Period I to launch a *pilot project* for the limited deployment of PMIS in all business divisions. This research understood that the *pilot project* could not be completed during Period I, as until the end of Period I, business-related challenges kept increasing, mostly due to external factors.

7.1.1.3 People (& resources)

As identified in the aforementioned organizational project management maturity surveys, the most apparent development was competence development through

launching project management training programs. For this purpose, human resource specialists were at the forefront. A further extension was to involve business division-wise competence development managers who were closely coordinating with their respective business PPMOs. The development activities were guided to seek '*what are the different sub areas of project management to be developed for business-wide competence development*'? For example, contract management competences were upgraded in liaison with business-specific organizational project management.

Initially, the development of resource competences was based on best practices refined in other business divisions, where the special focus was on a business project management model. Later, at the end of Period I, these learning programs were reconfigured with a cross-divisional development approach, in which resources from all business divisions and geological regions were participating in the trainings. This was a vital step towards the formation of a common business language based on project management terminologies. This research understands the development of common language as a cornerstone for PPMC routine development and realizing its idealized performance outcomes.

The development of resources was not limited only to project management competence training. In tandem, the global (structural) roles of project management were refined, and new roles were also crafted. For example, earlier, the project manager's role was reconfigured with the vision (and required competence) of unified in all business divisions. This could help in cross-divisional knowledge integration and solution development with unified project management routines' procedural memory. Accordingly, other roles in core project teams, including lead engineers, were redefined. These strategic actions towards resource competence development and crafting role definitions helped in developing project management culture. However, in practice, this development of project management culture was not uniform across TCA. The business context and external environmental factors were impacting on this development. Meanwhile, the *people-processes-tools based development* approach also contributed positively to project management culture. Explained by an expert that the effect of resource development was obvious in terms of the incorporated business process adjustments.

The trained resources were also involved in previously indicated portfolio governance structures. Positively, there was an obvious alignment between the resource participation and different governance structures. Most of the experts participated in more than one governance structure at different organizational levels. It is reasonable to establish that this was an action of maintaining

transparency in the decision-making process as well as establishing stakeholders' visibility as to '*what developments are ongoing in the organization*'. Naturally, this alignment was not uniform across the corporation. This PhD research learned that the expected business benefits were not understood to be uniformly attainable in different business divisions, or otherwise the other organizational changes were prioritized over unifying corporation-wide stakeholder mental models.

7.1.2 PPMC routines (& activities)

7.1.2.1 Governance routines

The Company Alpha (TCA) initiated the collection of PPMC governance routines which included oversight of the development of PPMC related competences, integration of existing business processes with project-based management, and defining accountabilities and authorities at various organizational levels (compare: PMI, 2013a). This development was aimed to maintain alignment with the corporate governance system (Müller, 2009). However, during Period I, the only notable success was related to the resource activity coordination for establishing the structures and the development of project stage-gate models. At the corporation-level, there was no platform to control the outcomes of projects, as the business divisions were responsible for the quality of project outcomes. Still, the focus of governance routines was to ensure stakeholder participation in the development of frameworks and standards to be uniformly implemented later throughout the corporation. One such example is the development of project classification framework (Figure 19). Such a framework was considered to be helpful for resource planning and workload estimations because all projects are not the same; however, for an original equipment manufacturer (OEM), some projects are more demanding than the others. Hence, it was learned that functional resources could be managed according to the project classifications.

Another related example of other governance routines was to develop project categories. One expert explained that there was a lot happening in the organization that was not visible, and while all the projects were considered to be the same in managing. Through governance routines, three project categories with their sub-categories were defined during Period I. Accordingly, the stage gate-models for these three project categories were developed. The stakeholder (resource) coordination and their engagement were ensured through empowerment based on knowledge and scope superiority; some functions were considered to be more expert in business projects, while others were better at P&S project management.

These routines were controlled by EPPO through coordinating activities among the corporation's stakeholders. One prime focus of organization-wide governance routine outcomes was competence development for '*efficient delivery of products and services*'. The earlier learned organizational development with a simultaneous focus on people-processes-tools is reflected in the operational decisions made during the governance routines.

7.1.2.2 Communication routines

Supported through the development of dedicated structures, PPMC communication routines were very visible during Period I. It is evident that one significant driver behind project portfolio management (PPM) approach was to '*facilitate accurate communication throughout the organization*'. Accordingly, all the previously discussed routines required the involvement of several knowledge experts for day-to-day based information exchange, which was achieved through formal communication routines. For example, the development of cross-divisional training followed a yearly action plan. The calendar of planned events guided the communication between the concerned stakeholders. Similarly, the project management role definition routines (governance) were clearly defined, and the communication requirements were agreed upon accordingly.

Another example was the planning for PMIS development & implementation program, where corporation-wide stakeholders were participating and their communication routines were organized, even though integrating diverse stakeholder requirements within the same corporation was challenging.

7.1.2.3 Project management routines

Project management routines involved the operationalization of resources in TCA, and these routines in two investigated divisions are described in the subsequent sections. However, on the corporation-level, the routines related to different project management processes of initiating, planning, execution, monitoring and control, and project closing were reported to become more visible. This visibility of resource actions can be attributed to earlier identified developments related to structures, people, and processes dimensions of PPMC. For example, the importance of stakeholders in projects was discerned gradually among individuals' competence development; the stakeholders' involvement was managed through introducing milestones in project stage-gate models and according to the categorization of projects. These actions led to focus on enhanced communication routines at the individual project level. Project risk management routines were

another group of coordinated activities established during Period I, but these developments again were not uniform throughout TCA. For example, project management routines were more mature in DBD than in SBD.

7.2 PPMC Development at SBD

Sigma Business Division (SBD) started Period I with a strong market position and an increasing offshore demand for their solutions. SBD leadership had already foreseen the needed adjustments to the business value propositions due to latest technologies and upgraded market regulations. As a result, the prime attention at SBD was to extend business value proposition by acquiring other globally present companies. It meant that future products & services were to embrace integrated complex product systems (CoPS). It is not that SBD was not already producing and delivering CoPS; rather, the inclusion of newly acquired businesses entailed technological upgrades to the existing portfolios, and the importance of systems engineering was further emphasized in leadership discussions.

SBD's internal aspiration was to become an equipment supplier with the most extended value offerings for their dedicated market segments. One consequence of the global financial crisis was irregular market fluctuations. However, despite market uncertainties, SBD maintained its market share of new orders, and it even expanded in some special business segments. The observed difficulty for leadership was to predict and strategize for demands in the extended future; this was important for new capability development targets, and PPMC development was one recent start-up. Consequently, the most recorded events at SBD indicate an extended focus on systems engineering to comply with technical and regulatory requirements. In the meantime, project management competences were developing to support an efficient integration of products into complex engineered solutions. Nevertheless, the project management model already existed and somehow had been practiced in SBD before the start of Period I.

In terms of its relevance to this PhD research, the PPMC development in SBD was to follow the corporation's guidelines for extended discipline (formalization) to their project management routines. There was natural resistance to this change; because, there were concerns about the practical implementation of the project execution models learned from the corporation. Consequently, routinizing the project management way of working had been relatively challenging, and this was reflected in project management maturity model survey results for SBD. Still, compared to its competitors, SBD's competence in project execution was on an adequate level. This research identified that the internally narrated business

project successes were due to their technical and engineering knowledge gained over the years, which made error detection easier. To reiterate the fact that SBD was becoming a market leader meant that it was expected to possess state-of-the-art knowledge of its technology and the engineered solutions.

At SBD, the prevailing mental models were guiding resource routines towards integration of solutions, while the time schedule delays to the end project (in customer responsibility) were of negligible effect. It was because of its limited scope for complete infrastructure development. The experts believed that the project owner [SBD's customers] would rarely succeed in on-time completion of their infrastructures. A prevailing vision at SBD was that their projects with limited SBD scope should be successful; first, if their promised CoPS are correctly engineered, and secondly, if these engineered CoPS are integrated into the client's infrastructure.

Consequently, the development of people competences and hence the processes, tools, and organizational structures at SBD were to ensure integration based on systems engineering. It was also notable that project management's coordinated activities developed with less focus on the IT systems used by SBD – for example, the ERP system and document management system.

7.2.1 PPMC dimensions

7.2.1.1 Structures

Learning to work in matrix structures with shared responsibilities between functional managers and project managers is a frequently discussed prerequisite in the literature (see: Kerzner, 2013; Turner, 2009). Accordingly, the first step was to promote matrix organization for working in projects; however, the organization showed notable resistance. Being a technology oriented product-based business, at SBD the '*final say*' was institutionalized to stay within the functions. These were promoting functional defensive routines for efficiently responding to problems after the recording of complaints. It was recalled by an expert that SBD functions were considerably good at solving problems after they occurred; however, a better approach was to prevent those problems from happening. In this vein, one of the business-lines focusing on products & services integration as CoPS was at the forefront of understanding needed structural adjustments. The other bigger structural changes to promote management by projects was adopted in the P&S teams, which started a special program to make the P&S development processes uniform with the organizational structure supporting management by projects and

bringing in the portfolio perspective to coordinate the scattered activities as project management and governance routines.

Part of the organizational changes, a major initiative with respect to the PPMC, was the establishment of PPMO. The prime objective of PPMO during Period I, as recalled by its former leader, was to establish a uniform way of working throughout the organization with a special focus on business projects. PPMO role was to ensure (controlling) that processes, tools, and methodologies developed in SBD are adopted (with provision for facial adjustments) from best practices at TCA and similar industries. Meanwhile, the coordination of resources and the development of their competences also remained within their owning functions.

Also notable was the limitation of learnings gained (best practices) from the other parts of TCA. The aforementioned coordination of various functional resources remained inefficient at a functional level as well as between the business lines. Thus, the prime aspiration of reaching a higher and more efficient level of technical knowledge integration was being realized at a slower pace. It is because that learning remained focused on refining the quality of existing (defensive) routines. Resultantly, reconfigurations to these existing routines could not be observed from the collected data.

7.2.1.2 Processes

At the beginning of Period I, corporation-wide processes to integrate equipment manufacturing with the delivery of contracted products were prevailing in SBD. In these prevailing processes were also included the business project processes incorporated in the quality management processes. To reiterate, these processes were formally developed across the case organization for ERP system implementation. The learned notion at SBD was to control CoPS quality through project management competence-based integration of geographically dispersed manufacturing with supply chain activities. Meanwhile, with the establishment of a formal PPMC structure (PPMO), the first step was to establish '*stage-gate model checklists*' to support project lifecycle decisions. Consequently, the '*gates*' were named as '*project quality gates*'. By the end of Period I, a list of nominated projects that could be managed collectively through the '*stage-gate models*' and associated checklists was developed.

The stage-gate models and associated checklists were developed for all three project types (business projects, ID projects, and P&S projects). In practice, it was achieved by elaborating on already existing project management processes. For example, the project planning processes were updated by incorporating the

expected tasks performed by project-specific roles, including project engineers, integration engineers, project planners, and project managers. Continuing with the already established coordination routines, these processes were learned as an extension of the quality management system.

7.2.1.3 People (& resources)

The effects of the financial crisis on SBD's business were significant, and the leadership understood that future business success lay in people's ability to successfully integrate diversified technical knowledge to support extended business value propositions. According to an expert, project management competences as the best practices developed in other business divisions were considered a panacea to the inefficient defensive functional routines. Relatedly, project management competence development at an individual level adopted ongoing corporation-wide training programs. Bearing in mind the fact that project management competences had never been reflected as core capabilities at SBD, the training programs as well as the materials (tools and techniques) taught in these training programs were based on learnings across TCA.

Nevertheless, there were business division-wise teams to gauge the competence requirements specific to different project types. However, lacking examples from best practices of (SBD's) project management routines, the impression in SBD was that training programs should have been further customized.

This research understands that such elaborated stage-gate models (one for each project type) and their incorporation into business processes was a first major step towards PPMC development in SBD. However, the causal mechanisms were based on integration for improved efficiency of the existing routines. One repeatedly cited advantage of these upgraded processes was improving information quality in terms of '*what is happening in the business division*'. However, the contribution of stakeholders from different business-lines and support function could still be further improved.

7.2.2 PPMC routines (& activities)

7.2.2.1 Governance routines

Project governance routines were modified according to the newly developing gate-models. In relation to the efficiency in focus, at the beginning of Period I, the

project governance at the business-division level was driven by financial motives rather than a strategic alignment of the projects at the business portfolio level. Accordingly, the development of processes, methodologies, and tools and techniques supporting decision-making were followed based on preparation for more sophisticated solutions (CoPS) to meet intermittent market demands, and mistakes had to be avoided. It was explained by one expert that the maturity in management by projects was lower, and hence the capacity to tackle uncertainties and business risks was lower as well. Therefore, the focus was on adaptive learning by exploiting what was learned at the corporation-level. Mostly, the governance routines at the portfolio level remained limited to the progress follow-up meetings through a, merely completing, list of projects and related activities.

The effects of this institutionalizing approach, undergirded by adaptive expectation mechanisms of best practice-based project management methodologies and consequent routines, was limiting PPMC development during Period I. However, the governance routines in one segment of SBD had been developing with less influence from the other business divisions: it was in P&S project teams. From the second half of Period I, the development focus was more oriented towards PPM. The strategic alignment of projects, 'killing' and combining projects, and prioritizing the most valuable projects was visible in developing PPMC governance routines.

7.2.2.2 Communication routines

During Period I, PPMC communication routines mainly included information exchange regarding project management competence and process development. This also included information exchange between different organizational hierarchies and functions, mainly to support project governance routines. Project charters, project plans, schedules, and resources estimation were included with technical knowledge integration. Periodic project meetings were organized, and the exchange of information was based on 'stage-gate models' and quality checklist. Functional communication routines were not new because SBD already had different informal structures to discuss progress and planning at different business levels.

A gradually apparent difference was the use of project management terminologies in communication. Herein, PPMO supported the diffusion of project management and PPM supporting business language. However, the focus of these communication routines remained on control of ongoing activities, with decision-making power mostly concentrated within the functional experts.

7.2.2.3 Project management routines

Learned in functional silos, *ad hoc* project management routines had already been institutionalized in distinct functions at SBD. This was clear in the first project management maturity survey results. Therefore, the strategic goal of managing further complex integrative solutions (CoPS) required SBD to learn integral project management routines and formalizing those routines. A quick best practices-based fix was adopted from the other parts of TCA. It means that PPMC governance fulfilled the literature guided investments on project management experience accumulation, and knowledge articulation and codification (as in Table 7). Furthermore, organizational project management experts from more proficient parts of TCA oversaw the development of project management routines. Therefore, the second project management maturity survey in SBD indicated noticeable improvements. However, routinizing integrated and formal project management did not flourish in most parts of SBD.

7.3 PPMC Development at DBD

At the beginning of Period I, market demand was increasing sharply for DBD products & services. The internal emphasis was on establishing a platform for expected continuous growth for the next five years. According to the market forecasts, Delta Business Division (DBD) could continue with their already planned technological development. On the other hand, the markets were uncertain, and signing business deals were delayed in DBD-operated markets due to the Great Recession. However, the leadership at DBD appeared to have faith in their project management-based competences and their recognition as a solution provider for the whole infrastructure.

DBD leadership targeted at gradually increasing business volumes to reach at the double. These targets were due to the confidence earned from consistent successes over the past few years. According to one expert, such forecasts required them to accomplish considerable developments in business processes, tools, and people. They continued building on their previous developments on maturing project management routines specific to their project teams. Broadening the scope of project management routines was a prerequisite to understand cross-functional routine synergies. This also required realigning the ongoing internal development as well as product and solution development initiatives.

It is pertinent to outline the strengths of DBD's project management and project portfolio management (PPM) activities. The earlier mentioned maturity assessment survey results indicated above-average scores for project management

and PPM at DBD. However, considering their growth targets the identified improvement areas required better coordination among value chain activities and envisioning the organizational view of business success potentials of PPM. The business reporting and governance-related project portfolio activities were already progressing because of the leadership's focus on various templates and reporting systems (see examples in Table 7).

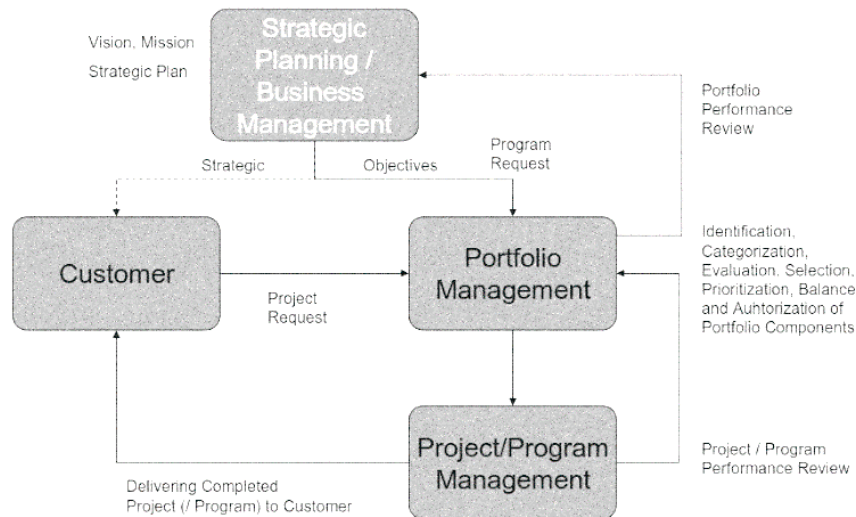


Figure 20. Strategic development view of PPMC (Source: Case company; from PPMO, masked for this report)

In fact, DBD fostered management by projects as a core competence, and formalizing PPM was a strategic development target for future business (Figure 20). Thus, management by projects (Morris, 2013) was at the heart of competence development roadmaps. These roadmaps were undergirded by the most visible ambition of integrated development of *people-processes-tools*.

7.3.1 PPMC dimensions

7.3.1.1 Structures

Prior to the start of Period I, DBD had already been learning to work in multi-layered matrix structures. In this matrix organization, project management was established as a specialized function. In this matrix organization, functional experts were working in project teams, and functional leaders with domain-specific knowledge were simultaneously leading business projects. This established the means to develop project management knowledge in parallel with technical knowledge and business-specific knowledge. A synergy between three

specific knowledge types was a strength that offered a platform to commence with PPMC development plans. These plans were in form of dedicated roadmaps connected with the complex product systems' (CoPS) business needs.

Herein, the PPMC routines could be established when resources collectively developed procedural, declarative, and transactive memory from these three knowledge domains. One important aspect of such structural reforms was to ensure a balance between control and coordination. Learned from the experts in DBD, their organizational culture was promoting collaboration in project activities and they could also observe control due to structural changes enacted over the past few years.

Another notable improvement in terms of PPMC development was the formal establishment of project management office (PMO). This PhD research learned of this structural formation undertook the PPMO role. The PPMO demonstrated a coordinating role for developing processes, tools, and methodologies to be used for cross-functional collaboration (Unger et al., 2012). This way DBD PPMO focused on business-wide competence development related to people, processes, and tools (compare: Pennypacker & Retna, 2009, p. 124). The aim was to establish a way of working for business that would be more profitable, and then extend capabilities for '*engineer-to-order*' business contracts. In this regard, PPMO's duty was to establish reporting and other communication channels for coordinating resources and utilizing them more efficiently.

Corporation-wide initiatives for project categories & classification required a flexible approach towards managing projects, acknowledging that '*one size does not fit all*'. In practice, these three project categories/types entailed dedicated structural support across DBD. Therefore, PPMO extended its coordination by establishing cross-functional development boards and dedicated PPMOs to support the development of competences related to each project type. For example, the quality functional resources were leading the competence development required to perform business DBD-wide ID projects. Whenever it was required to develop individual resources (for example, newcomers and junior team members), there were dedicated experts from HR to support. Meanwhile, the DBD PPMO was leading in coordinating these development activities.

7.3.1.2 Processes

The Delta Business Division (DBD) was established as a functional unit with a strong focus on corporation-wide business processes. Management by projects required a relatively flexible approach towards work coordination. However, the

control over this coordination could not be compromised. Therefore, the initiatives to reconfigure the business processes were already in progress prior to Period I. Mostly, the efforts were focused on the integration of resource activities by developing a local variant of processes. As a result, the introduction of the stage-gate model (Figure 21) was a source of continuous positive discussions between cross-functional process development teams. It was understood that change in processes would require supporting tools and competent people to understand the effect of coordinated action.

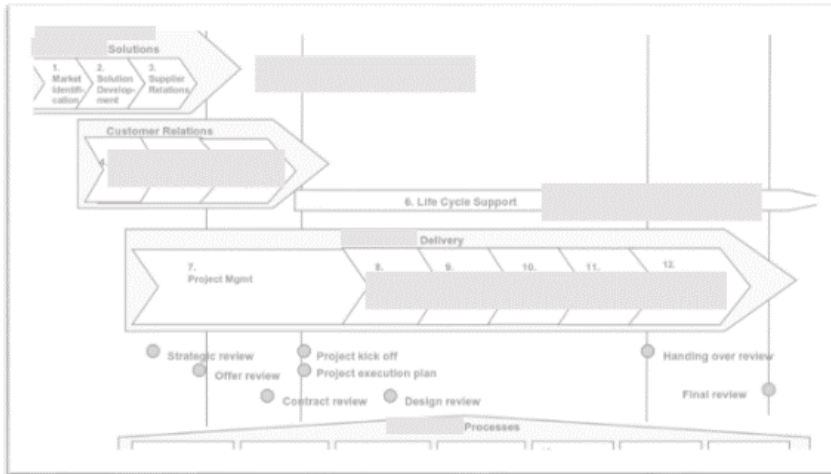


Figure 21. Draft of stage-gate model-based integration of business processes
(Source: Case company; from PPMO, masked for this report)

PPMO-led training programs also included guidance about operationalizing the stage-gate model-based business processes. Considerable development requirements were to be fulfilled until these processes could be routinized with intentionality and certainty about their claimed performance outcomes. It was being realized through the knowledge coordination of formal and informal structures of the developing PPMC.

7.3.1.3 People (& resources)

The DBD undertook the development of project management competences as the foremost feature of changing the way people worked. It was important to establish supporting processes and tools at a pace suitable to individuals' knowledge. The business environment was uncertain, and investing in a new knowledge domain was a courageous decision that also at times required a vertical leadership style. However, establishing a long-term commitment to ongoing developments could not be achieved without shared leadership where people were encouraged to speak

about the development of their specific functional activities. Subsequently, as people were simultaneously educated about management by projects, the multi-domain knowledge was created for work routines carrying know-how (procedural memory), know-what (declarative memory), and know-who (transactive memory). It was evident that each function in DBD contributed to establishing the competence requirement for their own people and outlining requirements for supporting processes and tools and techniques. Because the developing competences, processes, and tools & techniques had to have a significant effect on the cross-functional coordination for managing multiple projects and programs as dedicated portfolios.

A result of formalizing the project management knowledge for functional experts, there were about fifty (50) individual experts holding project management certifications. The training programs for these professionals were covering multiple domains including all three expert knowledge domains (project management, functional, and technical knowledge). For example, engineering functional teams were introduced to advanced concepts about project management, including project portfolio management. Also, the functional leadership could influence the yearly competence development calendars. In fact, dedicated competence development calendars were prepared for each function, covering all three knowledge domains. Meanwhile, the function-wise development calendars were synchronized to ensure multi-functional individuals' participation in the project management training programs. This was coordinated and controlled by PPMO with support from HR. This research learned that such a coordinated effort laid the foundation for developing shared mental models at different organizational levels. People started to develop a sense of their coordinated actions and their effects on business outcomes.

7.3.2 PPMC routines (& activities)

7.3.2.1 Governance routines

According to the in-house experts, the portfolio view of end-to-end activities was inevitable for success in a large-scale project business like DBD. The motivation was to establish control over business and to be able simultaneously to fulfill the diverse requirements of the markets and stakeholders. Such a PPMC governance approach was similar to the governance paradigm of a '*versatile artist*' (see: Müller, 2009). Herein, project management was being established as a core competence. The PPMC governance routines (& activities) were used to oversight

and guide the development of processes, methodologies, and decision-making criteria (including tools and techniques). At the same time, the alignment of ongoing developments with corporate governance at TCA was ensured.

PPMC governance routine origination in DBD was also affecting communication routines. To support the developing routines, resources in project control function (reporting to PPMO) were developed to act as change agents promoting project reporting (for example, the ERP system) and information-sharing based on the existing platforms (for example, the document management system). The presence of a suitable organizational structure, the supporting/localized processes, and competent resources were important to transform governance routines and further temporally realizing reconfigurations.

7.3.2.2 Communication routines

PPMC governance routines are apprehended through supporting PPMC communications activities. Governance routines established communication channels through available mediums. However, effective communication routines were important to ensure stakeholder engagement (functional experts) and integration of their knowledge. This in reverse established a platform to develop the shared meaning of governance activities (& routinizing). For example, periodic meetings for business-focused project performance assessment were extended to diverse stakeholders.

There were already PPMO's efforts to formalize these communication routines through project-wise governance in the form of checklists and templates for decision-making and transparently communicating those decisions to the stakeholders. In addition, project resource requirements have been discussed through these formalized communication routines. The hierarchy of these control- and coordination-based communication routines was observable at different portfolio levels, i.e., from the project level to division-wide project portfolios.

