Ambidexterity through Project Portfolio Management

Resolving paradoxes in organizations

تحقيق البراعة المؤسسية من خلال إدارة محافظ المشاريع

تحليل و حل التناقضات داخل المؤسسات

by

YACOUB PETRO

A thesis submitted in fulfilment of

the requirements for the degree of

PhD in PROJECT MANAGEMENT

at

The British University in Dubai

Thesis supervisor
Professor Udechukwu Ojiako
June 2017

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ABSTRACT

This thesis aims to build an understanding of how ambidexterity can be achieved in Project Based Organizations (PBOs). Ambidexterity is the organizational ability to simultaneously explore market and exploit knowledge and resources to improve performance and drive through sustainability. This thesis proposes the use of Project Portfolio Management (PPM) practices to show the path to ambidexterity in dynamic, albeit project-based, environments.

This study has significant implications for practitioners and scholars. In that, it proposes taking forward project portfolio management practices to establish a link with ambidexterity. This link can offer new methods for practitioners to enhance the performance of PBOs. Moreover, the theoretical outcome of this study generates the substance of a new paradigm shift in this area. This new shift in paradigm can be used as a foundation by scholars to build on for future studies.

KEY WORDS: Project Based Organizations (PBOs), Project Portfolio Management (PPM), Organizational Ambidexterity, Exploration, Exploitation, Dynamic Capabilities, Small and Medium Size Enterprises (SMEs)

ملخص البحث

تهدف هذه الأطروحة إلى فهم كيفية تحليل و حل التباين و التناقض الداخلي في المؤسسات و الشركات القائمة على إدارة المشاريع. و نُعّرف البراعة المؤسسية في هذه الحالة بالقدرة التنظيمية على استكشاف سوق العمل من فرص واستغلال المعرفة والموارد لتنفيذ هذه الفرص و لتحسين الأداء والقيادة للوصول إلى الاستدامة. و بناءً على ذلك تقترح هذه الأطروحة استخدام ممارسات إدارة محافظ المشاريع لتحقيق البراعة المؤسسية في البيئة الديناميكية القائمة على تنفيذ و إدارة المشاريع.

هذه الدراسة لها آثار هامة على ممارسين المهن، مدراء المشاريع والباحثين. وفي هذا الصدد، تقترح هذه الأطروحة المضي قدما في ممارسات إدارة محافظ المشاريع من أجل تحقيق البراعة المؤسسية. ويمكن لهذا الشأن توفير طرقا جديدة للممارسين و مدراء المشاريع لتعزيز أداء الشركات و المؤسسات. وعلاوة على ذلك، فقد وَلدّت هذه الأطروحة نقلة نوعية جديدة في هذا المجال و توصلّت لبناء نموذج إدارة جديد و من الممكن إستخدام هذا النموذج من قبل العلماء و الباحثين أيضاً للبناء عليه و لفتح مجالات لدراسات مستقبلية أكثر شمولية.

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Preface

Organizational ambidexterity is the ability of an organization to simultaneously explore the market and the surrounding environment, and exploit one's own knowledge base and resources to improve on performance and drive through sustainability. Due to its importance in achieving simultaneous capabilities to efficiently manage today's business challenges and also at the same time have the competency to cope with future business challenges and changes, and the role it plays in both improving on business development, marketing activities, and project delivery, I opted to commission a research project, which was funded by the Project Management Institute (PMI), to understand ambidexterity in greater detail, understand what drives it, and understand what could influence it.

Most of the organizations nowadays are projectified or 'projectized'. It can therefore be safely assumed that everything in the current business world is run through projects. This research hence aims to build an understanding of how ambidexterity can be achieved in the project-based environment, and in particular in Project Based Organizations (PBOs). As the title of this study implies, project portfolio management was proposed here as a standard practice used to show the path to ambidexterity in Project Based Organizations.