7.3.2.3 Project management routines

During Period I, DBD already had established routines related to project scope management, time management, cost management, quality management, and risk management. However, the maturity of these routines varied, with lacking competences between the functions. Therefore, the focus of PPMO was to make sure that basics were reached correctly across the functions.

Business management reports, strategic reviews, and marketing reports proposed that DBD had institutionalized formal project management routines. These routines combined technical and functional knowledge with a focus on sensing and realizing customer value management. One important achievement was the aforementioned development of matrix-based organization with shifting focus from products to complex product systems (CoPS). Although this shift in focus took a longer period of time (before the start of the data collection process), and this PhD research understood that it was exogenously motivated from the operating environment and resultant deliberate adjustments to the business strategy. However, the expert knowledge coordination became successful through management by projects and needed structural transformations realignments.

7.4 Period I: Capability Development Summary

PPMC development Period I reflects TCA's commitment to extend organizational project management (OPM) competences across the corporation by adopting practices from its more successful business divisions. Meanwhile, those more successful business divisions had already established an urge for project portfolio management (PPM) practices. The first and foremost step towards PPMC development was the formalization of EPPMO. The EPPMO, although an informal structure, had the mandate to control the coordination of future developments related to *people, processes, and tools* supporting OPM. EPPMO participation included business divisional PPMOs, IT functions, and HR functions. EPPMO prioritized at first to make uniform and then upgrade the project management competences among corporation-wide resources, and then to make step-by-step developments in the PPMC processes. Meanwhile, there already existed a need to establish an IT-based project (portfolio) management information system (PMIS) across the corporation.

Table 8. Summary of capability development during Period I

PPMC Development	The Alpha Company (TCA)	Sigma Business Division (SBD)	Delta Business Division (DBD)
External Context	Market leadership requires efficient knowledge integration with the recent technologies. Financial crisis; increasing market uncertainties.	More stringent regulations in future and need to compete with the recent technologies and competitors. Shrinking business due to the financial crisis.	Increase in market demands to support technological leadership. DBD's CoPS complementarity with new technologies.
Internal Context	Extending the technology leadership among the competitors. Extend prior developments (business processes and IT-based systems). Exploit project management competences through unification.	Knowledge integration within the old and newly acquired business-lines. Functional silos are hindering efficient project operations.	Extend market leadership, enter into new markets. Establishing a platform for future growth. Extend the project management to the next level.
Adaptive Expectation Mechanisms	Best practices expected to lead to higher success across the corporation.	Best practice-based quick fix to system engineering and value delivery issues.	Expectations to learn higher level competences supporting PPM from other institutions & industry.
Complementary Mechanisms	Uniform project management processes to promote the economy of scope within business divisions.	Limited actuation to synergize functional actions (for example in P&S teams).	Stakeholder engagement to develop capability requirements in line with technological, functional, and project management knowledge.
Coordination Mechanisms	Coordination between corporation-level functions and businesses to design efficient operations.	Limited stakeholder coordination to capitalize on the developments achieved at corporation-level.	Coordination to refine the earlier plans and roadmaps during the implementation phase.
Learning Mechanisms	Single-loop – refinement to the methods and procedures to lead to efficient routines. Double-loop – structural and competence reconfiguration for PPMC development.	Single-loop – refinement to the methods and procedures to lead to the efficient routines. Double-loop – people competence development and (limited) structural reconfiguration for PPMC development.	Single-loop – refinement to the procedural and transactive routine memory. Double-loop – reconfigurations to the structures, processes, and people competences. Triple-loop – Shared mental models towards requirements about future competence developments.

Outcomes	<p>PPMC Dimensions</p>	<p>Development of new structures: EPPMO, governing bodies. Stage-gate model refinements. Formal training programs and defining global roles.</p>	<p>Development of new structures: business divisional PPMO and an independent PMO for P&S projects. Stage-gate model refinement and checklist. Resource competence development based on best practices tested in other business contexts.</p>	<p>Development of new structures: PPMO and cross-functional competence development boards. Integration between business processes and project stage-gate models. Business context-specific competence development of resources, multi-hierarchical resource engagement.</p>
	<p>PPMC Routines</p>	<p>Developing declarative memory led to pre-formation of governance routines. Communication routines formation with procedural and declarative memories. Refinements to the institutionalized project management routines, and also the development of new routines (for example, project risk management).</p>	<p>Limited pre-formations of (pre-formalized) governance routines with developing declarative memory in the P&S function. Extension of existing communication routines, mostly due to stage-gate model checklists. Intermittent refinements of the project management routines by improving procedural and transactive memory.</p>	<p>Transforming the existing governance routines to accommodate multi-stakeholder knowledge integration for PPMC development. Communication extension to diverse stakeholders. Reconfiguration to the existing routines with new supporting tools and extended processes.</p>

During Period I, uniformity to people's competence was targeted through developing special training programs. The objective was to learn in-house best practices in corroboration with state-of-the-art (at that time) project management procedures, methods, tools, and techniques. EPPMO promoted these training programs to all business divisions and functions. Also, stage-gate model upgrades in business divisions were prioritized before approaching the formal PPMC processes. The capability development related to PPMC people and processes unfolded differently at the corporation-level than in the business divisions. Such differences were more obvious between the business divisions. Consequently, routinizing of the PPMC could be further distinguished between business divisions and the corporation. Accordingly, the capability development paths in TCA, SBD, and DBD were different from the beginning of Period I.

The difference in development paths was mechanized idiosyncratically due to the surrounding conditions and internal and external contexts. At TCA level, the actuated self-reinforcing mechanisms propelled the EPPMO efforts towards unification in competences, practices, methods, tools, and techniques. Similarly, SBD expected to benefit from unification at the corporation-level and established the coordinating structures for this purpose. On the other hand, DBD expectations were to explore new competence developments and coordinate with EPPMO through its already established structures. Accordingly, the DBD's stakeholder requirements for capability development were established in a relatively more integrated manner.

The PPMC development Period I process has been explained in the preceding sections of this chapter. Meanwhile, critical realists pursue mechanisms and context-specific explanations (Harrison & Easton, 2004). Making sense of the actuated mechanisms and guiding context for path-dependent development is a demanding task. Period I capability development process outcomes, context, and actuated mechanisms of path reinforcement are collected in Table 8. Further discussions on the effects of the actuated mechanisms are included in Chapter 10.

The developing PPMC dimension and its consequent routine formalization could result in significantly varied performances from the project portfolios at TCA, SBD, and DBD. The case data suggested that with more advanced routinizing, PPMC had higher performance outcomes. However, this PhD research refrains from particularizing the PPMC performance outcomes for specific portfolios, business divisions, or corporation-wide functions. At first, data collection limitations were one hurdle, and secondly, identifying inferior performances was not in accordance with the ethical tenacity of this PhD research. Rather, the developments of capability dimensions and routines should well indicate the success in attaining PPMC performance outcomes. However, to contextualize the capability developments in the next period, only the highlights of performance outcomes from Period I are presented in Table 9.

Table 9. PPMC performance outcome highlights during Period I

PPMC performance highlights	
Decision-making Transparency	Mostly related to individual business projects (and only) where the stage-gate model-based routines were relatively more proficient (and considered to have direct consequences on business performance). Later, decision-making transparency gained importance for P&S projects to govern as portfolios.
Visibility & Predictability	The degree of stakeholder exposure increased with stage-gate model-based interactions. Predictability of project results still remained (almost) the same, especially in functions and divisions lacking proficiency in project management routines.
Strategic Fit	Business project portfolio risks and opportunity coordination may have increased strategic fit. P&S project portfolio had communication routines supporting strategic fit with long-term and short-term development focus.
Value Maximization	Specifically remained to the recording of financial benefits and profitability of business projects and programs.
Synergism	At corporation-level, limited synergism in developing capabilities through EPPMO stakeholder knowledge, relational, and cognitive networks (and related coordination). In few business divisions, synergism extended to the functions and special purpose informal structures.
Change Adaptability	Change adaptability could be least attributable to PPMC due to the technical and directional complexities (compare: Saynisch, 2010). Planned changes were managed as unconnected/independent, however, sometimes formally led as programs.

8 CAPABILITY DEVELOPMENTS PERIOD II

Important developments in project portfolio management capability (PPMC) were realized during Period II. The most apparent were PPMC processes development and development of corporate-wide PMIS. For this purpose, a significant program was already under discussion during Period I; the notion behind this program was to develop an information system to develop consistent processes for the management of organization-wide projects. The earlier learned approach of simultaneous development of people, processes, and tools was at the core of development actions planned through this program (Figure 22). From the beginning of Period II, these discussions had been renewed regarding productive actions supporting PPMC development.

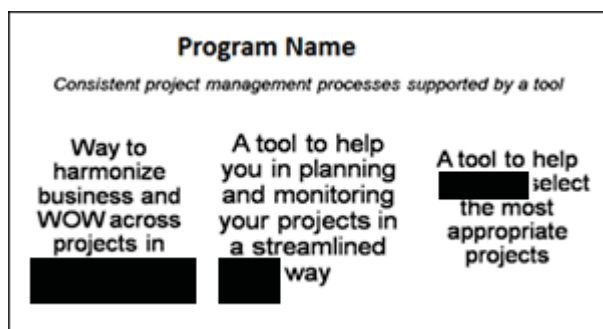


Figure 22. Program message for organization (source: case company, masked for this dissertation)

Since Period I, the world economy was suffering from the Great Recession, and consequently world GDP decreased gradually during Period II. Relatedly, TCA-operated market segment business volumes decreased by more than one third for both the investigated business divisions of DBD and SBD. Meanwhile, the business performance of both business divisions was noticeably consistent (or declines were trivial) compared with the competitors. According to the interviewed experts, focus on extended value proposition and the alignment of internal processes with the business operations were supporting this consistent performance. Instead of superior performance complacency, there was corporation-wide concern for even more stringent market conditions. This would result in substantial business reduction for TCA, as its competitors were suffering already. Another externality affecting the corporation-wide decision was business activity concentration shifting towards developing countries, requiring further decentralized operations.

Even though, business volumes in TCA-operated market segments were shrinking, still the independent (external) forecasts were indicating growth potentials, but at

an increased technological transformation rate. Shrinking market volumes and transforming demands led TCA to renew its product portfolio for supporting extended value propositions. Pertinent to the business environment, all planned developments were obligatory to be realized very efficiently at a decreased cost of operations.

TCA announced a new business strategy during Period II. Accordingly, technological development (R&D) received significant investment and new businesses were acquired in liaison with required technological diversifications. According to the experts, these investments could be realized by consistent business performance over recent years. Meanwhile, TCA wanted to maintain its technological leadership in the industry and its operated market segments. In addition, this new strategy required efficient and lean management, especially in the manufacturing units. For this purpose, a new informal structure at the corporation-level was established to collectively oversee the quality and operational development investments (projects, programs, and portfolios of internal development).

In the beginning of Period II, corporation-wide IT function restructuring had slowed down PMIS-related PPMC developments. In the second half of Period II, a major organizational structural change was initiated. During these years, TCA reduced approximately 10% of its global workforce. This downsizing and restructuring was most significant in SBD and in the manufacturing units across TCA. Consequent to these structural changes and downsizing, the ownership of resources altered between TCA divisions and functions. New roles were defined, reporting structures were altered, and leadership mandates in decision-making were changed. Another noticeable change in the organization structure was the formation of an in-house consulting department to support awareness of business process efficiencies and reduction in non-value adding activities (lean operations).

8.1 PPMC Development at TCA

8.1.1 PPMC dimensions

8.1.1.1 Structures

Earlier, during Period I, The Company Alpha (TCA) had achieved critical structural developments for PPMC. The EPPMO was propagating an earlier developed slogan of “*One TCA*” (a frequently repeated slogan in archived documents). It means that

leadership was realizing the existence of increasing functional and divisional barriers to technological knowledge transfer within the organization. This PhD research learned that development of a common language for increased cooperation in knowledge transfer within TCA was the crux of planned strategic developments for the coming years (Figure 23). The achievements during previous period (Period I) were planned to capitalize on the previously mentioned program for the development of organizational project management and project portfolio management processes and practices. Although the aim was one unified way of working, it could not be equally beneficial to all business divisions. Therefore, one notable structural achievement was the establishment of an EPPMO matrix organization. Practically, it means that another layer of informal structure overlapped the earlier developed PPMOs in each business division and support functions. This informal structure was based on earlier identified project categories/types: business projects delivery; ID projects; and P&S projects.

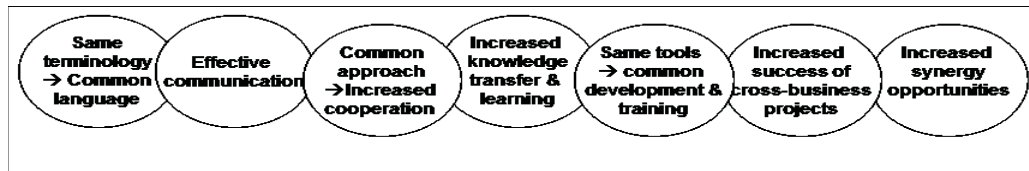


Figure 23. PPMC development strategic approach (Source: Case company; from EPPMO at TCA)

Each of the business divisional PPMO was further supplemented with three PPMOs as the owner of concerned project category portfolio(s) within the business division. Consequently, in each business division there was a separate PPMO (informal structure) for business project portfolio(s), a second PPMO (informal structure) for ID project portfolios, and a third PPMO (informal structure) for P&S project portfolios. From all business divisions, there were three PPMOs (informal structures), one to support each project category at the corporation-level. For example, the corporation-level PPMO for business projects was formed with the participation of all business divisional PPMOs for the same project category (business projects). Accordingly, the EPPMO organization expanded to ensure that PPMC development needs were met separately for each project category. A related decision was made that for each of these three corporation-level PPMOs, lead should be given to the most knowledgeable function or division for that category.

Additionally, at the corporation-level there was another informal structure, internal development and quality management board, overseeing the EPPMO-led achievements related to PPMC, although similar structures were observed to

already exist prior to Period I in TCA. However, their impact on the PPMC development was not evidently significant, as it became due to internal and external contextual dynamics during Period II. It is because, at first, PPMC development was not heavily budgeted for or invested in at the corporation-level (cross-divisional level). Secondly, strategic development related activities in TCA were becoming more visible and could easily be overseen through the developing PPMC informal structures.

This PhD research accepts that this was mostly possible due to the TCA-level corporation for PPMC, because upper echelons had been monitoring these developments through formal and informal structures. On the other hand, increased focus on exploitation of already maturing project management practices in one business context and/or project category could lead to sub-optimized 'as-is' implementation in other business contexts. Furthermore, it was evident that due to major organizational structural changes, especially in SBD and manufacturing units, the planned adoptions would not have even brought the operational efficiency as desired by the strategic leadership.

8.1.1.2 Processes

During Period II, PPMC process development was one major achievement of EPPMO's efforts to control ongoing developments. This development was part of TCA's PPM program, including PMIS development and implementation. Establishing 'one TCA' through a uniform way of working was the objective of this program. However, it first required unified control over projects through institutionalizing the earlier learned project management competences. This PhD research learned that considerable efforts were made first to develop these processes and then to institutionalize them to govern corporation-wide PPMC routines. In brief, the development projects under this program entailed a corporation-wide model for developing PPMC processes and procedures to support PMIS. These corporation-wide processes included, for example, defining decision-making criteria for portfolio management; developing checklists for different project quality gates specifically for all project categories; activity based management scheduling; resource management; risk management; monitoring of projects and portfolio reporting (communication); and, the development of training materials.

Specific Period II achievements related to the PPMC processes included project identification, project categorization, project evaluation, project selection, project risk identification and analysis, project prioritizing, portfolio balancing, portfolio

risk response, portfolio communication, portfolio authorizing a component, review and report portfolio progress, monitor business strategy change, and monitor and control portfolio risks (Figure 24). Meanwhile, dedicated processes to support ID projects through enterprise architecture management developed during Period II. Additionally, formalized processes specific to project management developed, including project scope management, project time management, project change management, project monitoring and control, and project communication management. However, it was already observable that these processes alone would have not been sufficient.

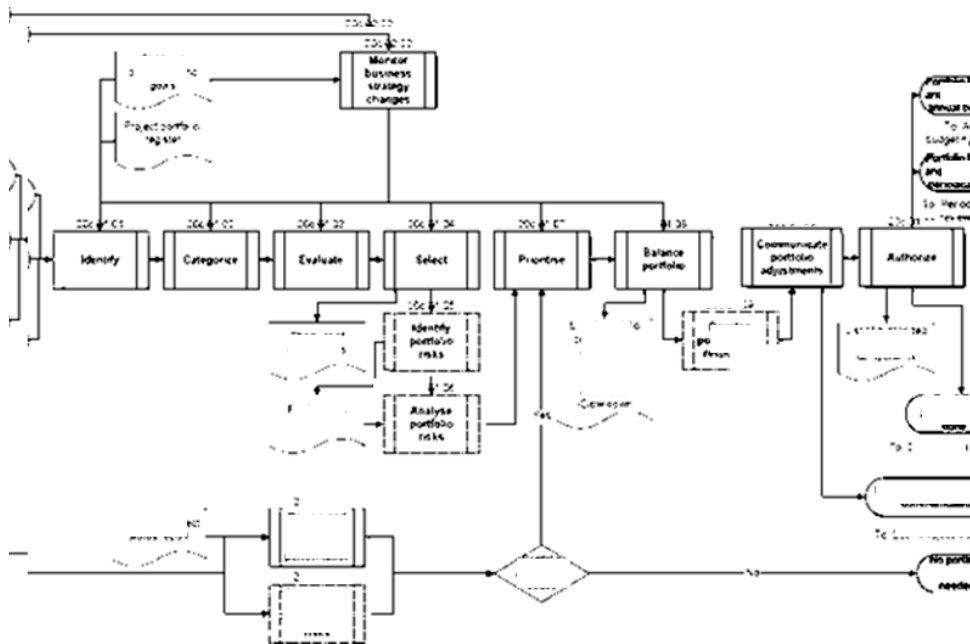


Figure 24. PPMC process model at TCA (Source: Case company; masked for restricted view due to the applicable IPR)

It was necessary to upgrade corporation-wide PPMC routines. EPPMO issued detailed guidelines for establishing one way of working to support the procedural and generative routine memory. These guides included detailed methodologies about systematic management of projects, programs, and portfolios. These guidelines support TCA's PPM model for all project categories. It also included standard stage-gate models with defined milestones and quality gates (different for three project categories). Detailed descriptions for expected stakeholder actions and deliverables through these milestones and gates were made available. These milestones and gates were linked at portfolio level to maintain and monitor business performance objectives through PPMC. Meanwhile, project evaluation score maps were also introduced, which kept on being refining year after year. This

PhD learned that these models were based on PMI (Project Management Institute) and external consulting on organizational project management.

Developing processes and methodologies in the form of guides was a rather efficient, however, an easier part of PPMC developments. The practical implications for synchronizing the processes and supporting tools with the existing infrastructure, especially, IT-based systems was the next necessary step to information systems' integration challenges. As earlier mentioned, enterprise architecture management processes address these challenges. The externally vendor-developed PMIS was to be reconfigured according to the existing cultures of different businesses and functions. However, with all their possible reconfiguration such ready-made tools are not simple enough to alleviate the complexity of organizational systems. The PPM program team at TCA had been efficiently achieving the PMIS reconfigurations (compare: Bibble & Bivins, 2011), meanwhile the ongoing structural changes were causing IT-based systems' integration challenges across TCA.

8.1.1.3 People (& resources)

Knowledgeable resources and the development of their competences are inseparable from performing organizational routines. This PhD research understands people's competence enhancement remained at the center of PPMC development during Period II as well. This development was twofold; at first, through the formal trainings with increasing focus on real-life business scenarios, and second through people's involvement in ongoing developments related to PPMC processes and PMIS customization (for unified working across TCA). For example, by the end of Period II, there were already over two thousand (2000) PMIS users across TCA. Such an approach was helpful in simultaneous learning at the individual, team, group, and business levels (compare: Crossan et al., 1999).

Under the ongoing PPM program, several smaller projects involving development, piloting and testing, validation, and deployment phases were planned. Resources were allocated as teams from business divisions participated in these projects. These teams were cross-divisional and cross-functional, as well as separate divisional and functional resources realized the developments when needed. It is a fact that this participation was not uniform across the corporation. Another fact is that project management proficiency varied noticeably among the participating project teams. To reiterate, the structural conjunction was between the business divisional PPMOs and three temporary structures of project type-wise PPMOs. Each of these three PPMOs was led by the most knowledgeable and competent (as

it was agreed at EPPMO) division or function of TCA, which means that some of the business divisional PPMOs were also leading project PPMOs. As a result, the PPM program's sub-components were being 'field-tested' at first in the leading PPMO environment propelled by their own resources' experiential learning. Subsequently, as it guided by Crossan and colleagues (1999), a uniform institutionalization across TCA was least possible in these conditions.

Naturally, the resources from leading PPMOs (and business divisions) were at the forefront in terms of exploiting their earlier learned organizational project management competences to development PPMC, an example of contextual ambidexterity (compare: Gibson & Birkinshaw, 2004) or harmonic ambidexterity (compare: Simsek et al., 2009). Meanwhile, the resource participation from adopting business divisions and functions followed these explorations in the leading functions and business-lines. It implies that their own contribution to the developments had, although observable, only a limited influence on the development outcomes. Comparing this phenomenon with guidance from Simsek and colleagues (2004), reciprocal ambidexterity was evidently at work. Stating simply, the dominance of the leading PPMO was indispensable in developing the corporation-wide PPMC.

These project, program, and portfolio management guides developed during Phase II also highlighted the role of different stakeholders, as well as participating formal and informal organizational structures. It indicates that there was another effort toward unification across the business divisions through standardization of resource roles. However, in practice, it was more challenging to realize, especially, due to the major structural changes across TCA and its consequential effects on human behavior; therefore, achievements in this regard were only intermittent.

For the sake of narrating the PPMC stakeholder importance, their participatory role in the management of individual projects and projects as portfolios were discussed in the corporation-wide guides. For example, these explanations included the role of project team members, project leaders, managers, and formal and informal governing structures during project and portfolio lifecycles. It also included guidance about their expected contributions in achieving milestones and passing the project (or program) gates, etc. Such an explanation of expected participation also implies that a variety of competences for managing project portfolios was required. Therefore, dedicated training tracks were developed considering the defined stakeholder groups and their expected participation. These tracks included external and internal trainings. For example, Project Management Institute (PMI)-based training programs were selected, and an

external accredited consulting firm was appointed to conduct the planned trainings.

8.1.2 PPMC routines

8.1.2.1 Governance routines

In TCA, PPMC governance has been considered as a higher-level performance state or organizational quality to manage portfolio of projects. Such an understanding had been learned in TCA during PPM program implementation in Period II. Apparently, it is due to the extant literature, which discusses scattered activities performed for PPMC governance. However, the guidance for routinizing these activities is rather rare. This PhD research considers that PPMC, in order to undertake the role of dynamic capability, should maintain flexibility and control over portfolio components (similar to Farjoun's (2010) notions about adoptability and stability), and routinizing governance activities is an essential step towards flexible governance. Accordingly, the formalization of PPMC governance structures during Period II, for example steering committees, portfolio management boards, and organizational operational and quality management boards, was the observed routinizing governance-related activities. The resources in governance structures were participating in the coordinated development of processes, extending these processes to the business-lines, and aligning resource competence with other developments related to PPMC processes and PMIS.

These governance routines were developed within the business divisions and also in cross-divisional teams. The PPM program team, and mainly the EPPMO and PPMOs, on a daily, weekly, and monthly basis collected organizational feedback on the ongoing developments and incorporating these in the PPMC processes and methodologies for project and program management. For example, the development of project management, program management, and project portfolio management guides were outcomes of these intensive governance routines during Period II. To reiterate, these governance routines' outcomes included the general rules for decision-making authority and accountability of defined stakeholder roles for three types of project in TCA. This PhD research also learned that piloting PPMC processes, methods, tools and techniques, and incorporating adjustments were included in the PPMC governance routines. In this regard, developing processes for a better and unified management of projects was one desired outcome for '*strengthening the governance*' of project portfolios.

An example of aiming at better portfolio governance by performing various trend analysis is the one illustrated in Figure 25. Other similar tools and techniques were designed, piloted, and deployed. These tools and techniques undergird stakeholder motivation towards integrated knowledge efforts.

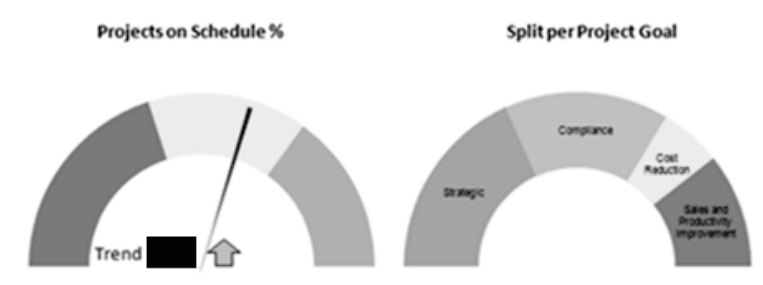


Figure 25. Example of portfolio trend analysis at TCA (Source: Case company; masked for presentation in this report)

Notably, at the TCA level these governance routines were more frequent for ID projects. The economy of scale mechanisms at the corporation-level was providing a driving force for the adoption of these governance routines. The internal and external contextual conditions were driving these higher level (controlled and deterministic, compare: Müller and colleagues (2015)) governance activities of PPMC development. Maximizing the return on investment with enhanced learning efforts towards competence development for cost efficient operations offered driving context in developing governance routines and the consequent decisions—a ‘flexible economist’ attitude (compare: Müller, 2009) was apparent in the governance routines during Period II, as TCA intended to increase control over its business operations.

8.1.2.2 Communication routines

PPMC communication routines support PPMC governance routines. In other words, PPMC governance success (effectiveness and efficiency) is dependent on stakeholder engagement and their commitment to learned and informed organizational developments. Considering the context in TCA, where all business divisions are independently responsible for their business results, the engagement of PPMC development stakeholders required well-functioning communication routines. This has been demanding for the EPPMO during Period II. From the beginning of Period II, the cross-divisional stakeholder participation was more committed to learning new methods, procedures, and processes. Later on, due to the planned structural changes in business divisions and manufacturing units, stakeholder participation was observed to be decreasing gradually. This does not

mean that communication routines were not followed; to the contrary, the routines were followed, but stakeholders' learning focus and commitment was limited to seeking only the procedural memory to promote the management of operations through projects. It was indicated by some experts that learning through communication routines and planned governance could not be applicable to the micro-contexts of several business-lines (sub-units of business divisions) at TCA.

Despite the contextual dynamics affecting communication motives, the unified processes for project management could not be routinized if communication routines did not involve resources from multiple hierarchies. Therefore, it can be considered that communication routines experienced considerable refinement during Period II. EPPMO and its sub-structures learned from the external evaluations during Period I that a 'common language' was important to develop a unified project management way of working. In this regard, along with the aforementioned guides, a project terminology guide was also issued to support PPMC development. It was explained by an expert that during Period I, stakeholder communication was less efficient due to a lack of knowledge of project management terminologies, and thus discussions lengthened with less development achieved at the corporation-level. However, the focus on developing common terminologies for communication certainly improved PPMC communication. Secondly, the appointment of dedicated resources for communicating the ongoing developments also positively affected stakeholder participation.

An important parallel development with PPMC communication was expanding the understanding of cross-divisional business activities in their micro-business and technical terminologies, the daily language. It involved knowing the details of what other businesses are doing on a daily-basis and consulting (in-house) expert resources in various knowledge domains. This PhD research understands that this parallel development of shared knowledge could offer a platform for successful future synergies across businesses divisions and business-lines.

In this age of becoming more digital, communication routines are supported by IT systems. Meanwhile, TCA had already before Period I established numerous IT-based systems. Related to PPMC development, PMIS was considered the prime platform to promote push-and-pull based communications (Kerzner, 2013) at the project, program, and portfolio levels. An expert indicated that an IT-based communication platform like PMIS can process only the available data entered by the resources during their daily work routines. Training resources for superior competences, developing communication terminologies, writing procedures and methodologies, and designing processes are all important steps toward enhancing

data availability. However, these developments will remain impractical if people are not motivated to routinize their actions accordingly.

Therefore, integration of IT systems for promoting communication routines had already been a significant challenge under consideration by TCA. It is because there were already established (defensive) routines for entering project-level data into existing systems, so it was not practical or simple to stop all those existing routines. Therefore, integration and transfer of resource routines was agreed to be carried out step-by-step. However, this also meant that projects' visibility had reached the desired level (in PMIS) at a slower pace. Another consideration, although not mentioned by the experts but inferred from the archived data, was the importance of corporate governance and related certifications for publicly-listed multinational companies. Globally operating corporations, like TCA, must ensure conformity with the regulations. Achieving such a confidence level for (globally spread-out) users of a newly adopted system is a time-consuming task.

8.1.2.3 Project management routines

The artefacts for procedural and generative memory of project management routines in TCA could be evidenced earlier before Period I. However, the organizational application of these artefacts and the consequent routine proficiency was noticeably improving just, at first, after EPPMO establishment. Then, secondly due to the sub-structures of EPPMO to support the PPM program. Answering the question of what had been the project management routines during Period II, an expert mentioned that the support functions in the organization also underwent more integrated actions in extending project management routines; otherwise, there was a developing sense of working differences between the departments, functions, and businesses. This PhD research learned that during Period II, functional integration was limited to interlinking work processes, procedures, and methodologies, mainly driven through single-loop learning motives for improved efficiency of existing routines at the business divisional- and corporation-level.

An increasing routine proficiency (the frequency of activities showing performative aspect of routines, as compared with Feldman and Pentland, 2003) was observed during Period II, for example, related to project resource and risk management. The learned processes, procedures, methodologies, and tools and techniques also affected routines in support functions. For example, the corporation-level quality management function established the portfolio of their ongoing projects linked through a stage-gate model. Similar routinizing of formal

project management could be observed at (other) distinct parts of the corporation. Accordingly, at the project level, the extending stakeholder communication routines were observed. Notably, these routines were based on learned procedures from a business project's context.

To reiterate, the level of proficiency and alignment with the business context was not uniform across all divisions and functions, even though the required processes were already developed and informed. For example, the resource management routines were observed to be more mature in P&S projects, and even more mature at the corporation-level R&D function than those similar functions in the business-lines. Another example of this diversified proficiency is change management routines between different project types and between business divisions and support functions. The maturity of these routines at the individual project level was certainly affecting PPMC performance outcomes because of their dynamic interaction with other PPMC routines.

8.2 PPMC Development at SBD

8.2.1 PPMC dimensions

8.2.1.1 Structures

According to an expert at SBD, the business division-level understanding of PPM started to formalize from the beginning of Period II. Relatedly, the PPMC structural changes advised from EPPMO could be realized. These achievements were related to the three sub-PPMOs, one for each project category. Otherwise, the required expectations from PPMC development involved limited support from diverse functions. However, only the project leaders from each business-line were required to ensure that ongoing developments at the corporation-level were aligned with SBD business operations. To reiterate, the PPM program was internally promoted as a part of strategic development roadmaps in SBD. Leadership wanted organizational developments at SBD to embrace business-wide project management. It is because, in other divisions of TCA, formal project management resulted in higher performance outcomes, and a similar outcome was now expected from adaptive expectation mechanisms at SBD (compare: Sydow et al., 2009).

However, the case data suggests that the business vision behind these developments was that the PPM Program would deliver PMIS as a panacea to

resolve CoPS integration challenges at SBD. The case evidence further suggests that PPMC was considered as an ID program focusing on an information technology-based '*application area*'. Accordingly, the articulated benefits of PPMC were value enhancement of individual projects through the management of globally dispersed resources by better project scheduling. Consequently, PPM was just a little more than an IT-supported set of tools to generate different reports and measure business process efficiencies. This IT system development approach is understood as one of the reasons for limited structural support for PPMC development at the SBD business-division level. The aforementioned structural transformations through downsizing further obstructed executive sponsorship for PPMC development.

Exceptions are reality too; one business-line apparently enthralled PPMC structural developments better than other sections at SBD. The repeatedly mentioned reason for this positive development was the higher complexity of solutions offered by this business-line. Adoption of processes, practices, and tools originating in the management of complex projects, though from other business divisions, suited to this business-line. Another exception was structural support for PPMC development related to P&S projects in one of the business-lines in SBD. Compared with other business divisions at TCA, P&S projects related PPMC development at SBD has been the most advanced. [For readers' reference, this product development function became a structural part of SBD during Period III. However, the resources of this function were participating in PPMC-related developments in SBD during Period II].

8.2.1.2 Processes

During Period II, SBD achievements related to PPPMC processes were not much different from the corporation; PPMC processes at the portfolio and project management levels were developed. Accordingly, the stage-gate models for different projects were being developed. Due to a wider variety, as compared to other business divisions, a uniform stage-gate model development remained under discussion, as the business-lines in SBD were still learning '*disciplined*' project management through development achieved during Period I. Alongside, the function responsible for P&S PPMO led the stage-gate model refinements and supported the practices, methods, tools and techniques for this project category at the corporation-level.

Enterprise architecture management processes were guiding PMIS integration. However, the on-the-ground implementation of the developed processes

supporting PMIS was proving to be an extremely demanding task. Consequently, the integration of PMIS with the other IT-based system was an enormous challenge. The narrated reasons leading to these challenges include functional silos, diversity of products and services-based projects in semi-independent business-lines, and most importantly the SBD's vision of the PPM program as the development of an *IT-based application*. Additionally, stakeholder engagement in PPMC process-related development could not flourish due to diminishing structural support. Even the prominent developers complained about stakeholder engagement and the lack of shared vision of PPMC and its potential performance outcomes.

8.2.1.3 People (& resources)

At SBD, the PPMC people (& resource) dimension was least developed during Period II. With limited stakeholder engagement and adopting PPM as practices supported by IT system, expectations did not reach beyond management by (individual) projects. Relatedly, an expert explained that business (context) requirements from SBD remained among the least affecting to ongoing PMIS developments. Another prominent reason for the prevailing vision of the PPM program as an effort for '*IT application*' was the interruptions due to restructuring and downsizing. In this situation, only a fast fix was sought by the SBD stakeholders. It was explained by an expert that SBD representation in EPPMO and other governing structures was changing frequently. Therefore, the stakeholder motivation in SBD and their expectations of the developments at the corporation-level remained limited. It is also that due to the '*one TCA*' slogan, the prioritized actions and resulting developments were not supportive of the business context of most business-lines in SBD.

Another apparent limitation was related to the functional supremacy of SBD. With external business pressures, the focus was on economizing operations, while ID projects remained beneath the surface and did not become a part of the portfolios. As explained by the experts in product & solution organizations, business-lines and functions were focusing only on ID projects and P&S projects with the least commitment to search for synergies. Although the ID PPMO in SBD was formalized to support divisional and cross-divisional projects, the stakeholder motivation for managing projects as portfolios was still developing slowly, due to internal and external environmental factors.

8.2.2 PPMC routines (& activities)

8.2.2.1 Governance routines

SBD has a relatively complex organizational structure compared to some other business-divisions in TCA, including DBD. SBD's top leadership was therefore conscious of deficient integration of the operational routines of its functions and business-lines. Therefore, during Period I, the PPMC development aspiration had been to enhance integrative operations at a lower cost, due to the external business context – conformist paradigm in action (compare: Müller 2009). However, with the limitedly practiced unified processes, practices, tools and techniques, a collective sense (Weick, 2009) of required flexibility was developing during Period II, similar to the flexible economist paradigm (compare: Müller, 2009). One supporting mechanism in this sense-making process was the coordination supported by enterprise architecture management that regularized ongoing developments involving IT systems, referring to aforementioned IT system integration-related challenges.

Due to the lack of stakeholder engagement and changing organization structures, including roles and reporting, governance routines were developing varyingly in different business-lines of SBD. Meanwhile, the PPMC governance bodies, especially the PPMOs, could coordinate and support to a limited extent with the circumscribed mandate to control capability development activities. According to the experts, one reason was establishing project management processes and routines, which were observed to be inconsistently adopted in different functions and business-lines of SBD. However, exceptions were always to be found because few functions could localize the developments achieved at the corporation-level. Here again, one such example was the resource management processes for P&S project teams. These processes were adjusted with *learning by doing* with PMIS.

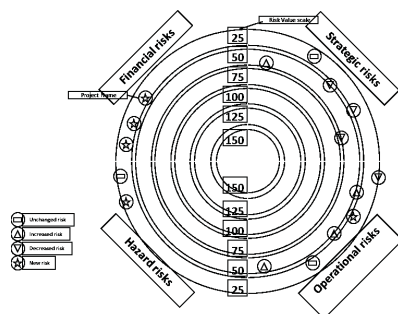


Figure 26. Generalized portfolio risk radar (source: case company; masked for presentation in this report)

Another example of developing portfolio governance routines was the inclusion of tools and techniques to support portfolio decision-making—for example, risk radar (Figure 26). An expert indicated the *'trial and upgrade'* approach was adopted for the tools and techniques. Positively, the decision-makers (stakeholders) were eager to reach balanced decisions regarding their portfolios. Meanwhile, the lack of shared vision kept the prioritizations fluctuating and resulted in frequent changes to the methodologies and tools and techniques leading to acclaimed portfolio management.

8.2.2.2 Communication routines

Due to the changing responsibilities of the stakeholders during Period II, PPMC communication routines restrictedly developed in SBD. Most developments centered on the ID projects in product & solution teams, as well as the coordination of PMIS development and its integration with other IT-based systems and tools used in SBD entailed proficient communications. These communication routines were based on stage-gate decision-making and communicating the development outcomes to the stakeholders. For example, there were frequent meetings with solution architects to review the compliance with and deviations from ongoing developments related to PPMC.

As explained by an expert in SBD, PPMC communication routines are enforced through PPMC structures. Herein the quality of information was critical to communication success. This quality of information improved with practicing the existing communication routines. The expert explained that at first, resource competence and stakeholder awareness of PMIS would increase; however, these two ingredients were not simultaneously available across SBD. Therefore, PPMC communication routines remained limited between the core teams working within PPMOs and supporting related ID projects. Misalignment between governing structures also restricted communications within individual business-lines and functions. Project managers therefore complained often about the bureaucracy involved in communicating with PPMC governing bodies. In these situations, with misalignment between PPMC dimensions, the PMIS could least support PPMC communication routines.

8.2.2.3 Project management routines

The project management routines in SBD were developing at a reasonable pace, as was highlighted in the project management maturity evaluations. However, in the beginning of Period II, many of the functions and some business-lines of SBD were

still in the process of familiarizing themselves with formal project management. Consequently, the ostensive development of project management routines was gradually resulting in improved performance. However, the most frequent complaint of inapplicability of certain practices instilled at the corporation-level (vertical leadership) was the lack of alignment between SBD business context and the know-how developed from the other business divisions. Resultantly, proficiency in project management routines was noted to be slowly growing among the SBD functional layers. The most focus was placed on learning by doing, where actors (people) endogenously activated improvements to routines by fine-tuning existing practices, methodologies, and tools. Some of the business-lines became more acquainted with integrated project operations than others. Subsequently, the procedural and transactive memories for integrated operations between the business-lines remained disconnected.

Interestingly, an external evaluation about the quality of operations [not the project management maturity surveys] in SBD highlighted the need for unified mental models for the success criteria of operations and the applicability of the tools used for operationalizing those criteria.

8.3 PPMC Development at DBD

8.3.1 PPMC dimensions

8.3.1.1 Structures

As discussed earlier, PPMC structure-related developments at the corporation-level were led by EPPMO, and the DBD's contributions were prominent in practical terms. Beyond than the matrix organization of PPMO's informal structures [in each business division, there were three PPMOs for each project category], during Period II there was another layer of project category expert and extended teams in DBD. For example, business project PPMO had nominated expert teams to support the developments related to PPMC processes, procedures, and methodologies. The context of this coordination mechanism was to collect business-specific development requirements for each project category. These structural developments, although informal in nature, were extending the mental models about 'what is project lifecycle' and 'how a project's value impacts business governance choices'.

To reiterate, the development of a shared vision about extending the existing mental model did not take place during a single period. Instead, this learning could be connected with the historical developments of the past decade and was very apparent during the data collection period. In terms of PPMC, the vision had been to realize *when a project starts and when it is finished*. The motivation for knowing more was to collect knowledge about stakeholder interactions and their impact on portfolio results. This means that multiple stakeholders in PPMC informal structures could bring insight to impact ongoing PPMC development. Related to these structural developments, one of these category expert teams mentioned bonus schemes connected with PPMC development targets.

8.3.1.2 Processes

At the beginning of Period II, DBD introduced an upgraded business process model to harmonize its *project-based operations* with project portfolio management guided by a stage-gate model. Each business process starting from *strategic planning and management* to *lifecycle operational support* was linked through various milestones and decision-making gates. The process owners with clear roles and responsibilities related to these milestones and gates were communicated to all hierarchical levels. Furthermore, templates, procedures, methodologies, and practices to support this new business process model were defined and/or refined. This all was needed to clarify and extend cross-functional coordination by improving the transparency of actions towards desired business performance, which is at the core of developing shared mental models. This PhD research cannot share the detailed business process model combined with a stage-gate model; however, a generalized model used for this alignment is presented in Figure 27. This model was also one important reference for PPMC process-related developments achieved at the corporation-level during Period II.

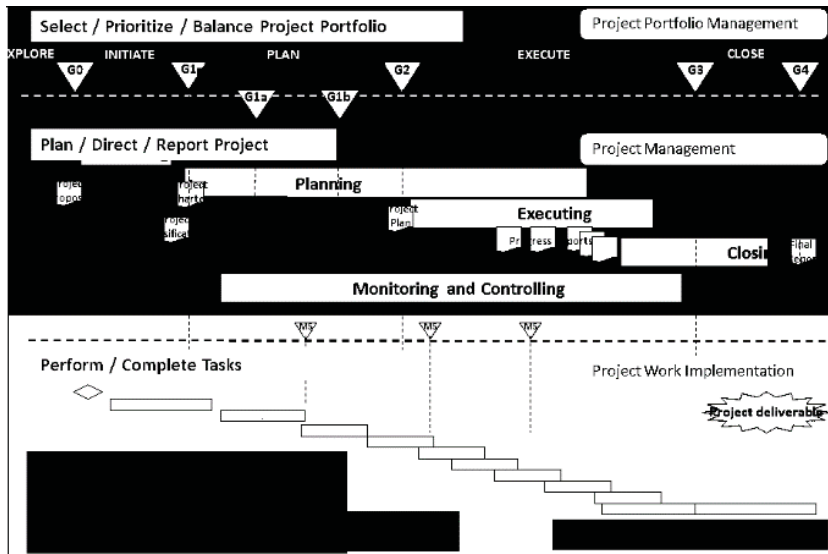


Figure 27. Generalized model for updated DBD business processes embedded in stage-gate model (Source: Case company; sensitive information masked)

A noteworthy development in the extended version of this model, which included all business processes at DBD, was the inclusion of interfacing with other business divisions in TCA (it was an extended evidence of synergism). For example, the business project support was extended with functions from other business divisions specializing in lifecycle support for the prime equipment. It is relevant to mention that this support was already present well before, but now, focused actions guided by this business model could improve the efficiency of operations through visibility and transparency.

8.3.1.3 People (& resources)

The achieved PPMC developments related to structures and processes required stakeholder participation, without which the routines could not be developed. Rather, project management-based culture in DBD enabled internal stakeholder engagement in collecting business requirements from various functions; meanwhile, the informal structures of PPMC supported these engagements, for example, through category expert and extended teams, which included participation from distinct functions including legal and equipment-sourcing teams. The business process model was also a foundation for this collaboration; one example of this is that almost all business process owners were included in the formal and informal structures [PPMC structures] related to all three project categories. This PhD research learned that this consolidation between three capability dimensions in DBD (PPMC dimensions) is a source of shared visions of

the business context-led development of PPMC during Period II. This became apparent through insights by an expert responsible for strategic planning and management. In practice, these developments were achieved through shared leadership (compare: Drescher & Garbers, 2016; Müller et al., 2016), as the category expert teams included resources from distinct functions and hierarchies.

Relatedly, all the constructive participation of stakeholders would be less effective without ongoing competence developments at the corporation-level. The competence development training and certification programs were led by EPPMO, and DBD's functional and strategic leadership was at the forefront.

8.3.2 PPMC routines (& activities)

8.3.2.1 Governance routines

In DBD, the PPMC governance routines for business projects were well established even before Period I. The focus on ongoing PPMC development was to extend these routines to distinct functions. The updated business process model was one outcome of already existing governance routines. Meanwhile, the development of informal structures, especially PPMO, helped to control the development of procedural and generative memory of other organizational routines in liaison with PPMC routines. With the virtue of structural and process consolidation with stakeholder participation, the performance of these governance routines is observed to be respecting multiple stakeholder requirements. During this period, resolving conflicting stakeholder requirements at DBD was far less disruptive than some other business divisions and functions of TCA. Still, the focus of governance routines was controlling the outcome of all three project categories (and portfolios). Compared to Müller's (2009) guidance, the observed PPMC governance routines in DBD were based on the 'versatile artist' paradigm.

Importantly, the DBD's PPMO for ID projects (a governance structure developed during Period II) was observed to assume a more influential role as planned. However, the corporation-wide ID project PPMO and the rate of corporation-level developments could influence PPMC governance routines and required decision-making criteria at DBD. In practice, PPM decision-making criteria for project selection and prioritization were adjusted and readjusted during this period. Meanwhile, the allocation of resources for internal developments in DBD had to respect the '*One TCA*' slogan, and the development outcomes in the other business divisions could influence DBD's ID project portfolio(s) because multiple portfolios

mutually impact each other (see: Young et al., 2011). This influence was observable in the DBD's internal development roadmaps during the second half of Period II.

8.3.2.2 Communication routines

During Period II, DBD realized the need to transform its already existing business project portfolio communication routines for (i) accommodating newly developing PPMC processes and PMIS, and (ii) the development of a PPMC structure for ID project portfolios. Otherwise, the PPMC communication routine development path followed at the TCA level was somewhat similar to DBD as well. An observation in this regard was the DBD's nominated representatives to communicate various PPMC development targets/topics at the TCA level. It was to ensure the transfer of learned procedures, methods, and practices to the corporation and, *vice versa*, the learning from other business divisions and functions.

Positively, due to earlier development of IT systems for information-sharing with multiple stakeholders in DBD, the transformation of PPMC communication routines was considered relatively easier than the rest of the TCA. Also, the earlier and ongoing successful developments related to people competences and structures to support multiple-stakeholder information and integrated business process model were corroborating the developing PPMC communication routines. The already established transactive memory of these PPMC communication routines facilitated accommodating new procedural memory and generative memory, i.e., how the information should be communicated through newly deployed PMIS. For example, the portfolio management meetings were expected to become more structured and business-focused with integrated information flow between various IT systems and PMIS's ability to generate portfolio reports.

8.3.2.3 Project management routines

During Period II, the routinizing of corporation-wide PPMC supporting project management processes was more successfully achieved in DBD, compared to other divisions and functions in TCA. Furthermore, project management routines were discussed at corporation-level, and DBD had to develop new routines through the transformation of existing routines. For example, project resource allocation and management routines were to be transformed with a more digitalized approach made possible through PMIS, as well as the new resource management routines to be appended to PPMC routines. Similarly, the project time management routines were required to incorporate activities performed in PMIS. Another such example

is the (ostensive) routinizing of change management processes for all three project categories.

All these new routines and transformations required procedures, methodologies, and practices that were developing during Period II. The development of project management routines was not uniform for all three project categories. Comparatively, project management routines development for P&S projects were least developed. Resultantly, PPMC routine performance for P&S project portfolios, including communication and governance routines, was observed to be lagging. The development responsibility of PPMC processes for this project category was with PPMO in other business divisions that transferred the procedures, methodologies, and practices tested in their respective business contexts.

8.4 Period II: Capability Development Summary

Period II evidenced the most significant developments in the PPMC processes realized at TCA. For this purpose, EPPMO led a dedicated program towards PPM management approach. Several development topics for PPMC embarked on the PPM program. Quite a few PPMC processes were designed at the corporation-level, and those developments were synchronized with ongoing PMIS developments. Extended EPPMO structures, the project category wise PPMOs, coordinated these developments with business-divisional and functional stakeholders. Mostly, the PPMC routine formalization was based on developing processes, and PMIS remained concentrated within PPMC structures. SBD and DBD represent two continuums of PPMC routinizing efforts at TCA. To differentiate them, DBD could extend the stakeholder engagements to the ongoing developments, and routinizing was therefore relatively less stressful. Where needed, the institutionalized routines' transformation was attainable with the presence of stakeholder-shared mental models.

PPMC development paths differed due to contextual peculiarities; hence, the actuated mechanisms at TCA, SBD, and DBD, as well as the capability developments remained idiosyncratic in their details (compare: Jacobides & Winter, 2012). Period II capability development process outcomes, context, and actuated mechanisms of path reinforcement are collected in Table 10. Further, discussions on the effect of actuated mechanisms are included in Chapter 10.