This research makes recommendations for organizations, particularly the project-based ones, on the means of applying project portfolio management practices to better achieve ambidexterity. Not only that, the first part of this research carries out a detailed analysis on ambidexterity and generates a comprehensive and detailed definition for what ambidexterity could be and how it could be achieved. This detailed discussion on ambidexterity should ease the reader's way through understanding this organizational capability and its possible relationship with portfolio management.

Researching and studying organizational ambidexterity in this context along with the portfolio management practice took me a total of three years. This period involved conducting extensive studies and research on this subject followed by focused and directed field investigations with the aim to prove the theories generated by this thesis.

Now, since this research has come to an end, I would like to thank all the organizations and colleagues for their participation in the field investigation and their assistance in carrying the message to others to invite them to participate as well. I am also grateful to the Project Management Institute (PMI) that awarded me a research grant which gave me the drive to carry out this research with great determination to get it done with quality and knowledge enhancement in mind. I am also grateful to the other organizations (names cannot be disclosed) that participated heavily and financially to drive the work behind this thesis. I am grateful to my doctoral supervisor for his direction and support in overcoming numerous obstacles I faced through my research. I would also like to thank my fellow doctoral students for their feedback, cooperation and of course friendship.

I would like to thank my friends for accepting nothing less than excellence from me. Last but not least, I would like to thank my family: my wife and my daughters whom I have been distant from during most of the period of this research, and for them supporting me spiritually throughout the writing of this thesis and my life in general.

Profile of the researcher

Yacoub Petro is the Regional Director of Projects and the Commercial Leader for MWH Global Middle East, now part of Stantec. Yacoub enrolled in the project management PhD program at the British University in Dubai to pursue further career development and to grow himself as a researcher to enable him to carry out further studies in similar contemporary and pressing subjects.

Yacoub has considerable years of experience in dealing with projects' delivery and various project management issues relevant to projectized organizations all mixed up with the dynamic and tough market conditions caused by the residuals of the 2008 financial crisis. During his work experience as a project manager, Yacoub has been exposed to various situations which are relevant to the subject of this study. These situations along with the project management issues have encouraged him to find solutions which could create resilience in today's organizations.

In his academic life, and prior to enrolling on the PhD program, Yacoub was awarded his Master's degree in Project Management. He was awarded this degree with distinction for its novel and insightful contribution to designing strategic directions and implementations in Project Based Organizations with a particular focus on leveraging the efficiency of business units. The Master's thesis was well received and published by the International Journal of Project Management, one of the renowned academic journals in the field of project management.

Yacoub is originally a civil engineer and a Chartered Engineer (CEng). He received his CEng from UK's Engineering Council (EC) through the Institute of Engineering and Technology (IET). Apart from leading the project management department of MWH with a Project Management Professional (PMP) hat, he has a passion for structural engineering and used to be the structural design lead in his organization. Working with the professional staff closely Yacoub was able to

create structural design capabilities in his organization, followed by project management capabilities upon leading the project management department for the entire region.

Yacoub's plan after publishing this study is to find ways to apply its outcomes in real-life situations by advising organizations on how to become more sustainable through the application of the simple rules of ambidexterity discussed in the following pages of this thesis. This advisory work may be followed by further developing the models and frameworks suggested herein.

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Abbreviations

ANOVA	ANalysis Of VAriance
APM	The Association of Project Management
APMBOK	Association of Project Management Body Of Knowledge
BD	Business Director
BDM	Business Development Manager
BIM	Building Information Modelling
BU	Business Unit
CEO	Chief Executing Officer
CFA	Confirmatory Factor Analysis
CIOB	Chartered Institute Of Building
COO	Chief Operating Officer
DBO	Design Build Operate
DC	Dynamic Capabilities
DSO	Days Sales Outstanding
EBSCO	Elton Bryson Stephens COpmany
EFQM	European Foundation for Quality Management excellence model
FCM	Financial and Cost Management (FCM)
GCC	Gulf Corporation Council
GIS	Geographic Information System
HC	Human Capital
HR	Human Resources
IC	Intellectual Capital
IM	Integrative Management (APM 2012)
IJPM	International Journal of Project Management
ISRI	Institute for Scrap Recycling Industry
IT	Information Technology
IP	Intellectual Property
JSTOR	Journal STORe
KIF	Knowledge Intensive Firms
KMO	Kaiser-Meyer-Olkin measure of sampling adequacy
KPI	Key Performance Indicator
LR	Literature Review
MEED	Middle East business intelligence magazine
MD	Managing Director