Table 10. Summary of capability development during Period II

PPMC development	The Alpha Company (TCA)	Sigma Business Division (SBD)	Delta Business Division (DBD)
External Context	Threats to technological supremacy. Financial crisis – markets stagnant and competitors suffering.	Significant reduction in market business volumes. Stringent regulations soon to be enforced.	Significant reduction in new business opportunities. DBD's CoPS complementarity with the newcomer technologies.
Internal Context	Revised strategy with a focus on technology diversification and extended value propositions. Major restructuring and downsizing to maintain operational profits.	Reduced operative margins. Structural transformations and downsizing. Knowledge integration challenges with semi-independent business-lines. A new business acquisition to increase these challenges.	Extending value propositions by exploiting complementarities with newcomer technologies. Extending stakeholder collaboration with PPM approach.
Adaptive Expectation Mechanisms	Expectations from in-house best practices to undergird uniformly developing PPMC and PMIS.	Corporation-level development adoption to promote needed operational efficiency.	Expectation to prioritized implementation of PMIS and PPMC processes.
Complementary Mechanisms	Search for the economy of scope complementarities between the ID project portfolios across TCA.	Limited synergies to gather the requirements for organizational developments related to PPMC.	Synergies to develop collective requirements for future developments to the business operations.
Coordination Mechanisms	Prioritized coordination (for PPMC processes and PMIS development) in the most proficient function/divisions.	Limiting coordination to PPMC development at the business-division level.	Coordination to develop procedures, methods, tools & techniques for maintaining routine efficiency after PPMC processes and PMIS.
Learning Mechanisms	Single-loop – refinement to the routines through extending stakeholder engagement and PMIS development; to establish standard guides for all project categories and portfolio management. Double-loop – to develop PPMC processes; PMIS driven reconfigurations to the existing processes.	Single-loop – adapting to the PMIS related developments including processes, procedures, methods, and tools and techniques. Double-loop – structural reconfigurations limited to fewer functions and a business-line; and enterprise architecture management process developments.	Single-loop – refinements to routines in accordance with the developing PPMC dimensions. Double-loop – PPMC structural and process reconfigurations, and developing new. Triple-loop – shared mental models to transform business processes along with the PPMC processes.

Outcomes	PPMC Dimensions	<p>EPPMO is supporting structures: project category wise PPMOs, and ID management board.</p> <p>Uniformly developed PPMC processes to support the project, program, and portfolio management.</p> <p>Extended training programs for simultaneously developing people competences.</p>	<p>Category wise PPMO coordination with EPPMO.</p> <p>'As-is' adoption of PPMC processes (with minimal refinements) developed at the corporation-level.</p> <p>Limitedly developing people competences; restrained stakeholder engagement in most parts of SBD.</p>	<p>Business divisional PPMO strengthen with project category wise PPMOs + expert teams.</p> <p>PPMC process development with corporation-wide support. Synergizing business processes, stage-gate model, and portfolio management.</p> <p>Extended stakeholder engagement in the ongoing developments corroborated with continual competence developments.</p>
	PPMC Routines	<p>Governance routine formalizations with declarative and procedural memories; also, limitedly extending outside PPMC structures.</p> <p>Communication routine formalization restrained to the PPMC structures.</p> <p>Existing project management routines extending to the distinct functions; routine proficiency increasing through developing procedural and transactive memories.</p>	<p>Governance routine formation within PPMC structures and coordination for enterprise architecture related IT-based developments.</p> <p>Communication routines limited to the PPMC structures and core teams.</p> <p>Project management routine refinements (disconnectedly) realizing in functions and business-lines.</p>	<p>Reconfigured governance routines for business projects and ID projects.</p> <p>Transformation of institutionalized communication routines.</p> <p>Transformation to the already institutionalized project management routines to accommodate new routines and PMIS activities.</p> <p>Best practice-based P&S project management routines underperforming.</p>

Period I had laid the foundation for PPM, and corporation-wide PPMC performance outcome targets were made explicit at the beginning of Period II. The foremost target was an improved **strategic fit** by prioritizing the *projects supporting strategy* and maintaining portfolio balance through the *risk-benefit profile* and *resource capacity*. This required **visibility** and predictability through *quality information communicated more effectively by motivated personnel*. Meanwhile, portfolio **transparency** would be enhanced by *objective decision-making*. Consequently, portfolio **value maximization** would be attained by selecting the *most profitable projects* in all three categories and finding *synergies between sub-portfolios* and killing the overlapping projects.

During Period II, [more or less] formalized PPMC routines for governance, communication, and project management were existing at TCA, SBD, and DBD. Meanwhile, the differentiated performance outcomes of these routines were obvious, at first due to proficiency variance, and secondly due to the dissimilarities in the actuation of self-reinforcing mechanisms. In Period II, the most significant developments to the PPMC processes realized at TCA. For this purpose, EPPMO led a dedicated program towards PPM management approach. Several development topics (for PPMC) embarked on the PPM program. Quite a few PPMC processes were designed at the corporation-level, and those developments were synchronized with ongoing PMIS developments. Extended EPPMO structures, the project category wise PPMOs, coordinated these developments within business divisions and functional stakeholders. Mostly, the PPMC routine formalization was based on the developing processes, and PMIS remained concentrated within the PPMC structures. SBD and DBD represent two continuums of PPMC routinizing efforts at TCA. Differentiating, DBD could extend the stakeholder engagements to the ongoing developments, and hence routinizing was relatively less stressful. Where needed, the institutionalized routines' transformation was attainable with the presence of stakeholders' shared mental models.

To reiterate, this PhD research refrains from particularizing the PPMC performance outcomes for specific portfolios, business divisions, or corporation-wide functions. However, to contextualize the capability developments in the following periods, only the highlights of performance outcomes from Period II are presented in Table 11.

Table 11. PPMC performance outcome highlights during Period II

PPMC performance highlights	
Decision-making Transparency	Mostly, the decision-making transparency related to business project portfolios increasing within specific stakeholder groups. ID project portfolio decision-making (process) gained noticeable improvements. P&S project portfolio decision-making transparency is segmented due to secretive nature of this business (or researcher-related limitations).
Visibility & Predictability	Visibility increased to the limit of PMIS data quality and quantity (increasing) during this period. Improved predictability about project outcomes within functions and business divisions proficient in project management routines and PMIS usage.
Strategic Fit	Gauging strategic fit of portfolio components became a part of PPMC governance routines for ID and P&S portfolios. The increase in strategic fit was evident from a continual discussion of project complementarities and interdependencies, mainly for ID portfolios.
Value Maximization	Resource optimization was prioritized, and hence value maximization was more explicitly focused on financial indicators. The ID project portfolio balance was observed to favor short-term investment (volumes), especially in the business-lines.
Synergism	Evidence of improved synergism between business divisions and corporation-wide functions.
Change Adaptability	Regular and planned changes were managed reasonably as portfolio components (PPMC governance applied). However, technical, directional, and temporal complexities caused unsystematically measured change effects to the intangible assets, including future business value.

9 CAPABILITY DEVELOPMENTS PERIOD III

Considerable developments in project portfolio management capability (PPMC) could be realized during Period II. During Period III, this continuing development was more significant in some parts of The Company Alpha (TCA). Accordingly, the PPMC routines were more apparent in some sections of TCA than the others. After realizing its authorized (chartered) developments, the EPPMO was dissolved and transformed into more informal PPMC structures during the second half of Period III. However, it was evident that these realized developments were not uniform throughout all business divisions and functions. Some parts (divisions and functions) of TCA were better at managing, for example, business project portfolios, and others were better at managing, for example, P&S project portfolios. These developments are highlighted in the following sub-sections of this chapter. Meanwhile, significant contextual dynamics had both direct and indirect impacts on PPMC development.

During Period III, world GDP increased only slightly. However, the TCA-operated markets remained infertile for new investments. Consequently, the business performance of both the investigated divisions of TCA decreased by the end of Period III; DBD business decreased by a quarter, and SBD's business decrease was less than one-tenth compared to the end of Period II. The overall business performance of TCA improved due to the better performance of other business divisions. Considering market business developments, the TCA leadership decided to decrease investments in in-house technological development by more than a quarter compared to the end of Period II. Furthermore, the TCA leadership introduced a revised financial policy (including funding criteria) for ID projects and P&S projects. According to the experts, this changed policy had noticeable effects on portfolio governance routines and overall portfolio-related decision-making.

The affected business landscape, first due to the financial crisis and then due to shifting focus on the development of emerging technologies, had already forced TCA's strategic shift towards technology diversification and efficient business operations. The effect of this strategy adjustment was to diversify technological footprints, which at first had resulted in a major business acquisition at the end of Period II. This acquisition resulted in the development of a new business-line operating under SBD. Another new business-line led by DBD started through synergizing the knowledge with SBD's newly acquired business during Period III. Later in this period, TCA decided on a second major acquisition to extend the SBD's value proposition and to maintain its market leadership. Another prominent

strategy adjustment was announced to cope with geologically changing market demands. Consequently, new joint ventures in developing countries were established, which had an impact on and resulted in adjustments to TCA operations, especially for SBD.

The Company Alpha (TCA) experienced major structural changes during the first half of Period III. Most of them were already initiated in SBD at the very end of Period II. Hereafter, a major readjustment was carried out again during Period III. The ownership of resources changed between the divisions; new roles were defined, reporting structures were altered, and the leadership mandate in decision-making was altered too. Similarly, DBD also underwent structural changes first due to the development of a new business-line with a new dedicated product portfolio to serve a special market segment. Moreover, to leverage its existing technical and project management knowledge, DBD realigned its existing organizational structure by developing new functions that were expected to collectively support both existing and new business-lines. All these structural changes were not free from downsizing during Period III. This downsizing was, however, less significant in numbers compared to the one completed during Period II. However, the overall work environment was described as becoming restrained in terms of new experimenting, and resources were less motivated to initiating endogenous changes in locked-in routines.

Accordingly, the top leadership's attention to organizational development also shifted significantly. At the start of Period I, the operational capability development revolved around organizational project management and project portfolio management (PPM). Afterwards, the perceived guidance from the external environment was to adopt a leaner approach to exploitation of existing capabilities and incorporating gradual endogenous improvements to the already established resource routines. Therefore, TCA was exogenously motivated to follow 'the crowd.' Thus, during Period III a new program was formally launched to promote leaner operations with agile management approaches throughout the corporation.

During the second half of Period III, it was decided to commence an external evaluation of organizational project management maturity. This was the third evaluation carried out during the data collection period (over 9 years) of this longitudinal PhD research. According to these evaluations, project portfolio management (PPM) practices well surpassed the middle level of the capability maturity scale throughout TCA. One important finding of this evaluation was related to the project management culture in business divisions which had improved noticeably. These evaluations highlighted two major sources of project

management culture and resulting higher capability maturity. The first was a prioritized focus on organizational resource competence development through training and certifications. The second reported success factor was the implementation of unified project stage-gate models with project categorizations.

On the other hand, it is pertinent to mention the lower degree of in-house satisfaction about the results of these surveys. The experts and individual resources expressed concerns about the limited (if not invalid) reflection of real capabilities through the three (3) organizational project management (OPM) maturity tests carried out at TCA.

9.1 PPMC Development at TCA

9.1.1 PPMC dimensions

9.1.1.1 Structures

The PPM program was structurally led by EPPMO, and during the development of processes and tools to support PPMC and its routines, there was an understanding that, where possible, the ID projects (as portfolios) would be managed collectively with the same governance model, or otherwise would be visible at the corporation-level. The business project portfolios and P&S project portfolios would only be monitored within business divisions and their sub-units (business-lines). This also had an impact on the expected participation levels of different PPMC governing bodies in the management of three project portfolio categories. The formal and informal PPMO structures remained prominent in PPMC development during the first half of Period III. However, the downsizing and restructuring of affected functions and business divisions could not ensure the required attention or participation, and their influence on capability development therefore remained unsatisfactory.

At the corporation-level, the most sustainable progress of PPMC structural development was achieved in relation to ID projects. There was a sense of attaining resource efficiency through synergizing ID projects across different business divisions. Another important factor had been the increasing dominance of IT-based collaborations, especially cloud-based technologies and the *internet of things*.

Before the end of Period III, the PPM program was concluded and EPPMO was formally dissolved after achieving their objectives. Along with this PPMC structural change, corporation-wide PPMOs for each project category also became dysfunctional. Only the corporation-level structural support for ID project portfolios remained practically functional; meanwhile, corporation-wide structures, including the governing bodies for the other project categories, could not be sustained further. Each business division still had its sub-structural PPMOs with three sub-PMOs to coordinate developments related to each project category. A depiction of PPMC structural reconfigurations after EPPMO was dissolved is presented in Figure 28.

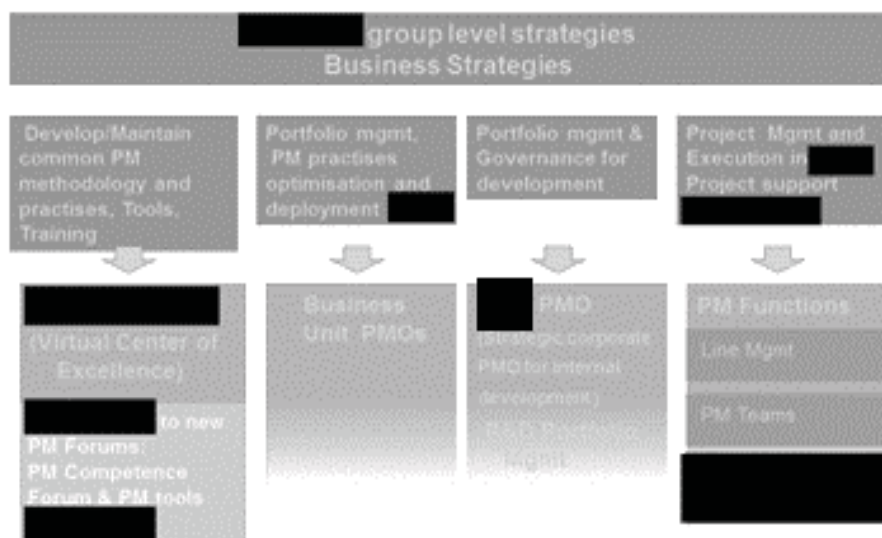


Figure 28. PPMC structural reconfigurations after EPPMO (source: case company; masked for presentation in this report)

At the beginning of Period III, EPPMO had established the project management communities of practice, referred to *forums* in Figure 28. Now, their importance became visible after the decision to close EPPMO. During the previous eight years, EPPMO's role had been to coordinate and control PPMC-related developments. EPPMO efforts also resulted in the development of several experts with state-of-the-art knowledge related to the fields of project management, program management, and project portfolio management. These experts had developed business relationships with external vendors, institutions, and communities with respect to organizational project management.

These in-house expert resources participated in the organizational project management communities of practice: the *forums*. The goal of these forums was to share knowledge among business divisions and promote common development goals without a formal bounding. This is similar to what Wenger (2000) observed

about communities of practice; these forums were “*born to learn*” about best practices, synergies, and common views of project management and portfolio management tools and develop proposals for possible future developments. In the first year of their prominence after the closing of EPPMO, these forums were meeting only a few times a year. A roadmap for knowledge collaboration was created in which planned actions were apparently a continuation from EPPMO and had become a part of organizational behavior. However, these forums had limited authority to control planned actions and their outcomes. Meanwhile, the experts participating in these forums had already developed transactive memory for a continual sharing of knowledge on both an individual and group level.

It was observed at the very end of the PhD data collection that these forums became relatively more active. An increasing number of corporation-wide stakeholders participated in one of the last evidenced meetings during the data collection period, in which the researcher also participated as an observer. The forum meetings were virtually arranged (Internet-based collaboration platforms) sessions for sharing the best practices within businesses and functions. Occasionally, these sessions were also joined by external experts or vendors.

9.1.1.2 Processes

The PPMC processes for project identification, project categorization, project evaluation, project selection, project risk identification and analysis, project prioritizing, portfolio balancing, portfolio risk response, portfolio communication, portfolio authorizing a component, review and report portfolio progress, monitor business strategy change, and monitor and control portfolio risks were already developed. The Period III developments focused on operationalizing these processes as PPMC routines. Consequently, TCA efforts related to the PPMC processes primarily focused on defining, refining, and implementing procedures for the already achieved developments of Period II. All procedural activities had to intertwine through the PMIS, reiterating the fact that PMIS already existed (in preliminary forms) in different business divisions before Period I. However, the changing business environment shaped this focus on a rapid corporation-wide implementation of unified processes, procedures, tools, and techniques for efficient operations.

Accordingly, the efforts were to “*deploy*” these processes in all business divisions and functions through PMIS. However, this was proving to be a challenging task in some business divisions and functions. For example, earlier in the beginning of the 2000s, TCA developed an ERP system flexibly to match the routines for each

business unit. To elaborate, the ERP system-based work routines had a business-specific design for business divisions. Even the customer relationship management systems were specifically developed for each business division. Contrarily, the unification of PPMC processes and further their '*one way of working*' deployment through PMIS in all businesses could not be equally successful in TCA. Period II anticipated IT-based system challenges became more apparent in Period III.

In this vein of IT-based system integration, a noticeable success at the TCA level is related to the ID project portfolio. Integration mechanisms reinforce PPMC processes for these endogenously driven portfolios. Interestingly, the ID projects and their management as portfolios was rather "novice" in TCA, which meant that most of the processes and routines related to these projects and portfolios developed during data collection period. Due to the upper-echelon focus, the stakeholder participation and engagement through PPMC formal and informal structures remained relatively more focused. Most importantly, here the economic benefits were considered to be convincing and obvious because of well tested and globally practiced instruments to calculate financial benefits—for example, NPV, ROI, and IRR. Latently, the unification-oriented PPMC developments have been the first phase to synergize rapidly expanding TCA business divisions. An example of such synergizing during Period III was the development of processes for managing project requirements, in which a common tool was developed through coordination between business divisions. This development project was a part of a cross-divisional ID portfolio. Another related example was the development of lessons learned processes. These three processes were developed with respect to individual business contexts.

9.1.1.3 People (& resources)

Competence developments initiated during Period I were embedded in organizational behavior during Period II. For example, the HR function developed '*training portfolio for project related competences*'. Supposedly, all new resources would be trained for organizational project management competences according to the learned plan over the past years of developing PPMC in TCA. This has been a '*standard delivery*', the fixed competence development path, as explained by an expert. Consequently, at the individual resource level, the competence about organizational project management (supporting PPMC developments) had acquired the desired developments. However, the development of people's training portfolio did not cease during Period III. Still, the leadership-related competence to support *PPM practices* was the next potential area for people development.

Relatedly, there had been ongoing actions to develop a training program by combining modules from 'organizational project management training portfolio' and 'leadership training portfolio'. As expected, existing competences, processes support through appropriate tools, and structures were observed to be affecting the development of newer training modules – as resource positions affecting future choices (Teece et al., 1997). Attaining lock-in based on ascribed historical success was easier and more efficient, and hence was promoted throughout the organization. It is important to mention that a newly started corporation-wide 'lean program' was visible in the development of new training modules. However, this research cannot take those into consideration, as these effects were still in the pre-formation phase of path alteration (see: Sydow et al., 2009).

As highlighted previously, the newer form of PPMC structures (project management forums) was envisioned as continuing the competence development path. Earlier, resource competence focus was on the routinizing of PPMC processes, methods, and tools and techniques, especially through PMIS. This remained the continuous focus and criteria, although not explicitly stated by the experts. People competence, engagement, and motivation (for PPM) was accessed through the number of active users of the PMIS, and then from the quality of project data in each portfolio. It was promoted that the extended usability of PMIS is a measure of an organization's competence to manage projects as portfolios. Remarkably, the instinct for organizational project management excellence remained at a higher priority. As a result, resource competence development continued through gradually attained developments during this period.

Characteristically, the resource conflicts (compare: Payne, 1995) were expressively reported during this period, especially those related to the development of PPMC processes, methodologies, and procedures. For example, stakeholder empowerment competitions between the EPPMO and organizational functions was a challenge for work prioritization (conflict between exploitation and exploration) and for business specific customizations, especially those related to PMIS. This PhD research learned that the development of a shared mental model of the business context of PPMC performance outcomes could not reach across TCA. This was due to the ongoing organizational restructuring and external markets, where the rapid adoption of unified processes and supporting tools was considered the best option.

9.1.2 Capability routines (& activities)

9.1.2.1 Governance routines

The foremost developments of PPMC governance routines occurred with ID project portfolios, where a governance model based on PPMC structures, processes, and stakeholders was established after regular refinements (formations attained during Period II) were becoming organizational behavior. This changing organizational behavior was limited to the extent of PPMC structural authority to influence existing routines in business lines and functions. Herein, this research learned that the proficiency of project management routines combined with the business context for PPM was an enabler for lateral extension of portfolio governance routines in TCA. Governance routines oversight remained with the PPMC governance board, where EPPMO was not present during approximately the last year of data collection.

PPMC governance routines' transactive memory formation during Period II was an enabler for refining the procedural and generative memories of these routines. Contextually, the changing business environment (exogenous shocks) and limited governance performance outcomes actuated learning mechanisms to refine the procedural memory and generative memory of governance routines. By exemplifying the refinements to the governance routines, an expert confirmed that due to the structural changes during Period III, business-lines were authorized to make their own development decisions. Meanwhile, the corporation-wide financial policy changes affected the project selection criteria.

Also noteworthy is the effect of updated criteria for project funding (Figure 29), as they favored projects with lower funding requirements and hence shorter payback periods. This was considered a safe way to speed up ongoing developments through decision-making agility, meaning that more projects were expected to be completed during one budgeting cycle. An expert explained that this was helping in ensuring strategy realization and more efforts to synergize various ongoing development efforts in different functions and business-lines. Similarly, another expert explained that P&S project portfolios affected by changing decision-making criteria for project selection, prioritization, and balancing the portfolio. These developments tend to adopt a short-term view of products and solutions development.

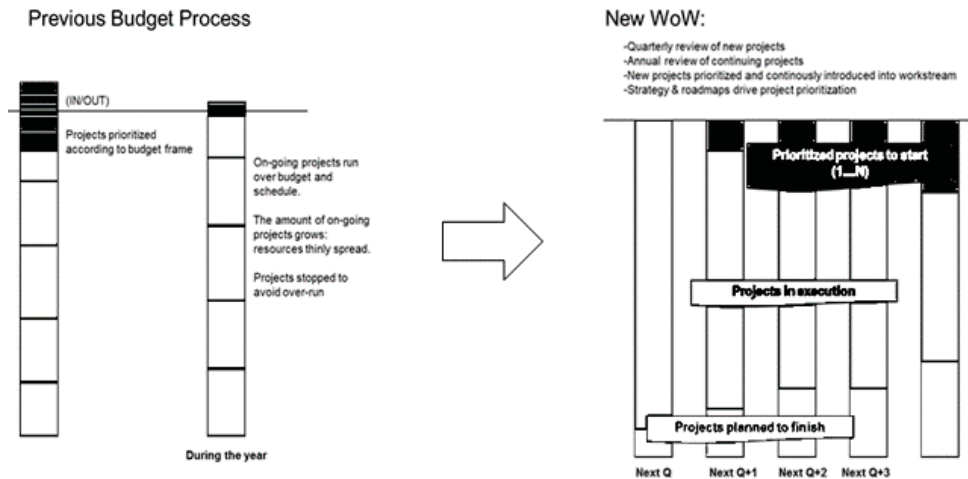


Figure 29. Project funding process simplified (source: case company; masked for presenting in this report)

One size does not fit all when it comes to PPMC governance routines. This PhD research learned that there was no first perfect fix for these criteria, and this was mostly due to external environmental pressures that promoted standardized treatment for all portfolios. Idiosyncratic considerations for individual programs and projects were required (see: Müller et al., 2014). A mechanistic view of corporate governance overrode PPMC governance through rigorous compliance with procedures and policies that could undermine the relevance of increased diversity in TCA operations. Consequently, TCA strived for organizational behavioral control for cost efficiency. The higher adaptive expectation mechanisms for routine efficiency drove PPMC governance routine development similar to a ‘conformist paradigm’ approach to portfolio governance routines (compare: Müller, 2009).

9.1.2.2 Communication routines

Pre-formation and formation of PPMC communication routine development paths from previous periods also continued during Period III. People (resources) in PPMC structures mostly led the formalizing communication routines. There were communication plans and matrices (see: Butt et al., 2016) available for communication development topics at the corporation-level. Meanwhile, the functional resources were previously involved in developing methodologies and procedures related to different topics identified by EPPMO. Now, these resources were instead focused on communicating their individual project-related activities. Nevertheless, was communicating about individual projects related to PPMC communication? Yes, it was.

The information quality of portfolio components (see: Jonas, 2010) is important for PPMC communication routine effectiveness (see: Butt et al., 2016). It entails the involvement of individual resources at the operational level as well as executive leadership (see: PMI, 2013a, p. 107). All these people, due to their structurally embedded roles and responsibilities for business success, appreciated the need for quality information about portfolio interdependencies. The quality of available information could develop push-and-pull and interactive communication activities. Well-functioning communication routines were therefore a central agenda item for establishing project management information systems (PMIS).

Now, the integration of PMIS with IT-based systems continued to be realized differently across TCA. PMIS was supporting communication with inbuilt features for systematic analysis of available information (compare: Arlt, 2010) and generating visual reports (see: Geraldi & Arlt, 2015). For example, portfolio status trends, project-level status trends, portfolio risk analysis, portfolio and project resourcing reports, portfolio cost and benefit analysis, etc., corroborated portfolio communication routines.

Due to the conformist approach to PPM (compare: Müller, 2009), an emerging impression discussed regarding resources revealed that *'portfolio management is for higher-ups'*. Remarkably, this impression held true at more than two hierarchal levels in functions and business divisions. Another interrelated observation from the very end of Period III was an enhanced focus on developing *'business financial reports'*. This was possible in business divisions where integration between the PMIS and other IT-based systems was less demanding and had been prioritized. Relatedly, an increasing focus on the economic performance of portfolios during PPMC communication routines was noticeable.

Resulting from the conformist governance approach (compare: Müller, 2009), the observed portfolio communication routines were reflecting the choice of information shared among stakeholders at different hierarchal levels in TCA. Meanwhile, not to neglect the experts in PPMC structures, because their experience accumulated, articulation and codification of their knowledge were arranged (compare: Killen et al., 2008). Still, the contextually actuated mechanisms inclined PPMC communication routines towards a short-term view of business reporting and budgeting cycles. However, as always, there were exceptions, but not many.

Importantly, project portfolios are dynamic in nature. Unexpected progress with one portfolio component influences decision-making with respect to other components. It implies that the unbalanced (exploration and exploitation) communication routines, adjusted only according to the business reporting cycles,

affect information quality especially in-between the reporting intervals. In fact, at TCA the stakeholders' motivation to participate in communication routines diminished between reporting cycles. Such communication gave the impression that PPM governance and communication was promoting 'bureaucracy', indicating inconsistencies between the performative and ostensible aspects of PPMC routines (see: Feldman & Pentland, 2003). There were exceptions where some functions and business divisions were experiencing more effective PPMC communication routines with stakeholder participation than others.

Not subduing the hardworking resources in EPPMO and its sub-structures up to where communication routines were somehow proficient due to the formalizing procedural, generative and transactive memories. This PhD research could not establish that the aforementioned context could lead to the development of a dynamic capability at the corporation-level. Because, a dynamic capability routinizes sensing, seizing, and reconfiguring and transforming activities by embedding those into other routines, and this cannot be true for corporation-wide routines across TCA.

9.1.2.3 Project management routines

During Period III, project management routines were expected to be reconfigured due to previously articulated PPMC processes and PMIS developments from Period II, and routinizing is a time-consuming accomplishment. Accordingly, the business and functional resources were required to integrate the stage-gate model-generated data activities with PMIS. For example, project management routines for resource management, risk management, cost management, change management, and time management were renewed with upgrading procedural and generative memories. As mentioned previously, individual resource training was arranged to transfer the accumulated experience (related to PPMC development) of experts to individual resources. However, the most common opinion expressed by the individuals was *what is in it for me?* The impression was that the proposed alteration to project management routines would consume more resources with least benefits regarding individual resources, spending more time on managing the same amount of work, and would lead to a diminished organizational culture.

In this vein, three categorically diverse organizational responses were prominent during Period III. First, vertical leadership practices (compare: Pearce, 2004) led resources focusing on conformance with the PMIS supported a way of working. Second, a teleological process (see: Van-De-Ven, 1995) was leading to a collective

recognition of inappropriate practices, methods, and tools and techniques adopted through unification. For example, time management procedures and tools adopted from business projects were not effectively applicable to P&S projects and vice versa, the resource management routines developed for P&S projects could not be applied to business projects. Such routine ineffectiveness was gradually addressed at the departmental, functional, and business division levels. Thirdly, after EPPMO dissolved the mandate of deciding about the needs for 'reconfigure processes and refine consequent routines' was transferred to a lean program management team (temporary structure). This lean program started at the beginning of Period III and had noticeable success in the manufacturing units across TCA. Positively, the triumph of PPMC refinement and reconfigurations was channeled through the still-intact EPPMO sub-structures responsible for corporation-wide ID project portfolios.

9.2 PPMC Development at SBD

9.2.1 PPMC dimensions

9.2.1.1 Structures

During Period III, the PPMO for business projects became least functional after the end-to-end business responsibility was transferred to business-lines at SBD. PPMC structures supporting business projects further weakened by the fragmentation of the business-line with the highest project management routine proficiency. This fragmentation was an outcome of lacking commercial viabilities. The expert resources from this business-line transferred to other business-lines and functions. These business-lines and functions were now expected to attain higher profitability by enhancing in quantum their knowledge integration with help from highly competent transferred resources.

The completion of such organizational transformations at SBD led to PPMC structural rejuvenation during the second half of Period III. The first notable achievement (PPMC) was the empowerment of divisional-level PPMO for ID projects. It could be realized through the augmentation of PPMO with competences learned in the ID portfolio management function supporting mostly P&S project teams (P&S project functions became part of SBD during Period III). The ID PPMO's role started to reconfigure from only support to the coordination of division-wide ID projects. For the projects with cross-divisional (cooperation-wide) stakeholders, ID PPMO was observed to take a more controlling position.

The ID projects' visibility and decision-making transparency (including the development of processes, tools, methods, and practices) was gradually increasing through empowered ID PPMO.

These empowerments led to reconfiguring the other PPMC governing bodies. For example, at the SBD level all ID projects were divided into multiple segments leading to several sub-portfolios, and all managed under the umbrella of ID PPMO; developments related to the management of business projects and P&S projects were among these segments. Each business-line at SBD took the responsibility of leading one of the ID segments. Reiterating the fact that during Period II, the internal business-line projects were least visible before the reconfigured PPMC structures.

Such a teleological process (see: Van-De-Ven 1995) of learning the limitations of acquired processes, tools, methods, and practices was very notable during the second half of Period III. However, these business-lines had yet to reach a shared vision about what PPM meant for SBD value propositions at the divisional level. From PPMC developments at SBD, this PhD research noted the limited role of business context in terms of developing organizational capabilities.

9.2.1.2 Processes

PPM capability maturity assessment indicated well above average PPM proficiency at SBD. However, the best practices adopted capabilities in an inconsistently dynamic business environment remained short of delivering the desired benefits. The need for flexibility in project operation was most acute during the second half of Period III. Therefore, most PPMO efforts concentrated on customizing and realigning the practices, methods, and tools and techniques supporting PPMC processes. One such example of identified misalignment was related to portfolio resource allocations for ID projects in the P&S functions.

In TCA, the P&S function was distinguished as the most proficient in following PMIS-supported practices for portfolio resource management. An expert explained that the processes and practices are closely followed due to the high competence of trained resources; according to that expert, the desired benefits are not achievable due to lack of consideration of portfolio interdependencies that are dynamic in nature. Methods for resource effort calculation and allocation for projects were to be refined; surprisingly, these methods were best practices for another business division in TCA! Another example of misalignment was a stage-gate model for business projects. This stage-gate model was upgraded with the inclusion of missing stakeholder interfaces and decision-points. According to an

expert, the previously adopted stage-gate model was learned from TCA best practices, as well as was influenced by the IT-based earlier development projects in SBD.

Such an upgrade of PPMC processes supporting practices, methods, and tools and techniques became a part of 'continuous improvement' initiatives through the lean program. Meanwhile, ID PPMO was coordinating these initiatives for continuous improvement along with other ongoing process development projects (independently as well as part of portfolios).

9.2.1.3 People (& resources)

The first two periods in SBD dominated with a vertical leadership style, but with limited authority to stimulate ongoing PPMC development. Period III reconfigurations to the PPMC structures had generated a continuous dialogue about leadership style affecting stakeholder engagement and operationalizing the learned practices, methods, and tools and techniques as a critical achievement to foster the potential synergies between business-lines and functions (PPM stakeholders). Without engaged stakeholders, it had been challenging to actuate even single-loop learning mechanisms to routinize formal project management.

It was explained by an expert that repeatedly experienced shortcomings of the adopted practices were limiting stakeholder belief in PPMC performance potentials. However, the empowered ID PPMO team had now been focusing on enhancing stakeholder engagement and trust in PPM. Another success in this vein was the business-line-driven management of ID portfolio segmentations. With formalized two-layered structural support, the competent resources resumed their coordination for integrated solutions and searching for knowledge complementarities.

Meanwhile, ahead is a long path of learning in terms of endogenously motivated changes to PPMC routines and possible reconfigurations of PPMC processes. Meanwhile, the external and internal context-driven supremacy of other prioritized programs and initiatives in SBD may also restrain the performance potentials of PPMC (as a dynamic capability) during this learning journey.

9.2.2 Capability routines (& activities)

9.2.2.1 Governance routines

SBD's reconfiguration of PPMC dimensions brought gradual uniformity to the PPMC governance routines during Period III. During the continuous dialogue regarding PPM at different hierarchal entities, PPMC governance routines and their impact on the project activities were noticeable. Certainly, the business projects were not being managed in concurrence with PPM governance as the existence of diverse guidelines & rules on managing these projects has still a challenge. Similarly, neither all the ID projects in SBD could be managed by PPM governance, nor was PMIS used for information management of all projects. Such projects had the lowest visibility in their respective portfolios. Subsequently, there were projects that adopted the developing governance rules and formed governance routines. Still, these reasonably well-governed projects (as portfolios) avoided PMIS for information management. For example, as explained by experts, the most fluent ID portfolio domain could eliminate PMIS-based activities; meanwhile, PPMC governance routines remained functional.

As discussed previously, a consistent governance-related challenge was the increasing complaints about stage-gate models, which was common to both the well-governed and least governed projects (as portfolios). Another challenge was multi-layer governance rules and their unfamiliarity for the stakeholders in the distinct functions and hierarchies of SBD. Nevertheless, this challenge was significant for the least governed portfolios; the experts from well-governed portfolios were also concerned about narrow-focused stakeholder engagement. Relatedly, a notable achievement was updated governing and funding policy (Figure 29) to support *deeper visibility* and establishing *project synergies*. Until the end of Period III, PPMC governing bodies promoted PPM governance policy awareness. According to the experts, limited proficiency in project management routines resulted in stricter outcomes from enforced governance at the portfolio level.

In short, a flexible economist paradigm of PPM governance was noticeable during Period III. With PPMC structural reconfigurations, at least the complaints about excessively layered governance were reducing. A cornerstone of PPMC governance routines; PPMO coordinated a series of stakeholder interactions that resulted in revised stage-gate models. Earlier mentioned continuous improvement initiatives stimulated through the *lean program* for refinements to the processes, methods, practices, and tools and techniques were frequent. A focus on financial results was

prominent in the permitted refinements. There was also a strong developing opinion to replace PMIS with another IT-based system more suitable to SBD business operations.

9.2.2.2 Communication routines

With increasing interfaces between business-lines and functions, restrained communication had become engraved into the business culture of SBD. During the first two data collection periods, path dependently developing PPMC communication routines was formalized by accommodating *historically known* restrictions. However, collective sense-making and resulting adjustments to PPMC dimensions were leading to reconstructing communication routines. The newly developing routines mostly involved PPMC governing bodies and core teams with the inclusion of each business-line leadership. Accordingly, PPMC communication routines for P&S portfolios and ID portfolios were most notable during Period III. Still, diversified IT-based tools and systems had generated and recorded the operational information of portfolio components (projects & programs). This was restraining the information quality and hence resulted in sub-optimal operational decisions for managing portfolios.

This PhD research acknowledges the importance of “*equifinality*” (Kapsali, 2011) in choosing practices and supporting tools for complex businesses. However, this was not true for developing effective communication routines at SBD. One reason was SBD’s limitations in collectively learning the reasons for underperforming PPMC practices and tools. Therefore, an expert explained that a first related achievement through PPMC governance routines was developing a consensus on the required data for actuating communication between different stakeholders.

9.2.2.3 Project management routines

At SBD, project management routines’ support of PPMC development during the first two periods had been slight, although the resource competences to manage complex projects were improving through dedicated training programs. However, the best practiced adopted processes and IT systems remained least practiced. The institutionalized ad hoc project management routines prevailed in most functions and business-lines during Period III. Meanwhile, the continuous improvement initiatives (the lean program) overtook the leading role in determining development needs at SBD. A noticeable number of initiatives were kicked off to integrate project management routines with functional operations across SBD’s business-lines. Such initiatives included improvements to the project

communication, logistical management, requirement management, and time scheduling routines. Notably, the most important of these initiatives was coordinated through ID PPMO governance routines.

Relatedly, an internal survey indicated the underdeveloped competence of harmonizing project management with products and services. Therefore, SBD continuously suffered from “*system interfacing issues*”. In this situation, the existing repository of IT-based systems could not resolve knowledge integration challenges. It is not that SBD was not fluent in managing all three type of project portfolio; rather, the problem had been inconsistent project management routine performance. It is because that historically the business-lines had a varying acquaintance with integrated solution-based (CoPS) operations. Correspondingly, an external survey of the quality of operations in SBD highlighted the need for unified *success criteria of operations* and the applicability of the tools used for operationalizing those criteria.

9.3 PPMC Development at DBD

9.3.1 PPMC dimensions

9.3.1.1 Structures

The PPMO at DBD had been among the thought leaders at EPPMO, and it demonstrated the realization of planned targets for PPMC structures along with other developments. It is, therefore, the case that PPMC structural developments in DBD were not much different from those of the corporation. After EPPMO dissolution, DBD’s ambition for enhancing PPMC excellence with *world-class project management* endured with similar excitement. Internal development roadmaps and mission statements were released to extend the achieved success. Cross-functional teams were formed to support the mapped targets. Due to exogenous environmental factors, including IT-based technology developments, appending the internally developed business processes with external stakeholders was prioritized.

The collaboration of resources and experts from all the three project portfolio categories was notable. A related observation is the hierarchy of informal structures to support all project categories. It was through a matrix organization configuration with shared responsibilities towards cross-functional excellence. An expert explained that this shared vision of business success was already present;

however, with attained PPMC developments, it was easier to comprehend internal strengths and weaknesses and to decide what should be further developed. According to the experts, the ongoing developments could be further paced-up. Therefore, this PhD research notes that capability development is a time-consuming process in which organizations require to combine refinement, reconfiguration, and transformation activities. However, this combination requires actuation of all three identified learning mechanisms in accordance with the environmental dynamics.

Meanwhile at DBD, PPMC structures for ID project portfolios were observed to lead to this internalization of externally sensed demands—for example, developing an application for collaboration with external stakeholders. As stated earlier, cross-functional teams at DBD were supporting this and other such ongoing developments. Meanwhile, the business-divisional PPMO played a relatively supporting role during Period III. Business-divisional PPMO at first focused on a continual integration of PMIS with other IT-based systems. Secondly, the PPMO targets included the development of processes, methodologies, and procedures for newly developed business-lines. According to the project categorization in TCA (and hence in DBD), the development of processes and related tools are the responsibility of ID projects PPMO. Therefore, the business divisional PPMO again took a supporting role, whereas ID projects PPMO has been coordinating these developments with the involvement of functional resources. It is of concern that the P&S projects PPMO could not take a leading role in the new business-line. One briefed reasoning was the inapplicability of technical knowledge of existing business-lines.

9.3.1.2 Processes

During this period, PPMC process-related developments mostly focused on procedures and best practices to align PMIS functionality with the routines. Equally notable were efforts to fine-tune business processes and PMIS to incorporate learned ‘practicalities’ from the on-board corporation-wide stakeholders of PPMC developments. At DBD, the adoption of newly developing procedures and practices was relatively easier compared to the corporation. One factor, according to the experts, was that the earlier developed IT-based systems were suitable to DBD business operations, and their proficiency and usability were rather uniform across the functions. A generated reality by ID projects PPMO was an increasing focus on maintaining portfolio balance between developing practices and alignment with the enterprise architecture.

Another important achievement was adjustments to the business process model. Herein, most relevant to PPMC was the flexible approach to business project governance. It was explained by an expert that this flexibility could be possible due to *higher proficiency in resource competences* and business-specific best practices library (an intranet-based tool developed at DBD during Period III). As discussed earlier, the observed extension of business project-specific processes to incorporate collaboration outside DBD boundaries was prominent. As a result, it was possible to dynamically involve the external stakeholders of projects (and portfolios). Here again, these developments were centrally coordinated and controlled by ID projects PPMO.

9.3.1.3 People (& resources)

Stakeholder engagement in developing resource competences had been the foremost agenda item for PPMC development at DBD. These developments had started prior to Period I and were formalized in structured training programs during Period I; customized competence developments related and incorporation of certification programs were highlights during Period II. During Period III, the owners/stakeholders wanted to promote specific competence areas of project management with guidance from PMI across DBD. These competence area owners were also responsible for continual development of resource training programs. These competence owners were from different functions in DBD, continuing the already attained stakeholder engagement with shared responsibility to maintain excellence with “*world class project management*”-based business operations.

Accordingly, new modules of DBD business specific training were developed. These modules were the demonstration of prevailing best practices, methodologies, tools and techniques already for all project categories. All resources involved in the management of projects of any type at DBD were required to attend the trainings. The approach of these trainings was to encourage the routinizing of learnings. The new learners had possibilities to avail themselves of post-training personalized assistance.

There were significant effects of downsizing and restructuring on people engagement in PPMC development and routines. For example, a prevailing impression was that the PPM approach purports to offer prioritized resource optimization for possible downsizings in the future, and hence stakeholder empowerment is restrained. The TCA-wide dialogue for possible synergies between leadership and PPM competence training programs was also participated in by DBD stakeholders.

9.3.2 PPMC routines (& activities)

9.3.2.1 Governance routines

The formalization of PPMC governance routines in DBD was readily observable before PMIS developments at TCA. However, with a unified IT-based platform (PMIS) in access, all internal resources engaged in various projects were mapped according to their roles and responsibilities towards portfolio outcomes. Relatedly, the tendency of documenting and managing the dependencies between portfolio components increased for institutionalizing portfolio governance routines. The ID projects portfolio(s) were central to the governance routines, which focused on decisions concerning resource involvement, user interfacing, and data integration according to the enterprise architecture. Compared to some other business divisions of TCA, the development of a PPM governance model and routinizing the governance activities at DBD had generated less complaining.

During this period, PPM governance model (business projects) for the newly developed business-line was also in progress. Initially, the development of governance routines for new business-lines was based on already developed business processes—the exploitation of already learned processes, procedures, methods, practices, and individuals' competences. However, by the end of the data collection period, there was a consensus regarding operational limitations connected with the 'as-is' adoption. The developed shared vision was that the exploitation of knowledge from another business-line (though within DBD) could lead to dysfunctional governance routines in the newly established business. Further events collected about this new business-line could not lead to any conclusion except the focus on value chain analysis for synergizing project management routines between DBD and SBD [It was informed earlier that this new business-line was established with cooperation between DBD and SBD].

One genre of routinized governance activities for internal development of PPMO was the evaluation of possible impacts of major projects and programs initiated by other business divisions. Although these projects and programs did not involve resources from DBD, however, their outcomes could have provided future development opportunities or would alter the scope of ongoing projects at DBD. This was possible due to the presence of PPMC structural bodies and their collaboration at the corporation-level (for ID project portfolios).

Another observation concerns the less formal routines for project ideation (processes), especially at the business leadership level. However, all the selected ideas as development projects were required to pass through the established

governance routines (implementation of governance model). According to the experts, the existence of such informalities was helpful to maintain a peripheral view of development possibilities and to *buy-in management support* for the portfolio components. Herein, decision-making transparency was relevant in '*drawing the line*' for resource allocation between portfolio components (see: Pennypacker & Retna, 2009, p. 152).

[There was an established process for 'idea management' in TCA, although this process was not developed as a part of the PPM program. Still, this could allow the relevant business process owners and competence owners to evaluate and select the ideas for their portfolios as independent projects or as an appendix to the ongoing projects. Diverse responses to the performance of this process were noted at DBD].

9.3.2.2 Communication routines

Stakeholder engagement through communication routines had already been well established in DBD. Hence, during Period III, the PPMC communication routines remained intact with an extended focus on portfolio dependencies and management of resource competence and their sufficiency (Turner, 2009). This PhD research learned that the business vigilance at DBD and the business context drove the development of PPMC capability dimensions, and that routines could contribute to a realigned communication focus in a difficult business situation.

Improvement to the PPMC communication routines includes, for example, stage-gate based business process model-driven performance reporting, an example of push communication routines. Then, for pull and interactive communication, the integration of IT-based systems could generate an increasing number of project portfolio reports generated from high-quality project information. Information quality, primarily due to the higher proficiency in project management routines, had increased consistently during the data collection periods. The underlying complementary mechanisms of self-reinforcement led to synergizing information from various IT-based systems.

For DBD as well, the PPMC communication focus shifted towards a business reporting cycle-driven approach due to institutionalizing from the corporation, as discussed in preceding sections. In fact, depleting business performance, due to market situation, was mainly responsible for this change in communication routines.

9.3.2.3 Project management routines

Well-functioning project management routines were at the core of PPMC capability development in DBD. During Period III, there were few noticeable changes to the existing project management routines, except those required for developing PPMC governance and communication routines. For example, there were new communication routines established, including recording and reviewing lessons learned by the project and portfolio management teams. Recorded lessons learned were one source of generating new ID project portfolio components.

Additionally, collaboration with external stakeholders required developing new procedural and declarative memory for methods, procedures, and tools and templates supporting existing project management routines. For example, for project requirements management (originally adopted from other business divisions) were reconfigured with respect to the DBD business context.

9.4 Period-III: Capability Development Summary

The PPMC developments of the first two periods became a part of organizational behavior during Period III. Corporation-wide ID PPMO and PMIS integrated functionality with other IT-based systems were the main highlights of this capability development period. After the EPPMO was dissolved, ID PPMO maintained a considerable mandate to coordinate corporation-wide development of processes, practices, and tools and techniques. The coordination between ID PPMO teams led the organizational vision towards synergizing individual developments, which had remained invisible in the corporation and business-lines. Meanwhile, the PMIS supported this corporation-wide stakeholder collaboration. However, the corporation-wide collaboration for business project portfolios and P&S project portfolio could not be sustained after EPPMO. Later, another informal structure, the project management communities of practices, were developed for a continual sharing of best practices developing across TCA.

Table 12. Summary of capability development during Period III

PPMC development	The Alpha Company (TCA)	Sigma Business Division (SBD)	Delta Business Division (DBD)
External Context	World economy recovery is indicating future growth opportunities. Newcomer technologies are becoming even vital for the traditional businesses.	Market value offerings to include integrated packages with newcomer technologies. New business opportunities are certain in developing countries.	The traditional markets are becoming infertile. However, the increasing dominance of newcomer technologies has further enhanced the importance of DBD's CoPS complementarities (with global market eco-systems).
Internal Context	Strategic realignment. New project investment policy. In-house R&D reduced. Technological diversification through acquisitions and joint ventures. A dedicated lean program to promote continuous improvements to operational (ordinary) capabilities.	Business reduced by ten percent. Major acquisitions consequent semi-independent business-lines. New joint ventures effecting business operations. Need for integrated knowledge is increasing with technological diversification. Lean program taking noticeable role in deciding the needed improvement to operational (ordinary) capabilities.	Business reduced gradually by one quarter. Restructuring and downsizing to remain profitable if same business situation persisted. Reaching new market segments – a new business-line by synergizing with SBD.
Adaptive Expectation Mechanisms	Corporation wide PMIS will be adopted with same performance outcomes across old and new business-lines of all divisions.	The acquired best practices to support operational alignment with the new business-lines and joint ventures.	The learned best practices are expected to be adopted 'as-is' in the newly developed business-line.
Complementary Mechanisms	To exploit economies of scope between ID project portfolios.	To exploit the economies of scope within business-lines.	Divisional support functions (proficient in project-based operations) to synergize developments with newly developed business-lines.
Coordination Mechanisms	Coordination within the PPMC structures of PPMO to implement governance models for the certainty of financial results.	Coordination to collectively understand the applicability of adopted capabilities and refine the needed routines.	Coordination to routine refinements and implementation to the newly developed business-line.
Learning Mechanisms	Single-loop – the gradual adjustments to the practices, methods, tools and techniques. Double-loop – limited to the EPPMO tenure for reconfiguring PPMC structures and processes.	Single-loop – Refinement of the existing routines and developing new through in-house experimentation. Double-loop – to question the applicability of adopted processes, best practices, tools & techniques including PMIS.	Single-loop – Refinement to the project management routines due to process reconfigurations. Double-loop – reconfigurations to the PPMC structures, processes, and people dimensions.

PPMC Dimensions	<p>ID projects PPMO role institutionalized. Project management communities of practices. Extending the PPMC processes, mostly by refining the support processes. Institutionalized resource competence development path and stakeholder engagement (governance models).</p>	<p>Reconfigurations to ID projects PPMO, and a management board with each business-line overseeing one dedicated development category. A gradual refinement to the stage-gate models and PPMC processes. Extended stakeholder engagement with support from PPMC structural reconfigurations.</p>	<p>Extending informal structures with functional and technical knowledge expert teams. Reconfiguration to the business process model with flexible application of the stage-gate model. Upgraded training programs customized in accordance with the refined routines.</p>
PPMC Routines	<p>Institutionalized (corporation-level) governance routines through a refined policy for new investments. Intermittent communication with a focus on financial values; routines institutionalized within PPMC structures. Institutionalized project management routines with accepted variations within functions and business divisions.</p>	<p>Reconfiguration to the governance routine formation. Extending stakeholder participation in this formation. Continual refinements to communication routines – data availability and quality affected from disconnected databases. A refinement to project management routines through the lean program.</p>	<p>Institutionalizing of governance routines for ID portfolios; P&S governance routines still in the formation phase. A refinement to the institutionalized communication routines. Minor adjustments to the institutionalized project management routines, and development of a couple of new routines, for example, for project lessons-learned.</p>

Outcomes

Along with these developments, a growing consensus was that the aspiration to corporation-wide unification remained limited in furnishing the planned performance outcomes from PPMC. At SBD, this was learned the hard way when continuous refinement to the existing routines supported by PPMC dimensions could not resolve the long-term issues of efficient knowledge integration among business-lines and functions. In DBD, the advancement in PPMC developments was evident from well-functioning (performing) routines. Whereas, the DBD's experience of an 'as-is' implementations of processes, best practices, and tools and techniques for the newly developed business-line revealed the need for a more flexible approach.

In fact, during the first two periods, PPMC development paths as well as the performance outcomes had differentiated enough between TCA, SBD, and DBD. Moreover, a deterministically unified way of working could not 'robotically' accommodate the business contexts. Meanwhile, the upper echelon at TCA persisted with economizing business operations, and a dedicated program was initiated to *clean up the process waste* incurred due to inefficient work routines. These included PPMC routines as well.

Here again, during Period III, the mechanisms of path self-reinforcement resulted in heterogeneous outcomes. The PPMC capability development contexts, mechanisms, and outcomes are displayed in Table 12. A detailed discussion of the further effects of actuated mechanisms is included in Chapter 10.

The case data suggests that PPMC performance targets of *Strategic fit, portfolio balance, visibility, decision-making transparency, and value maximization* were evaluated after the closure of the PPM program. Accordingly, the acclaimed benefits from PPMC included the following:

- i. Increased work efficiency;
- ii. Possibility of focusing on strategic projects;
- iii. Improved competence allocation for projects;
- iv. Possibility of analyzing and balancing portfolios and creating programs by synergizing;
- v. Structured planning through best practice-based templates; planning, controlling, and monitoring portfolio dependencies, including resource management;
- vi. Improved lessons learned and their implementation;
- vii. Improvement to business risk management; and
- viii. Improved quality of project deliverables.

A conversion of these performance benefits to monetary values suggested significant variation across the TCA. For example, the reported monetary value of PPMC performance at DBD was noticeably significant than at the other investigated entities. As mentioned previously, this PhD research refrains from particularizing PPMC performance outcomes for specific portfolios, business divisions, or corporation-wide functions. Rather, the developments of capability dimensions and routines should well indicate the relative success in attaining PPMC performance outcomes. However, for contextualization purposes, only the highlights of the PPMC performance outcomes from Period III are presented in Table 13.

Table 13. PPMC performance outcome highlights during Period III

Observed performance outcomes of PPMC	
Decision-making Transparency	Decision-making transparency remained similar to Period II. As a whole, it remained consistent within the stakeholders participating in various PPMC structures.
Visibility & Predictability	Visibility increased to the limit of PMIS data quality and quantity (increasing) during this period. Improved predictability of project outcomes within functions and business divisions proficient in project management routines and PMIS usage.
Strategic Fit	Gauging strategic fit of portfolio components became part of PPMC governance routines for ID and P&S portfolios. The increase in strategic fit was evident from continual discussion of project complementarities and interdependencies. Strategic fit evaluations extended with the decision-making transparency of stakeholders, which in many parts of TCA increased during this period.
Value Maximization	Considerable evidence of value maximization. In business divisions, the value maximization is measured through financial quantification. Support functions such as IT and HR are calculating value maximization from reduced redundancies.
Synergism	Synergism opportunities increased; one realized example was the establishment of new business-line in DBD.
Change Adaptability	Regular and planned changes were managed as portfolio components (PPMC governance applied). However, technical and directional complexity remained the change effect analysis limited to tangible assets and financial results. Meanwhile, good exceptions were always there.

SEGMENT IV: DISCUSSION AND CONCLUSIONS

10 DISCUSSIONS

Organizational capabilities are complex social constructs, and therefore establishing a reasonable explanation about their development is challenging. However, a separated presentation of each dimension and routine in the preceding chapters has made the PPMC development process at the case company rather simply understandable. This chapter reviews the interdependent development of capability dimensions and routines at the case company to extend the theory-laden explanations (compare: O'Mahoney & Vincent, 2014) of PPMC development and to establish an emergent theory (Eisenhardt & Graebner, 2007) of path-dependent development of organizational capabilities.

The case findings of PPMC development shall converge section by section throughout this chapter. The result is a denser description of interactively developing capability dimensions and routines. These descriptions are intensive and somewhere complicated too, which reflect the complex nature of organizational capabilities. Avoiding these intensive discussions was inevitable to reach a simplified model presented in the last section of this chapter. This critical realist model establishes an emergent theory of path-dependent development of organizational capabilities (compare: Whetten, 1989).

Relatedly, the assumed names for the investigated entities shall be least referred to during these collective discussions of organizational capability development, herein PPMC. Instead, the distinction between various parts of the case company has been referred from their dominant approach towards capability development. For example, the business units and functions which could transform capability dimensions are referred as the transformers, or otherwise the "as-is" adopters and refiners. This distinction shall become more understandable through the proceeding sections of this chapter.

10.1 PPMC Development Dynamics at the Case Company

This research has investigated the development process of project portfolio management capability (PPMC) in The Company Alpha. The existing literature offered few insights into the nature of PPMC; rather most scholarship focused on PPM practices. Using retroduction, a generalized framework for investigating PPMC (Figure 12) developed during the research process. Also, David Teece advised examining capability development by such an approach (Teece, 2014a, p. 335). According to this framework (Figure 12), PPMC developed within the structures, processes, and resources of the case organization. During this

development, organizational resources coordinated their actions as the capability routines leading to certain performance outcomes. Hence, along with the developing PPMC dimensions, this PhD research has also investigated the developments related to PPMC governance, communication, and project management routines. Meanwhile, PPMC performance outcomes at TCA offered a valid source for contextualizing the development heterogeneity.

The PPMC development events at TCA and its two business divisions, Sigma Business Division (SBD) and Delta Business Division (DBD), have been recorded over nine (9) years. This long duration was then segmented into the three sequenced periods of PPMC development. Such an approach of temporal bracketing (compare: Langley, 1999; Langely et al., 2013) enabled the identification of the capability development discontinuities and path variations among the three investigated entities. This identification was not limited to the experienced events; rather, it included unraveling the causal mechanisms and contexts which led the heterogeneous PPMC developments.

TCA undertook a corporation-wide intentional development of PPMC from the beginning of Period-I. Their internal and external context (for capability development) led to a unified extension of the in-house organizational project management capabilities (OPM). At the beginning of Period-I, some of the business divisions, including DBD, were front runners in routinizing project management and collectively governing their business projects. On the other hand, there were business divisions who did not establish formal project management routines for supporting PPMC. Meanwhile, both of the investigated business divisions delivered plausible business performances over the studied years. Reiterating that TCA already had attained a technology leadership role in its specialized market segments.

The planned corporation-wide unification to organizational project management was designed to further strengthen this technological leadership by integrating newly acquired businesses. However, there was a noticeable difference between the business divisions' aspiration towards PPMC. For example, synergizing business-lines (existing and newly acquired businesses) for an efficient (knowledge) integration of products and services as CoPS was the PPMC development context at SBD. Meanwhile, extending the business successes into the existing and new markets through an integration between the corporation-wide stakeholders was an apparent driver for PPMC development at DBD. Both the divisions had aspirations for an organic growth (Penrose, 1959) of their existing organizational project management capability. However, this also

required them to acquire externally developed competences (including an IT-based PMIS) to extend their future growth (Lockett et al., 2011).

The effect of extended variations in the operating environment was noticeable on the PPMC development context during data collection periods. The case finding summaries (Table 8; Table 10; and, Table 12) have briefed these noticeable differences in capability development contexts at the corporation and business divisions. From a critical realist perspective, these different contexts uniquely actuated the self-reinforcing mechanisms, and hence, the capability development path remained heterogeneous throughout the data collection periods. Besides, not all the mechanisms could contribute to the development of PPMC. Consequently, PPMC dimensions and routines inherited characteristics peculiar to each of the investigated entities of TCA.

Despite the fact that PPMC development paths remained differentiated among the three investigated entities, the externally coordinated survey evaluations (by external consultants) reflected almost the same maturity of PPMC at all three investigated entities. Indisputably, PPM as an integrated approach to manage the multiple projects of operational and strategic importance (compare: Artto, 2001; Martinsuo & Killen, 2014) had been established in the case company. Ideally, the three investigated entities would have developed the process-based decision-making (Rad & Levin, 2006) for ideation, screening and evaluating, selecting, prioritizing, approving, and monitoring and performance auditing. Meanwhile, processes for “doing the right projects” and methods for “doing the projects right” (PMI, 2013a) were also identifiable at all three investigated entities. However, the proficiency of functions, departments, and structures in routinizing (as indicated by Fernandes et al., 2015) the assessed developments varied considerably. The role of contextual evolution (Mullaly, 2014), therefore, could have been considered for the path-dependent development of PPMC. Whereas, a unified and singular development approach was considered as the most dynamic response to the varying business environment. This was contrary to the Miller’s (1993) warnings about over simplification.

10.2 The Development Path Heterogeneity of PPMC Dimensions

The heterogeneous development of organizational capabilities was a reflection of path-dependent evolution (Helfat & Peteraf, 2003). Additionally, this research identified the underlying mechanisms by identifying the distinctive developments

alongside the path heterogeneity. These distinctions encompass the PPMC dimensions and routines.

The development path for PPMC structures changed from the beginning of Period-I. At that time, one of the most prominent developments was the establishment of EPPMO, which controlled and coordinated (compare: Unger et al., 2012) the corporation's PPMC developments. Some of the business divisional PPMOs had been able to support and in a limited way coordinate the ongoing developments within their business-lines and functions. The assigned role of the business divisional PPMOs changed slightly during the first two periods due to the reinforcement from adaptive expectations (towards unification) and coordination mechanisms. At the corporate level, control was important to ensure a unified way of working, whereas, the follower business divisions (Teece, 2007) adopted the minimally required coordination to adapt to the corporate developments. It implies a limited actuation of learning mechanisms in an organizational system.

Afterwards, the development of project category PPMO with the extended actuation of learning mechanisms (double-loop learning mechanisms) supported the complementary mechanisms. The actuation of complementary mechanisms combined with single-loop learning and double-loop learning mechanisms alleviated some of the problems with understanding PPMC development effects on the business processes and IT-systems, as well as on the other organizational capabilities. Extended coordination was required, which was slightly possible in restructured and downsized business divisions and functions. Meanwhile, EPPMO with its responsibility to develop PPMC processes, practices, tools and techniques supported by the corporation's PMIS continued with the PPM program for unification. In fact, all of the business divisions and functions had an equal opportunity to contribute to the customization of externally-acquired practices and PMIS. However, the internal and external contexts resulted in uniquely experienced events within the business divisions. Consequently, some of the business divisions persisted with their historically developed work behaviors [locked-in to the existing paths].

Here again, the adaptive expectation mechanisms had actuated distinctively. It implies that only some of the business divisions and functions were able to visibly alter their capability development paths (Garud et al., 2010; Vergne & Durand, 2011) while others either struggled due to operational inefficiencies (and inapplicability) engendering from "as-is" adoptions. Otherwise, some of the functions, unilaterally, kept incorporating the endogenous changes to capability routines, however, at a rate slower than it was needed. Meanwhile, PPMC structures kept on accumulating experience within their assigned responsibilities.

Whereas, their articulated knowledge remained limited in applicability to the day-to-day work routines. Subsequently, functional resources remained focused on enhancing PPMC performance outcomes only by refining the existing organizational project management artifacts [locked-in to the existing paths].

During Period-II, before receiving the necessary support of the developing PPMC processes, the corporation-wide PPMC structures and leadership could merely comprehend the attained developments for PPM. It is because most of earlier scholarship had overwhelmingly advocated PPM as the set of processes to support strategic decision-making (Abrantes & Figueiredo, 2015; Bible & Bivins, 2011; Cooper, 2005, 2008; Crawford et al., 2009; Padovani & Carvalho, 2016; PMI, 2013a; Rad & Levin, 2006). Furthermore, the guidance in the literature for implementing corporation-wide PMIS with uniformly formalized PPMC processes was ubiquitous in spite of this approach having limited multi-process integration (Arlt, 2010), and hence, decreasing synergism between different functions and business-lines. PPMC performance outcomes could have remained more consistent by embedding a suitable degree of balance between the formality and flexibility in PPMC processes (Keegan & Turner, 2001; Turner et al., 2010).

Essentially, TCA developed corporation-wide PPMC processes (detailed in Chapter 8) during Period-II when the business environment changed dynamically. These PPMC processes were drafted, refined, and reconfigured before their corporation-wide uniform implementation. PPMC structures coordinated the development of these processes within their contextual boundaries and through the concurringly actuating mechanisms. The limited applicability of earlier established business processes [Prior to Period-I, when organizational project management processes were included as a sub-set of quality management] to the PPM approach had been well-recognized within the PPMC structures, including the governing bodies. Therefore, it was decided to develop a separate set of processes to support PPM. This entailed, at first, developing new processes for managing projects of all three categories, and later on, reconfiguring these new processes. However, only a few of the business divisions and functions could alter their business processes according to the newly developed processes (including stage-gate models) supporting PPMC.

Meanwhile, the corporation-wide development practices, methods, tools and techniques was led by the transformers. These business divisions and functions demonstrated higher degree of PPM success. It means that a corporation-wide applicability of these processes, practices, methods, and tools & techniques had certain implications. Consequently, the refiners and the “as-is” adopters (business divisions and functions lacking PPM success) remained on their earlier

development paths. This was due to the limited synergizing potential offered through “as-is” adoptions. The resources, therefore, preferred endogenous improvements by exploiting the existing knowledge. At the corporation-level, PPMC structures (the resources) recognized this increasing resistance and limiting complementaries, however, only as a literature known typical organizational reaction to change initiatives (compare: Kotter, 1995).

These reactions were a reflection of the persistence of the existing behaviors – a “lock-in” stage where certain organizational units were unable to alter the development paths even in the presence of exogenous shocks (Garud et al., 2010). Literature recognizes that organizations vary in their ability to apprehend the rate and frequency of exogenous shocks (compare: Helfat & Winter, 2011). Likewise, the peculiarity of context-specific actuation of self-reinforcing mechanisms and the resulting idiosyncratic PPMC developments (compare: Blundel, 2007; Easton, 2010; Harrison & Easton, 2004; Sayer, 2000) were distinguishable among the three investigated entities at TCA.

Earlier, the ERP system development with its aligned business processes had uniformly been adopted across the case organization. This ERP system applied unified processes for specialized expert knowledge amongst the corporation-wide functions, for example, in the supply chain management, manufacturing, HR, and finance & accounting functions. This ERP system also offered the needed degree of flexibility to business divisions and their functions that could adjust the methodologies and practices according to business specific requirements. The case evidence (discussions with the interviewed experts) indicated the existence of a corporation-wide shared vision that leaned toward needed flexibility and customizations of ERP system.

Whereas, the contextual dynamics could not stimulate the necessary mechanisms for a corporation-wide shared vision while the PMIS developments were in progress. Thus, TCA persisted with the earlier adopted path of unification, however, with considerably less resource commitment and energy toward localization required for better performance outcomes at different divisions and functions of TCA. During this development, the corporation-wide shared mental models for understanding the PMIS role in corroborating knowledge integration of resources from multiple domains remained fading. Still, there were business divisions and functions which could transform the structures, processes, and people to maximize PPMC performance outcomes through PMIS development.

Such capability development path heterogeneity within a single business enterprise is not reported earlier in literature. Herein, this research could unravel this reality about organizational development through illuminating the contingent

relationship between context, mechanisms, and the generated outcomes (Sayer, 1992). To the researcher's understanding, this heterogeneous development of a single capability dimensions also explained why injecting best practices might not lead to generating long-term performances (compare: Rahamandad & Repenning, 2016; Teece, 2014).

Meanwhile, critical realism approach of this research focuses on elucidating why capability performances remained heterogeneous amongst the different entities even within the same business organization. Such a heterogenous development also explains why amongst business firms in the same industry, only a few continuously outperform others – a most lucrative impression of dynamic capabilities conceptualization (Teece et al., 1997). However, this research has remained only to explaining the capability development process through the effect of path reinforcing mechanisms. This is why awareness about the dynamics of self-reinforcing mechanisms (Sydow et al., 2009) directly impacts strategic choices (Greve & Seidel, 2015) for future path development. The discussion on the capability performances heterogeneity and the organizational effects of dynamic capabilities are left out for the future extensions to this research.

During Period-I, the most prioritized actions that were controlled and coordinated by PPMC structures, focused on the individual's competence development. The human resource management (HRM) function devised extensive training programs, mainly for organizational project management competence development. Because in CoPS based P-form organizations, project management is a core competence to support daily operations (Söderlund & Tell, 2009). Meanwhile, at TCA, the development of training programs conformed to the historically fluent (in project management) business divisions and functions. Thus, the practices, methods, and tools and techniques, included in the content of these training programs, had specialized in more proficient divisions and functions. These training contents were constantly updated in coordination with the state of the art project management body of knowledge. These training programs were equally accessible throughout the corporation. The divisional and functional resources continuously participated in these training programs; however, only to the extent of their aspiration towards PPM and the corresponding structural support. As a result, the competence development rate and quality remained wide-ranging between business divisions and functions.

In fact, resource competence development and the best utility of developed competences is not straight forward. It also includes (detailed in section 4.3.3.1) organizational commitments, conflict resolution, stakeholder empowerment, individual resource engagement, the context & complexity of portfolios, and, most

importantly, learning new knowledge during dynamic interactions of portfolio components. All these factors were handled specifically at each of the three investigated entities. Consequently, the differentiated actuation of self-reinforcing mechanisms (Table 8; Table 10; and, Table 12) also resulted in heterogeneously developed resource competences to perform PPMC routines.

At corporation-level, the focus was on resource capacity building by increasing the commitment from business divisions and functions, which required extending their knowledge integration. Business divisions approached competence development differently depending on their retained contexts for PPMC development. Noticeably, the refiners and “as-is” adopters focused their prime attention on capacity building for resolving “resource conflicts” and establishing resource “engagement.” On the other hand, the transformers ensured capacity building for stakeholder empowerment and for expanding the PPMC development context. It does not mean that the other aforementioned characteristics (in section 4.3.3.1) were ignored. However, a prioritized focus on a few characteristics reflected diverging approaches to develop people competences, even within a single business corporation. These resource competence development peculiarities resulted in distinguished positive-feedbacks and negative-feedbacks to PPMC development paths of the three investigated entities.

Meanwhile, organizational capabilities required continual evolution toward compatibility with the external operating environment (Helfat & Peteraf, 2003). This remains valid for PPMC development at TCA (earlier identified by Killen & Hunt, 2010, 2013; Killen et al., 2008; Killen et al., 2012; Petit, 2012). During the research process, it was discovered that the required rate of compatibility maintenance would increase in cases (business organizations) where PPMC takes the role of a dynamic capability. It is because PPMC as a dynamic capability should also ensure this compatibility of other organizational capabilities by “*integrating, building, and reconfiguring resources; and customizing*” them according to the operating environment (Killen & Hunt, 2013, p. 132).

The findings of this PhD research establish that prior to (PPMC’s) fixing the other organizational capabilities and needed resource competences, it was pertinent to first seek for PPMC development alignment with the internal operating conditions. Without a focus on internal alignment, PPMC would remain an ordinary capability to administer and govern organizational resources. It is in accordance with the earlier intimations by David Teece (see: Teece, 2014a, 2016). Meanwhile, the control of such administrative governance remains within the PPMC structures. In such a situation, PPM stakeholders’ engagement in sensing, seizing, and

reconfiguring and transforming routines (compare: Teece, 2016) may remain a delusion.

10.3 Extant Literature Limitations in Explaining the PPMC Development Process Through Learning

Amongst the most influential scholars of organizational capabilities, (according to Peteraf and colleagues (2013)), Zollo and Winter (2002) have referred to three learning investments (experience accumulation, knowledge articulation, and knowledge codification) as the learning mechanisms for dynamic capability development. According to the earlier research on PPMC (see: Killen and colleagues (2008)), these three learning mechanisms were responsible for the evolution to PPM dynamic capabilities. Meanwhile, investigating learning abilities of project-based organizations, Prencipe & Tell (2001) distinguished the outcomes of three learning mechanisms proposed by Zollo & Winter (2002). They included a list of activities associated with *experience accumulation*, *knowledge articulation*, and *knowledge codification* at the individual, project/group, and organizational levels. A list of these learning-based activities is available in Chapter 4 (Table 7) of this dissertation. The existence of these activities was also witnessed at the investigated entities of TCA.

During Period-II, all three investigated entities had the PPMC structures, processes, and the base competences (resources) for performing PPM practices and activities as suggested in the literature. These practices, methods, and tools and techniques had articulated, codified, and well-tuned by the resources. The solution prescribed in the literature for attaining dynamic capability maturity through learning investments (Killen & Hunter, 2013; Zollo & Winter, 2002) was also made to ensure *experience accumulation*, *knowledge articulation*, and *knowledge codification*. Still, the dissimilarities among PPMC performance outcomes between the investigated business divisions and functions at TCA remained noticeable, were known to the leadership, and under discussion at different forums during the case data collection periods.

In fact, in their later scholarship, Killen & Hunt (2013) identified limitations associated with maturity achieved through *experience accumulation*, *knowledge articulation*, and *knowledge codification*. All of their six case companies, which according to these authors (Killen & Hunt, 2013), successfully had developed PPM dynamic capabilities and changed their development paths based on the post-implementation reviews (PIRs). However, with their reliance on *experience accumulation*, *knowledge articulation*, and *knowledge codification* activities,

these case organizations were unable to “*stop poor performing projects and reallocate[d] resources*” (Killen & Hunt, 2013, p. 145). Similar examples were noticeable at TCA, as a few of its business divisions had low confidence in their PPMC, despite being able to maintain experience accumulation, knowledge articulation, and knowledge codification.

Interestingly, through their proposed tri-lateral learning mechanisms of dynamic capability development, Zollo & Winter (2002) had focused on the co-evolutionary relationship between knowledge exploration and knowledge exploitation activities in an ambidextrous organization. Recently, amongst the prominent scholars on organizational ambidexterity, O'Reilly & Tushman (2013) recognized that organizational ambidexterity models supported learning the knowledge for business survival only to a limited extent. Also, cautioning about these limitations, Zollo and Winter noted that “...[knowledge] *codification, like many other things, is likely to produce bad results when done badly*” (Zollo & Winter, 2002, p. 343). As Prencipe & Tell's (2001, p. 1390) had recognized, the project-based organizations “*seem to focus their effort on outcomes rather than on the process*” of learning. Meanwhile, the learning outcomes, the management of knowledge in multi-project environment, and the associated challenges have been already noted in literature (for example in Ajmal et al., 2009). This PhD research, though, has established that the literature's focus on learning outcomes, including the three processes of experience accumulation, knowledge articulation, and knowledge codification, does not guarantee the best performance outcomes.

In their research, Zollo & Winter (2002) did emphasize the importance of organization-specific “*conditions*” for experience accumulation, knowledge articulation, and knowledge codification to remain effective. Simply stating; organizational capability development is always business context-specific (Schreyögg & Kliesch-Eberl, 2007; Teece, 2012), and the same is true for dynamic capabilities as well (Helfat et al., 2007, p. 7). Accordingly, this critical realist research has valued the contingent relationship between business context specifically actuating learning mechanisms and their outcomes. Subsequently, the case findings have reinforced the importance of conditions, the capability development contexts, under which the knowledge has accumulated, articulated and codified.

Accordingly, a clear distinction between the investigated business divisions was related to the business context-specific development of PPMC. Business context specificity enabled high-performing routines (Schreyögg & Snow, 2011; Teece, 2016), which were least attainable with best practice “as-is” adoption (Rahamandad & Repenning, 2016) or by continual refinements to the existing

routines (Sydow et al., 2009). Hence, the transfusion of best practice-based processes, methods, tools and techniques, and the supporting IT-based systems neither guarantees the best performing ordinary capabilities, nor can such capabilities shall take the role of a dynamic capability.

10.4 Interdependently Developing Idiosyncratic Routines

Rendering PPMC development in a case organization entails temporal elucidation of work routines (compare: Pentland et al., 2011; Turner & Fern, 2012; Turner & Rindova, 2012). These work routines carry an organization's memory system (Chen & Miller, 2015; Felin et al., 2012). Even though work routines represent fixed action patterns (Staw, 1984) and provide stability during change (Deken et al., 2016). However, an increased commitment to existing routines reduces an organizations ability to seek better alternatives (Sydow et al., 2009). Therefore, organizations get into a "lock-in" situation with a persistent exploitation of existing routines. This type of development of an organizational capability, including PPMC, becomes a 'success trap' (compare: Killen & Hunt, 2013). And further refinements to the capability routines will not remain economical in the longer-run, and, therefore, organizations are led to practice capability retrenchment (Helfat & Peteraf, 2003).

Path dependency as a tri-staged process (Schreyögg & Sydow, 2011; Sydow et al., 2009) has offered a fundamental support for this PhD research. Actuated mechanisms provide either positive or negative reinforcement to the capability routines. Meanwhile, the apprehension of exogenous shocks generated by the operating environment (internal and external contexts for capability development) lead to either continuing or otherwise altering the chosen development path. This PhD research has also elucidated the effect of environmental dynamics apprehension to the actuating self-reinforcing mechanisms by explicating changes to the selected PPMC routines at TCA (Nelson & Winter, 1982, p. 128): PPMC governance routines, PPMC communication routines, and PPMC project management routines. These routines interacted dynamically (Pentland & Rueter, 1994; Deken et al., 2016), and affected the accomplishment of work performed by the resource.

PPMC governance routines was at the forefront for apprehending PPM maturity at TCA. The case company considered PPM governance as "a state of excellence" for being able to maximize portfolio value with the least disruption to the business operations. Meanwhile, PPMC governance as an organizational routine did not gain recognition. Normatively, this unawareness reflects the effects of a universal

approach towards PPM organizational practices. As the literature had suggested, PPM governance was considered as a subset of corporate governance (Biesenthal & Wilden, 2014; PMI, 2016; Müller et al., 2015; Müller et al., 2016a; Too & Weaver, 2014).

However, the prudent approach toward PPM development as an organizational capability (PPMC) is about seeking a flexible approach toward governance (compare: Geraldi, 2009; Locatelli et al., 2014). It also necessitates striving for a shared vision of business value (Müller et al., 2014, p. 1318) through PPMC. Otherwise, a fixed, corporate governance-like approach for enhanced control leads to the issues associated with dysfunctional PPMC (compare: Too & Weaver, 2014; Elonen & Artto, 2003). Despite having robust governance systems for controlling portfolio components, TCA experienced these associated issues.

Interestingly, the PPM governance approach (comparing with Müller's (2009) governance paradigms) within the three investigated entities was also distinguishable, even though their prime focus was on establishing a state of higher governance. Earlier in literature, Müller & Lecoivre (2014) also noted such an existence of more than one governance paradigm within a single enterprise. In the case company, a context-specific actuation of self-reinforcing mechanisms was recognizable. For example, the actuation of all three learning mechanisms primarily resulted in a stakeholder-focused performance outcome approach similar to Müller's (2009) "versatile artist paradigm." On the other hand, a limited actuation of learning mechanisms indicates disregarded PPMC stakeholders with controlling outcomes and behaviors similar to Müller's (2009) "flexible economist paradigm" and "conformist paradigm." Meanwhile, the case findings also recognized the applicability of all four governance paradigms (Müller's, 2009), however, only suitable according to portfolio context, organizational capacity, and commitment to PPM (compare: Payne, 1995).

Valuable explanations by the interviewed experts gave guidance about their best possible selection of portfolio governance in any given situation. However, the selected governance paradigm's suitability was temporary for certain business divisions and functions. The unsuitable governance paradigm delayed the routinization of processes, practices, methods, tools and techniques, and IT-based supporting systems. Consequently, PPMC governance routines and their underlying paradigms affected the other two investigated PPMC routines. It is because PPM governance routines oversight the development, integration, and monitoring of overall activities performed in a certain project portfolio (PMI, 2013a, p. 11).

Developing PPMC governance routines reflected collaboration among portfolio stakeholders. The consequent PPMC communication routines then reflected the dominant thinking for PPMC developments, because portfolio collaboration should have been striving to surpass structural boundaries (Jonas, 2010; Pennypacker & Retna, 2009, p. 188; PMI, 2013a; Rajegopal, 2013, p. 76). However, some parts of the case company experienced visible restrictions to the portfolio coordination. Consequently, PPMC communication remained limited to the core PPMC structures and teams. The resultant impression, at some parts of TCA, is that PPM was a bureaucratic approach to control resources.

Otherwise, the developed communication routines encircled the financial figures and project payback times. Indeed, this driving focus on economic benefits has been dominant since the inception of PPM out of portfolio theory (noted by Rad & Levin, 2006). Consequently, as Martinsuo and Killen (2014) earlier identified that there is a general tendency of neglecting intangible benefits of PPM, for example, organizational learning. This research recognized during literature reviews that this neglected balance between the tangible and intangible value of PPM, has been responsible for the limits of developing PPMC, if ever, as an organization-specific dynamic capability. Meanwhile, this research also recognizes that an ultimate balance shall vary among the industries, organizations, businesses, and portfolio types.

In conjunction with PPMC governance and communication routines, project management routines also should develop. The crucial importance of project management competences had already resulted in a noticeable recognition for PPMC evolution. For example, Killen & Hunt (2013) have narrated the available literature support on this matter. In line with the literature guidance, the case company aspired to develop PPMC through the underpinnings of its project management competences. TCA's slogan of developing corporation-wide '*unified way-of-working with PPM approach*' was the depiction of this crucial requirement. It is because, some parts of the company had already, before the formal PPM program, been reconfiguring their project management competences and, hence, the routines to support PPM. These proficient business divisions and functions amplified the corporate vision towards a unified way of working, while other parts of the company limited their PPM learning.

The shrinking market volumes and the domination of newcomer technologies provided positive feedback to this adopted path of limited actuated learning mechanisms. In this situation, the excessively experienced exogenous shocks could limitedly effect the PPMC development contexts. Therefore, project management routines, under the effect of this limited actuation of learning mechanisms, kept

refining, even in the situations where organizational memory kept decreasing due to restructuring and downsizing. In the meantime, new project management routines were developed either through adoption or reconfigured PPMC dimensions.

Interdependence of organizational routines, further, restrained PPMC development. It was, at first, due to the lost memory of existing project management routines and, secondly, due to the inclusion of new routines for managing projects. Along with the limited actuated learning mechanisms, the increasing complexity of organizational routines' interdependence created a dragging focus on long-term performance outcomes. And PPMC routine refinements were dominant. In these parts of the company, lean philosophy-based programs established to be more effective in realizing routine refinements.

Investigating PPMC dimensions along with the corresponding routine interactions has been a fortunate research experience. This PhD research observed three different performance states of PPMC routines interacting along the capability development path. The first consisted of the already established routines locked-in to organizational behavior. The second category of routines was adopted on "as-is" principles. Routines in the third performance state were the ones that formally developed during the data collection period. Opportunity to observe the interactions between routines in these three performance states has been pivotal to understand the PPMC development paths. Reiterating that (individual) resources at the case company comprehend three knowledge domains: project management knowledge, technical knowledge, and function specific knowledge. These expert resources combine these knowledge domains to perform their specific routinized actions.

In the absence of conditions under which routine actors (resources) could understand the collective impact of their actions on overall capability performance (comparable to Peter Senge's (1990) term of shared mental models), PPMC remained under-performing. Metaphorically, in the absence of shared mental models, PPMC performance through interacting multi-state routines was comparable with a resultant vector in physics, wherein, the direction of resultant vector reflects the dominating force. Meanwhile, the magnitude of resultant vector remains limited due to the aggregate of the opposing forces. Similarly, the dominance of routines of a particular state was observable through the action of resources in distinct functions (and hierarchies). However, these resources consumed their energies in sorting out the best possible routine combinations, and still remained short of expecting performance outcomes. Simply stating; even the short-term performance outcomes of a capability reduced (from the available

potential) in the absence of shared mental models, while functions and departments endured the routine refinement efforts.

Relatedly, observing PPMC routine pre-formation, formation, and developing as organizational behavior [referred as three phases of path dependent development (Schreyögg & Sydow, 2011)] were also stimulating phenomena in the case company. Capability development context-specific actuation of mechanisms affected the all three phases of path dependently developing PPMC routines. These PPMC routines carried organizational knowledge (compare: Nelson & Winter, 1982) required for PPM success in business divisions and functions. Organizational routine embedded knowledge consists of three memory components important for PPMC performance (compare: Felin et al., 2012; Miller et al., 2012): a declarative memory component for knowing what to do; a procedural memory component for knowing how to do something in a given operating environment and; a transactive memory component for knowing who should be involved in order to attain the desired performance outcomes of a certain PPMC routine.

In a business organization, the assembly and up-grade of these three knowledge/memories are result of a dynamic interaction (Miller et al., 2012) between the ostensive and procedural aspects of PPMC routines (Dionysiou & Tsoukas, 2013; Feldman and Pentland, p. 3). The operating environment provided exogenous shocks to organizational memory (routine) up-grading. However, at certain parts of the case company, apprehension about the exogenous shocks (Vergne & Durand, 2011) to a certain capability routine remained limited to the capability development context i.e. why a capability should be developed and how the routinizing and performance of that capability is interdependent on the other existing capability routines in an organizational system. Lacking business context specificity (Dionysiou & Tsoukas, 2013, p. 198), PPMC routine development in some parts of the company remained in multi-directional flux. Subsequently, with the lacking performance through adopted practices, tools and techniques, and IT-based systems, many of the PPMC designed activities could not be routinized as organizational behavior. In this situation, instead of collective development of PPMC routines, the focus remained limited to gradual refinements through the continuous improvement of built-in individual routines (compare: Miller et al., 2012). Such approach of separately refining individual routines was insufficient to realize the best performance outcomes of PPMC.

This observed neglect to exogenous shocks and unaffected capability development context resonates with Scharmer's (2009, p. 247) caution about a social system that *"the bigger the gap between exterior systemic complexity and the interior capacity to access the deeper streams of emergence, the more likely a system will*

go off track...” It implied that a persistent dependency on the existing routine refinements ultimately leads to capability retrenchment. However, TCA was able to avoid this retrenchment even in business divisions with low performing PPMC when during Period-III reconfiguring the dimensions of PPMC provided an opportunity for stakeholder dialogue.

It is important to notice the interplay between the ostensive and performative aspect of organizational routines. The ostensive nature of PPMC routines reflected a knowledge codified “*standard operating procedure, or...a taken-for-granted*” artifacts and their subjective understanding of routine actors (Feldman & Pentland, 2003, p. 101). These standard procedures still needed contextualized details for realizing routine performance outcomes. Because, more repetitive the coordinated actions (a routine) of individual resources from multiple hierarchies (Felin et al., 2012) are, the more improvements to the three memory components of the routine are possible (Miller et al., 2012). However, as in some parts of TCA, resources struggled to integrate the existing, adopted, and newly developing routines. Hence, the PPMC routines’ performance remained limited.

Furthermore, in the nexus of interacting business-wide work routines (compare: Nelson & Winter, 1982), limited practice of PPMC routines led to unsatisfactory improvements to their adopted ostensive aspects. Meanwhile, the actuation of the same self-reinforcing mechanisms, even in the changing context of capability development, resulted in similar outcomes. This was observed through events when resources preferred shuffling between the “*taken-for-granted*” routine memories. Under such circumstances, PPMC routines could not dominate long-term business performance. Therefore, the routine emergence (compare: Felin et al., 2012) alternated between pre-formation and formation phases of path-dependent development. In other words, during the first two phases (pre-formation and formation) of path development, the actuated mechanisms provided negative reinforcement due to the limited performance of routines based on adopted memories. Consequently, the actors continuously questioned the applicability as well as the potential performance outcomes of PPMC routines.

Similarly, some of the investigated entities prioritized refinements to the already performing routines. These refinements impacted the other routine memories (Deken et al., 2016) insofar as these routines overlapped all PPMC dimensions (structures, processes, and people). Therefore, any reconfiguration to the PPMC dimensions had consequences on the performance of those routines which had already been settled as organizational behavior, meaning that disconnected capability dimension reconfiguration and routine refinements further restrained PPMC development and its performance outcomes.

10.5 Organizational Capability Development Through Learning Organization Mechanisms

Earlier discussion of the research case findings emphasized upon the contingent shared effect of contextly actuated mechanisms on interactively developing capability dimensions and routine. The literature-synthesized framework for capability investigation (Figure 10) comprehends the collective importance of organizational resources, processes and structures as the “*whole entity*” (Checkland, 1981, p. 12; Senge, 1990, p. 6). In other words, an organizational capability in itself is an entity comprised of dimensions, routines, and performance outcomes. Capability as an entity coexists with other capabilities embedded in a bigger entity (Banathy, 1992, p. 30; O' Connor, 2008; Scharmer, 2009; Walton, 2004). These capabilities altogether represent an open system of business organization (Banathy & Jenlink, 2004). The structures of this bigger entity, a learning business organization, possesses power to actuate three learning mechanisms for the development of sub-entities (the capabilities). During the actuation of these learning mechanisms, the development context for sub-entities clearly affects the realized changes to an organizational system, and vice versa.

Along with heterogeneous outcomes of the actuated self-reinforcing mechanisms of path-dependent development, the research case findings also evidenced the partially actuated learning mechanisms. For example, in some parts of TCA, there was barely any evidence of actuated triple-loop learning mechanisms. The PPMC development paths in these parts of the case company were distinguishable from the ones which experienced the actuation of all three learning mechanisms of a learning organization. Because capability development with the actuation of all three learning mechanisms was relatively less disruptive and well-paced.

Unraveling the capability development process through the self-reinforcing mechanisms of path-dependent development further clarified the distinctive effect of each learning mechanism on the capability investigation framework (Figure 10). Herein, each of the three self-reinforcing learning mechanisms specified a different approach toward the organizational capability development process (see: Figure 30). Meanwhile, the organizational utility of these three mechanisms varied throughout the capability lifecycle (compare: Helfat & Peteraf, 2003). It establishes that how business organizations uniquely combine these diversified approaches for the development of their capabilities. Thus, the development paths of a single capability are always distinguishable between different business organizations, and even between the business-divisions of a larger corporation. Resultantly, each literature-known organizational capability remains ideosyncratic in its details across firms and their hierarchies. That is why a perfect

adoption of best-practice based procures, methods, tools and techniques is only arbitrary.

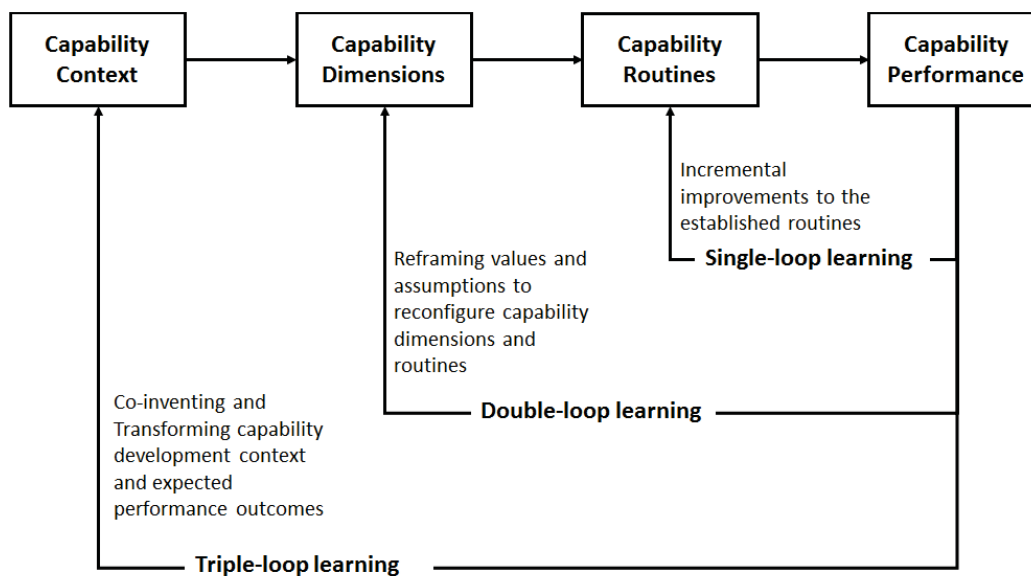


Figure 30. Critical realist model of capability path-dependent development through learning mechanisms

Single-loop learning mechanisms concern incremental refinements to the already locked-in routines constituting a capability. Accordingly, the actuation of single-loop learning mechanisms is related to routine specialization by exploiting the already learned knowledge, which accumulates as the procedural, declarative and transactive memory of an organization. Routine actors, independently from the external environment, continue improving their problem-solving skills to maintain stability while changing and upgrading their routine supporting practices, methods, and tools and techniques.

Self-reinforcing double-loop learning is concerned with reframing the values and assumptions toward the integration of capability dimensions and their interrelationships – literature referred capability reconfigurations. Hence, actuation of double-loop learning is an agency-based intentional adaptation to the external environment. This results in the development of new routines, the inclusion of new resources, processes, and even changing organizational structures. While capability dimensions reconfigure and new routines develop, the refinement and reconfiguration to the existing routines become inevitable. It also involves “*the redesign of [existing] routines*” (Teece, 2012, p. 1398) and even unlearning (Visser, 2017) some of the existing routines. It means that double-loop learning is also concerned with the dynamic interaction and interdependence of

capability routine. Therefore, in a learning organization, double-loop learning and single-loop learning mechanisms complement capability development process.

Triple-loop learning mechanisms are concerned with the business context of capability development. In this way, triple-loop learning ensures the temporal and spatial alignment between single-loop and double-loop learning. Through triple-loop learning, the organizational actors change their mental models and co-invent the capability utility, or even use the existing capability in a new business context. Therefore, triple-loop learning mechanisms involve the transformations to “*alter the current development trajectory* [development path]” (Helfat & Peteraf, 2003, p. 1004) of organizational capabilities. In a learning organization, the role of triple-loop learning mechanisms is to realize a shared context, a platform, a multi-layered social network of collectively sensing, actuating, and transforming individuals and resources supported through organizational structures and processes. Thus, transforming involves combining, synergizing, reconfiguring and protecting the resources (Teece, 2009, p. 45). The position of this research is that triple-loop learning accomplishes the transformation of existing capabilities. It also encourages co-specialization in loosely coupled structures and embraces innovation with minimal agency issues (Jensen & Meckling, 1976).

Learning organization mechanisms-based self-explanatory model of capability development path heterogeneity (Figure 30) is a unique contribution to the strategic management literature. This model is similar to Chris Argyris’s (1999, p. 68) model for producing solution to an organizational problem through single-loop and double-loop learnings. This PhD research argues that understanding a capability development through this model (Figure 30) has the potential to alleviate the confusion of extant literature where each of the known organizational capabilities, including PPMC, has been generalized as a dynamic capability. Meanwhile, the research case findings have demonstrated that even with the partially actuated learning mechanisms, experience accumulated and knowledge was articulated and codified too. Still, in some parts of the case company, PPMC performance could not reach as high as of a dynamic capability. Though PPMC remained there as an ordinary, however, an important operational capability (the characteristics of the two capability types is available in Table 6).

This critical realist research based self-explanatory model is also similar, however, not same to Petit’s (2011, 2012) conceptualization of three leveled PPM capabilities. Earlier, Petit (2011) along with other scholars assumed PPM to be a generalizable dynamic capability in all organizational contexts. According to Petit (2011), the first order PPM involved the operational activities to manage portfolio components (projects and programs). The second order PPM concerned the

development of processes etc. Petit's study, however, did not explain the third order PPM dynamic capability which were thought to develop at strategic level (upper hierarchies). After analyzing the development of PPMC in the three different entities of a single business organization, this research recognized that, Petit also understood the heterogeneously developing PPMC. Whereas, Petit's (2011, 2012) theoretical positioning and assumptions did not allow to explicate causal mechanisms of PPMC development heterogeneity. Therefore, as an alternate Petit research was prone to split capabilities at different hierarchical orders.

Contrarily, this current PhD research does not admire the position of ordering a single capability at different levels. Rather, it stimulates the understanding of learning mechanisms and their context-specific actuation leading to heterogeneous development within the capability dimensions. The findings of this current PhD research explains that Petit referred operational activities of a capability are in fact capability (PPMC) routines. Meanwhile, according to this current PhD research Petit referred PPM processes are one amongst other dimensions of PPMC. Furthermore, this research has evidenced that Petit's hypothesized third order strategic PPM capabilities are dependent on capability development contexts. These contexts are always business specific. Investigating organizational capabilities as a system of systems, as modeled in this chapter (Figure 30), potentially explains the effect of learning mechanisms whose contingent outcomes produce differentiated performance outcomes from a single organizational capability.

Earlier the research case findings validated the potentials of this model to elucidate capability development path heterogeneity. Whereas, this research refrains from stating that PPMC reacted as a dynamic capability in some other parts of the case company. At present, this PhD research has established, what David Teece has been suggesting over the years that dynamic capabilities are always organization-specific with least fungibility towards best practice-based adoptions. Consequently, it is not necessary that one specific dynamic capability for one organization must remain as a dynamic capability in the other organization. This research, however, argues that each organizational capability, including any organization-specific dynamic capability, is constituted from routines. Accordingly, this PhD research has synthesized a theoretical framework (Figure 11) for investigating a dynamic capability and its tripartite routines of sensing, seizing, and transforming. Further after theorizing the central construct of capability development path dependence, this PhD research can be extended to understand the development and performance of organization-specific dynamic capabilities.

This PhD research has also verified Eisenhardt & Martin's (2000) apprehensions about best practice-based, as if those should be generalized as, dynamic capabilities [this has not been the position of this PhD research]. These scholars have positioned that all (dynamic) capabilities become best practices through a unified development across firms. Such best practice-based adopted capabilities may limitedly generate superior performances, however, only in the short term. These best practice-based adopted capabilities will not lead towards the sustained competitive advantage of a business organization. David Teece has continuously cautioned about the limitations associated with the best practice-motivated organizational capabilities (Teece, 2007, 2012, 2016). These research case findings (in Chapter, 7, Chapter 8, and Chapter 9) have furnished real-world evidence of Teece's repeated warning. These findings are one-step closer to a long-awaited synthesis of two main streams of dynamic capability literature which earlier was only hypothesized by Peteraf and colleagues (2013).

Meanwhile, this PhD research questions (Popper, 1959, p. 32) the position of earlier research which has concluded all organizational capabilities are universally generalizable dynamic capabilities. Although organizational capabilities always change with time and hence are always dynamic due to this continual development. However, this fact of ever-evolving organizational capabilities does not qualify all the literature-known organizational capabilities to be generalized as dynamic capabilities (compare: Teece, 2007). This research argues that dynamic capabilities will always remain organization-specific. The transferred (if possible) dynamic capability of one organization to another only remains there as an ordinary capability. Such capability transfer context requires a minimum effort to learn (single-loop learning) in the form of best practices. Meanwhile, this limited development context of adopting best practices restrains the performance outcomes of an organizational capability (compare: Collis, 1994).

11 CONCLUSIONS

The first section of this chapter recapitulates the research and its main findings. Thereafter, theoretical contributions and implications of this PhD research are presented in the subsequent section. The last section of this chapter briefly recalls the research limitations to guide to the future research directions.

11.1 Research Summary

Business organizations are always expanding their resource base (Barney, 1991). Accordingly, this research indicated that organizational capabilities remain in a continuous flux. The capability development process, therefore, also continues through an extemporized mixture of refinements, reconfigurations, and transformations; and, this change never ceases. It is because organizational capabilities evolve from the interdependent work routines of semi-permanently acquired resources. A change in the organizational resource base, therefore, affects multiple work routines and actuates capability development mechanisms to maintain alignment with the competitive market environment (Penrose, 1960; Porter, 1980, Teece, 2007, 2014, 2014a). Meanwhile, the market winner organizations skilfully step-up capability development rate through a shared vision about the future. During this envisioning, the organizations do not forget their available resource base and the historical development paths (Penrose, 1959; Teece et al., 1997). Their collective vigilance enables the needed learning mechanisms to the future development paths.

This critical realist research began with idealizing PPMC as a generalized dynamic capability. However, through retrodution-based process research approach, enough evidence was gathered (Popper, 1959, p. 32) to repudiate the notion of a generalized stance around dynamic capabilities, at least for PPMC. A single case study based conceptualization is powerful for this purpose (Siggelkow, 2007, p. 21). The literature synthesized capability investigation framework (Figure 10) offered a “*reproducible effect*” (Popper, 1959, p. 66) to negate the notion of generalized dynamic capabilities in the other for-profit business organization contexts.

Generally, single case studies have been discouraged due to the limitations around the replication of findings. However, this research has demonstrated spatial (three investigated entities) and temporal (three data analysis periods) replications while developing an emerging theory of organizational capability path dependence. In fact, being always a context-specific highly complex phenomenon, understanding

the capability path dependence required such a critical case investigation. During the research process, the critical realism based approach facilitated a simultaneous examination of the capability development events and their generating mechanisms. Critical realists believe in theory-laden explanations of reality. Therefore, a plausible explanation about a capability development process has been realized by adding appropriate theoretical insights to the case data (Hodgkinson & Starkey, 2012; O'Mahoney & Vincent, 2014, p. 18).

The overarching objective of this research to explain the context-specific path-dependent development of organizational capabilities has been accomplished by answering the following three research questions:

RQ1: How are project portfolio management capabilities (PPMC) developed in the case organization?

RQ2: How do learning mechanisms effect the path-dependent development of organizational capabilities?

RQ3: How to explain the (idiosyncratic) development of organizational capabilities?

Answering the first research question (RQ1) encompassed the research case findings in segment III of the dissertation. For this purpose, a capability dimensions, routines, and performance outcomes-based PPMC investigation framework (Figure 12) synthesized from the extant literature. It also required rendering project portfolio management (PPM) as an organizational capability (PPMC). Based on this framework, the nine (9) year PPMC development process at the three entities of the case company has been explained in three equal periods. This research has highlighted the interdependently developing capability dimensions and routines that led to the differentiation of performance outcomes at three investigated entities of the case company. Because, their PPMC development paths remained heterogeneous.

The second research question (RQ2) focused on demystifying the phenomenon of path-dependent development of organizational capabilities. Intuitively, path dependence reflects a locked-in state and a situation of limited future choices. However, a closer look at the literature revealed that path dependence is a three-staged process propelled through self-reinforcing mechanisms. These mechanisms generate positive and negative feedbacks for making and breaking a development path. Meanwhile, the context-specific actuation of self-reinforcing mechanisms results in development path heterogeneity. Amongst others, learning mechanisms possess a central role in the path-dependent development of organizational

capabilities, because an organization's awareness of capability path dependence directly impacts its future selections. Therefore, this PhD research has given particular attention to the self-reinforcing learning mechanisms.

Contrary to the extant literature in which the "*basic learning mechanisms*" has been operationalized (Eisenhardt & Martin, 2000, p. 115), this PhD research sought guidance from Peter Senge's (1990) system's view of a business organization. Accordingly, the making and breaking of a capability development path has been investigated through the three learning mechanisms of a learning organization. The research case findings illustrate the differentiated effect of each learning mechanism in PPMC development. The case finding summary tables (Table 8; Table 10; Table 12) outline the effects of these uniquely actuating learning mechanisms. The unique combination of these learning mechanisms and their actuating context leads to heterogeneous development of organizational of a capability across organizations. Hence, a single literature known organizational capability can attain idiosyncratic details (the routines) which may result in differentiated performance outcomes across the firms.

Earlier chapters of this dissertation detailed the effect of learning mechanisms on the interdependently developing capability dimensions and routines. It was explained that how limitedly actuating learning mechanisms can restrain the capability performance outcomes. Meanwhile, a business context-dependent actuation of all three learning mechanisms cultivates a shared vision. A consequent, engaged, and empowered stakeholder involvement (to capability development) results in superior performance outcomes. The analytical generalization of the research case findings led to the development of learning mechanisms-based self-explanatory model of capability development path heterogeneity. The third research question (RQ3) was answered through the development of this model (Figure 30). Accordingly, business organizations can approach their future development path through an inimitable combination of refining, reconfiguring, and transforming activities. Consequently, their capabilities attain peculiar characteristics and hence always remain idiosyncratic. The research case findings have further confirmed that even a single capability developing within different business-divisions of a large corporation attain idiosyncratic details.

Although the research has evidenced the existence of high-performing PPMC, however, it has avoided stating that PPMC is a dynamic capability in some parts of the case company. Because it was not the objective of this PhD research.

Meanwhile, this research still conjectures through congruence (George & Bennett, 2005, p. 181-187) and interpolation (Andersen & Kragh, 2011) that it is possible for an organizational capability, including PPMC, to undertake dynamic capability

characteristics in some business organizations. Theoretically, such a development is realizable by establishing the tripartite schema routines of sensing, seizing, and transforming (Teece, 2014a, 2016) within the capability dimensions of structures, processes, and people (Figure 11). For example, PPMC, as any organization-specific dynamic capability, will also include sensing, seizing, and transforming in the list of its constituent routines (Figure 12). A future expansion of the research would be accomplished through an extended data collection and analysis. There already exists, however, conceptualizations only that a single organizational capability may possess a twin-role of ordinary capability as well as dynamic capability in the same business organization (Helfat & Winter, 2011).

11.2 Research Contributions and Implications

The main contribution of this PhD research is learning mechanisms based model to explain the dynamics of organizational capability development process (compare: Helfat et al., 2007, p. 34; Teece, 2014, p. 30-31). This model establishes an emergent theory (compare: Whetten, 1989) of path-dependently developing organizational capabilities. In the extant literature, path dependence is amongst the most important features of organizational capabilities and, for example, for dynamic capability development (Eisenhardt & Martin, 2000; Helfat et al. 2007; Helfat & Peteraf, 2003; Jacobides & Winter, 2012; Stefano et al., 2014; Teece et al., 1997; Teece, 2007, 2009, 2012, 2014, 2016; Winter, 2012). This PhD research has also produced theory-laden explanations of how organizational capabilities develop through context specifically actuated mechanisms which provide positive- and negative-feedback to the existing development paths. These explanations offer critical redirection to organizational capability literature (compare: Conlon, 2002, p. 489).

This novel view of organizational capability development has synthesized from the already validated prior scholarship synthesized in Segment II of this dissertation. This novel view and the supporting model (Figure 30) are constituted from different other theoretical contributions of incremental nature (compare: Corley & Gioia, 2011). These incremental contributions represent the theory building-blocks of the learning mechanisms based model of capability development path dependence, which is the main contribution of this PhD research.

By explaining the socially embedded complex interaction between capability dimensions and routines in the case company, this PhD has also addressed academia's complaints about the scarcity of research on the interconnected development of routines and capabilities (Grant & Verona, 2015; Winter, 2003).

Meanwhile, academia's continuous demand for a longitudinal study of PPMC evolution (for example: Killen et al., 2012) is reasonably fulfilled too. The case findings of this longitudinal study also reinstate the capability development path heterogeneity, even within a single business enterprise. In the absence of such a real-world example of capability development path heterogeneity, the conceptual divergence and contradictions in literature had kept increasing. Wherein the scholars focused only on the capability performance outcomes and ignored the importance of their development process. By demonstrating the literature renowned characteristics of organizational capability development, namely: context, path dependence, dimensions, routines, interdependence, heterogeneity, and idiosyncratic details, this PhD research rejuvenates the literature. Therefore, the collective contributions of this research are significant to the literature, have practical implications for the industrial organizations, and offers revelatory scientific utility for future research (compare: Corley & Gioia, 2011).

11.2.1 Literature contributions

Resembling to Whetten's (1989) criteria for theoretical contributions, this PhD research has challenged the underlying relations in the existing theories of organizational capabilities. At first, by literature synthesis based logical arguments, and then providing evidence from the case findings. This research has also proposed remedies to the developing theories, for example dynamic capability view. Most importantly, by empirically validating the literature synthesized model, including its factors/components and their interrelationships, it has responded to increasing contradictions in literature. By successfully attaining its overarching objective to explain the context-specific path-dependent development of organizational capabilities this PhD research has offered theoretical contributions and empirical advancements to the multiple streams of literature. Within the earlier detailed theoretical, methodological, and practical limitations (section 1.6), the main contributions related to the literature positioning of this PhD research (section 1.5) are outlined in Table 14. Afterwards, these contributions are briefed in the subsequent text.

Table 14. Literature contributions outlined

	Theory Building Contributions	Empirical Advancements
Organizational capability literature	<ul style="list-style-type: none"> - Discovery of capability dimensions, routines, and performance outcomes based investigation framework; - Extending the path dependence as 'a process' conceptualization to organizational capabilities; - Discovery of learning mechanism based model of capability path dependence – an emergent theory; - Providing literature synthesis that sensing, seizing, and transforming are routines; and, - Proposing dynamic capability investigation framework. Sensing, seizing, and transforming routines are built within the dimensions of an organizational capability and complement the other routines of that capability. 	<ul style="list-style-type: none"> - Case evidence of inter-dependently developing routines and capabilities; - Case evidence of the practical applicability of the discovered capability investigation framework; - Case evidence of path dependence as a process rather than an irreversible state; - Case evidence of the validity of the learning mechanisms based model – the emergent theory; - Case evidence of capability path heterogeneity and consequent idiosyncratic details of the same capability; - Real life evidence of temporal and spatial interaction of capability dimensions and routines – opposite to dividing one capability into different hierarchal orders; - Case evidence to denounce literature stance of generalizable dynamic capabilities; and, - Case evidence of capability development contexts affected performance outcomes (similar to Collis, 1994).
Project portfolio management (PPM) literature	<ul style="list-style-type: none"> - Extending PPM practices as an organizational capability (PPMC) involving multiple hierarchies; - Rendered PPMC and the framework with defined dimensions, routines, and performance outcomes; - Defining PPMC processes for a flexible approach towards different PPM types and categories; - Conceptualizing PPM governance as a routine for a flexible approach possible through PPMC; - Collecting PPMC performance outcomes rather than PPM success or effectiveness etc.; - Differentiating communication routines for PPMC from individual project communication; and, - Identifying literature gaps on PPM stakeholders and leadership. 	<ul style="list-style-type: none"> - Case evidence of PPMC development in an industrial organization; - Case evidence of interdependently developing PPMC for different PPM types and project categories; - Case evidence of interdependently developing PPMC dimensions, routines, and performance outcomes; - Case evidence based validation of PPMC development investigation framework - Case evidence of PPM governance paradigms applicability according to PPMC development context; - Validation of extant literature identified importance of project management routines to PPM success [PPMC performance outcomes]; - Case evidence of limitations associated with best practices based unified approach towards PPM; - Case evidence to reject the position of PPMC as a universally generalizable dynamic capability; and, - Case evidence that extant literature identified learning mechanisms of experience accumulation, knowledge articulation, and knowledge codification are not sufficient to develop PPMC dynamic capability.

Theory Building Contributions	Empirical Advancements
<p>Organizational learning literature</p> <ul style="list-style-type: none"> - Extending the role of triple-loop learning mechanisms to organizational capability development literature; and, - Extending the learning organization mechanisms to study path-dependently developing routines and capability systems. 	<ul style="list-style-type: none"> - Case evidence of how should an organizational system learn capabilities for higher performance outcomes; - Case evidence of the actuation of all three learning mechanisms of a learning organization; and, - Operationalizing triple-loop learning mechanisms to understand organizational development.
<p>Organizational path dependence literature</p>	<ul style="list-style-type: none"> - Case evidence of path dependence as a reversible process.
<p>Research methodology</p>	<ul style="list-style-type: none"> - Increasing retrodution-based methodological applications to the longitudinal case studies of industrial organizations.

The PhD research's discovery of dimensions, routines, and a performance outcome-based capability investigation framework is a valuable addition to the organizational capability literature. This framework appreciates the existence of competing and interdependently developing organizational routines. Meanwhile, the capability dimensions complement each other and effect the development of organizational routines. The framework offers alleviating ever-increasing literature contradictions especially after the inception of dynamic capability conceptualizations. This research addresses this literature distress by extending path dependence as a reversible process, rather than an irreversible inertial state towards diminishing choices for development. In this sense, path dependence offers guiding principles, through contingently actuated mechanisms, for organizational decision-making for future. The reproduction-based capability investigation framework has enabled investigating a relatively complex phenomenon of capability development at the case company.

Extending path dependence as a tri-staged process of capability development leads to recognize that the sources of organizational flexibility to respond to the internal and external environments. Because organizational apprehension of internal and external environment actuates self-reinforcing mechanisms of path dependence. These mechanisms generate contingent outcomes for making, breaking, and reinforcing the capability development paths. Resultantly, organizational capability development paths remain heterogeneous among organizations. Meanwhile, the constituent of capabilities remains idiosyncratic within their details. Most important among the path reinforcing mechanisms, learning organization mechanisms offer decisive role. Dependent on the context specific actuation of these mechanisms, path dependence refers to a source of flexibility or inflexibility to adopt to the changing business environment. Accordingly, this research has developed, an emergent theory, the learning mechanisms based model of capability path dependence.

The research case findings have validated the dimensions, routines, and a performance outcome-based capability investigation framework. It entailed learning the interaction between interdependently developing routines and capabilities within three entities of a single business corporation. Case evidence validated path dependence as a state of flexibility or inflexibility for capability development options. It was due to the capability development context specific actuation of mechanisms that provided positive and negative feedbacks for making, breaking, and reinforcing the paths. Resultantly, the development paths of one literature known organizational capability remained heterogeneous among the three entities of the case company. Consequently, the unified adoption of practices, methods, tools and techniques was not possible, and hence the capability

remained idiosyncratic in its details. The learning mechanisms based model of capability development embarks on these case findings.

This model illuminates the reality of capability development context affected performance outcomes (compare: Collis, 1994). Hence, by elucidating the phenomena of capability path dependence this research depreciates the ubiquitous stance of declaring each literature-known organizational capability as a universally generalizable dynamic capability. Because in real-world settings the capability development process is more important to its generated performance outcomes. However, this research does not reject the existence of organization specific dynamic capabilities. Therefore, it has proposed a dynamic capability investigation framework for a deeper understanding of dynamic capability dimensions and routines. This framework promotes establishing the tripartite schema routines of sensing, seizing, and transforming within the capability dimensions of structures, processes, and people. For example, PPMC as a dynamic capability will also include sensing, seizing, and transforming in the list of constituting routines.

This PhD research has developed an emergent theory of capability development path dependence through the retrodution-based investigation of PPMC development. Such an approach enables a simultaneous development of theory and its empirical validation through the case data. The best practices based deterministic approach has dominated PPM literature. It is already established that maturity model-based best practices restrain the potential performance of organizational resources performing PPMC routines. Contrarily, this PhD research has rendered PPMC dimensions, routines and performance outcomes based investigation framework. This is a novel addition in literature and pursues for a flexible approach towards PPMC development. A detailed description of PPMC dimensions, routines, and performance outcomes is established by synthesizing the extant literature. Meanwhile, literature limitations related to PPM stakeholders, leadership and communication are also identified in this dissertation.

The PPMC investigation framework, a unique contribution to PPM literature was empirically validated at three entities of an industrial organization. Understanding the PPMC development for the management of enterprise-wide portfolios is important. Therefore, Case evidence included PPMC dimensions and routines development for the management of three interdependent project portfolio types (internal development, product & solution, and business project portfolios). The case evidence of path dependently developed PPMC rejects the generalizability of dynamic capabilities across all organizational contexts. The evidence also confirms that PPMC development was heterogenous even inside one business corporation, and hence the PPMC routines remain idiosyncratic in

their details. It was therefore, the literature promoted mechanisms of experience accumulation, knowledge articulation, and knowledge codification are not sufficient to develop PPMC dynamic capability.

Because experience accumulation, knowledge articulation, and knowledge codification is possible with only one learning type, for example, through single-loop learnings. However, this leads to a situation of increasing inertia to adapt to the changing externalities and ultimately capability retrenchments. Contrarily, the context actuation of all three learning mechanisms of single-loop learning, double-loop learning, and triple loop learning guide a sustainable evolution of an organizational capability system. Such an actuation provides opportunities for making, breaking, and reinforcing the capability development paths. This conceptualization of simultaneously actuating learning mechanisms of a learning organization has rarely explicated in the reviewed literature during this PhD research. This literature gap is obvious, especially, in organizational capability literature and PPM literature. Whereas those available studies remained segregated because of their inability to understand the role of organizational capabilities and their interactions within the various parts of an organizational system.

The current PhD research has not only extended organizational learning literature by conceptualizing the aforementioned role of three learning types, however, has further operationalized it through the case data. Illuminating the role of these three learning mechanisms offer innovative insights to understand contingent feedbacks that manifest path dependence as a phenomenon towards short-term as well as long-term capability performances. In fact, the most novel in this vein has been conceptualizing and operationalizing the triple-loop learning to understand capability development path heterogeneity. Earlier literature has been sparse to simultaneously conceptualize and operationalize the role of triple-loop learning in a learning business organization.

Path dependence as a phenomenon towards short-term and long-term performance outcomes shall help in narrowing down the academia's ever-increasing conceptualization of dynamic capabilities. Because path dependence is the only agreed phenomenon amongst the two streams of scholarship believing and not believing in sustainable competitive advantages through a dynamic capability. Scholars insisting on the possibility of short-term competitive advantages seek path dependence as an inertial state with limited choices to develop. The other stream of scholars sees path dependence as a source of stability during change. These scholars see understanding of historical choices as a source of further prosperity, and thus believe in long-term performances leading to

sustainable competitive advantage. This current PhD research has unraveled the conditions that actuate the learning mechanisms responsible for short-term and long-term capability performances. The philosophical positioning of this PhD research has been a critical choice to reach to these underlying conditions.

Critical realism is a relatively newer philosophy in social sciences and its applications to study business organizations are not in abundance. Critical realism purports abduction and retroduction based methodologies. Wherein, the application of abduction based critical realist methodological choices are more frequent. Therefore, this retroduction based longitudinal case study research is a valuable reference for future researchers. Particularly for those who seek reaching to the conditions (context) which generate mechanisms of experienced realities and then theorizing for analytical generalizability. Retroduction necessitates imagining a big picture of mechanisms that can explain the investigated phenomenon. However, developing such a theoretically plausible big picture is considerably demanding especially with real-time data collection in a longitudinal case study.

Herein, a critical realist researcher needs case-specific balance between extending data collection and converging to the most relevant theoretical lens. It is because retroduction brings gradual, however, a continuous clarification to local causality between the events and their underlying mechanisms. Accordingly, researcher's knowledge (researcher's mental models) about the phenomenon increases only gradually. Therefore, a continuous engagement of researcher with the research case is vital. It implies that choosing critical case representing the phenomenon and then seeking the needed data access are important success factors for keeping researcher's morale high.

11.2.2 Implications for practitioners

A real-life example of capability development process at TCA offers greater insights for organizational practitioners because business organizations, through their entrepreneurial managers and leaders (Amit & Shoemaker, 1993; Helfat & Peteraf, 2015; Teece, 1998), ensure that their capabilities maintain the relevance with changes in the operating environment. Organizational efforts to adopt environmental changes and to balance the cost and performance benefits of their capabilities (Winter, 2003) are observed through persistent upgrades or retrenchments (Helfat & Peteraf, 2003). However, without comprehension about capabilities and the interdependency of constituting routines, managers can apprehend the capability development paths only partially and that also in the

short-term. This is especially true when capability development (Collis, 1994) and the underlying mechanisms along their generating structures remain unobservable. By explaining the role of context and actuating mechanisms, this research has attempted to alleviate this gap between the reality of capability development and practitioners' apprehension of it.

Organizational capabilities that develop within, at least, three dimensions of structures, processes, and people, signify the importance of system's thinking. Organizational consciousness about the need for change to one or all capability dimensions and the consequent multi-lateral effects is important. Otherwise, the whole may not be greater than the sum of its parts. This is observable in well-established business organizations. Managers & leaders influencing changes to capability dimensions are usually from distinct functions. For example, HRM assumed a major responsibility for people's dimensions and how the expert functions to take responsibility for developing new organizational processes. However, we know that organizational systems striving for integrative decision-making at various management and leadership level (Scharmer, 2009) develop capabilities with long-term cost effectiveness, and a sustained competitive advantage. A shared vision about capability development context is vital, and managers from all concerned functions and hierarchies should embrace it.

In the absence of a shared vision, organizational capabilities remain as distinct best practices and competences. Routinizing these practices through the knowledge and competences of resources is important for work economics and business profit generation (Nelson & Winter, 1982). However, best practice advocacy in PPM literature, for example, merely appreciates the need for routinizing [essentially, routines have ostensive and performance aspects]. Thus, leadership focus on developing practices, tools and techniques, and training those to organizational resources does not lead to developing high-performance capabilities. By understanding dynamic interaction between the capability dimensions and needed practices, methodologies, tools and techniques, organizational managers and leaders can aim for performing routines. Meanwhile, their capability development efforts shall continue through the refinement, reconfiguration, and transformation.

This PhD research understood the managerial importance of best practice capability maturity models. However, the case findings taught that best practice maturity of a capability does not guarantee superior performance outcomes. Because, the performance of new and existing routines is vital for capability development. Both of these routines perform interdependently and interact dynamically during their renewals. As explained by the interviewed experts, a

prioritized deployment of the developed methodologies and tools and techniques is a managerial challenge. However, knowing that how the action of one resource shall affect the actions of other resources [referred as shared mental models] is also required. Subsequently, accumulating experience, articulating knowledge, and codifying it does not lead to desired performances unless, organizational learning is realized through all three learning mechanisms (single-loop, double-loop, and triple-loop learning). This is in agreement with the guidance of Zollo & Winter (2002, p. 343) who stated that “[knowledge] *codification, like many other things, is likely to produce bad results when done badly.*” Here again, by bringing forth real-life examples, this PhD signifies the importance of system’s thinking which appreciates shared vision and mental models (Senge, 1990) for entrepreneurial managers and leaders (Teece, 2016).

11.3 Limitations and Future Research Directions

Critical realism promotes theory-laden explanations while believing that no single theory in literature can explain a phenomenon completely. Therefore, establishing a logically correct analytical explanation of complex phenomena entailed theoretical pluralism, as it is reflected in the learning mechanisms based model (Figure 30). Then temporal and spatial replications across the case company has certainly increased the quality of analytical generalizability of the research findings too (Eisenhardt & Graebner, 2007; Maxwell, 2012; Langley, 1999; Yin, 2003). Still the claim of accessing the whole reality and explaining the complete phenomenon of capability development has not been made due to the methodological, conceptual, and practical limitations explained in the Chapter 1 (section 1.6). Stating cautiously, the findings of this research could never be absolute because the reality is always in the state of making (Sayer, 2000).

Even acknowledging the critical realist stance that human knowledge about reality and the available resources remain restrained; it is important to reiterate the other known limitations associated with this PhD research, data collection and analysis, and presentation of the research results. For example, data collection included the recording of important events that could have impacted the development of PPMC. However, collecting ‘all those events’ could have not been practically achievable. Similarly, not all identified experts could be interviewed due to their unavailability in the case company, or otherwise refused the request for being interviewed. Still high quality data for contextualizing and connecting strategies of data analysis and reaching to credible explanations was available, however, it was have not been complete. Meanwhile, this analysis of data could be done only for literature-known

dimensions and routines of PPMC. Then limitations associated with the anonymity of the case company and its experts also restrained the presentation of the results.

Therefore, it is important to collect theoretical feedback (compare: Whetten, 1989) on the newly developed emergent theory of path dependence through its applications to other industrial organizations. This theoretical feedback would require testing the learning mechanisms based model for the other organizational capabilities and possibly including the other theoretical lens (identified in section 1.6) to this model too. Along with the invited theoretical feedback two essential extensions to this PhD research are likely in future.

At first, extending the generalized capability investigation framework (Figure 10) to conceptualize a literature-known organizational capability in the role of dynamic capability (Teece, 2007). It has been discussed in literature synthesis chapters that tripartite schema of sensing, seizing, and transforming activities routinize with the other routines of the organizational capability. For example, PPMC in its role as a dynamic capability should include sensing, seizing, and transforming in the list of these routines. Earlier, a conceptual research by Helfat & Winter (2011) also identified that some organizational capabilities may possess a twin-role of ordinary capability as well as dynamic capability. However, only a conceptualization (Figure 11) proposed in this PhD research is not enough. Rather future research should also bring the real-life evidence of development interaction between all capability routines, including sensing, seizing, and transforming. In this regard, the literature lacks synthesis on the ostensive aspect of such sensing, seizing, and transforming routines. Also, the modern literature regards that dynamic capabilities are always organization-specific. Does that imply that the procedural, declarative, and transactive memory component of sensing, seizing, and transforming routines of such a dynamic capability shall also be organization-specific?

A more fundamental challenge, before the routinizing of sensing, seizing, and transforming, is to model the constituents of other literature-known operational capability and the dynamics of these constituents. Separating this fundamental challenge from literature's favorite focus on performance outcomes may, to a noticeable extent, eliminate the literature divergence about dynamic capabilities. This PhD research is an example of such an attempt. By modeling PPMC constituents and then evidencing their interactive development, the impression of a universal generalizability of PPMC was discouraged.

This attempt to model a literature-known organizational capability, PPMC, have also identified few other literature limitations, the needed guidance about PPM stakeholder engagement and leadership, for example. Idealizing the development

of high-performing organizational capabilities requires eliminating such restrictions. Therefore, a related extension of this PhD research can focus on such restrictions. However, it is understandable that developing such an immaculate organizational capability investigation model may remain beyond the cognitive limitation of individual scholars.

The second essential extension to this PhD research entails explaining how an organization-specific dynamic capability controls the development of operational/ordinary capabilities, especially if such a dynamic capability continues its path-dependent development through refinement, reconfiguration, and transformation. Before such evidence of a simultaneously developing operational capabilities and a dynamic capability is available, the validity of dynamic capability framework (see: Teece, 2007) will remain under discussion. Such a future study would also be important to learn how self-reinforcing mechanisms unfold over time and effect both capability types. Because dynamic capabilities remain organization-specific, such a development can be observed in a single case organization. This way, the operating environment changes shall also remain similar (if not same) for both types of organizational capabilities.

This PhD research has evidenced the significance of the business performance context for organizational capabilities. Subsequently, the aforementioned, simultaneous development of organizational capabilities should also evidence the effect of technological breakthroughs, such as using artificial intelligence and digitalization in the core business operations. Ultimately, such technological advancements are disruptive for business value propositions (for example, by extending product offerings with compulsory services). Originally, dynamic capability conceptualization was developed to explain why some organizations perform better than others in disruptively dynamic environments. However, the real-life evidence of such an explanation is yet to be witnessed by academia. The need for such research has recently identified by David Teece (Teece, 2017 [In press]).

Complementing the system's view of a learning organization with another theoretical lens, such as change management process theories (Van De Ven, 1995) offers potential to explain the simultaneous development of dynamic capabilities and operational capabilities. Initial efforts towards theoretically combining learning mechanisms with the organizational evolution processes of variation, selection, and retention already exist (for example, Crossan et al., 2013). Similarly, in explaining such an ideal development of organizational capabilities monitored by one or more dynamic capabilities, understanding the agency related issues (Jensen & Meckling, 1976) shall also be important. Because, the entrepreneurial

and cognitive skills of managers & leaders affect the development of organizational capabilities (Helfat & Peteraf, 2015). Meanwhile, the resource schemas (Danneels, 2011) and their orchestration (Sirmon, 2011) processes offers valid insights for sustaining VRIN resources (Barney, 2011) through dynamic capabilities.

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