MMA	Multi-Methodological Approaches
NGO	Non-Governmental Organization
NPD	New Product Design
OA	Organizational Ambidexterity
OC	Organization Capital
OGC	Office of Government Commerce
OLS	Ordinary Least Square
OS	Organization Science
TMT	Top Management Team
PC	Project Capabilities
PBO	Project Based Organization
PMBOK	Project Management Body Of Knowledge
PMI	Project Management Institute
PMJ	Project Management Journal
PgMO	Project Management Office
PMO	Program Management Office
PPP	Private Public Partnership
PMIS	Project Management Information System
PMIS	Portfolio Management Information System
PPM	Project Portfolio Management
PRINCE	PRojects IN Controlled Environments
QM	Quality Management
RBV	Resource-Based View
RfP	Request for Proposal
RM	Risk Management
ResM	Resource Management
ROI	Return On Investment
RQ	Research Question
SEI	Software Engineering Institute
SC	Social Capital
SM	Scope Management
ScM	Schedule Management
SME	Small or Medium Enterprise
VIF	Variance Inflation Factor

Executive summary

This thesis aims to build an understanding of how ambidexterity can be achieved in Project Based Organizations (PBOs). Ambidexterity is the organizational ability to simultaneously explore the market and exploit one's own knowledge base and resources to improve performance and drive through sustainability. Ambidexterity has been known to overcome situations and issues which could occur in dynamic environments. This thesis proposes the use of Project Portfolio Management (PPM) as standard practice to show the path to ambidexterity in dynamic, albeit project-based, environments. It does so by providing an answer to the following research questions:

> *RQ 1: What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?*
> *RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?*
> *RQ 3: How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?*

This study generates a comprehensive definition for ambidexterity moving away from the level of abstraction previously used to address this organizational capability. It restructures what ambidexterity looks like and how it should be dealt with in organizations in general and in PBOs in particular. The redefining and restructuring of this organizational capability facilitates understanding ambidexterity and applying it in the context of PBOs. By doing so, the study generates mechanisms which can be used to achieve ambidexterity in organizations in general and in PBOs in particular. Those mechanisms are comparable with known practices, such as the PPM practices, which can be applied to PBOs.

The thesis adopts a unique theoretical perspective to define the underpinning theory. This perspective represents a careful merger of the modern perspective and the postmodern organizational perspective that has been proposed in the literature. This merger suggests the application of a mixed-method research design in defining and proving theory. A qualitative method that adopts the subjective traits of the postmodern perspective is used to develop the theory through the use of multi-case study design and analysis. A quantitative method that takes on the objective traits of the modern perspective is considered to test some of the specificities generated by this theory.

In light of the above, ambidexterity has been redefined and restructured in this thesis to represent the ability of the organization to employ a range of techniques to resolve paradoxical challenges within all levels (separate and interwoven) of the PBO to overcome external competition and dynamics, taking into account internal limiting factors such as size, resource availability and absorptive capacity of the organization.

Subsequently, this study establishes a link between PPM practices as represented by the effectiveness of their application and ambidexterity; it also found a relationship between ambidexterity and performance of organizations in general and performance of projects in PBOs in particular.

This study was conducted in various organizational contexts such as industries and sizes. The study outcomes conferred more importance on achieving ambidexterity in Small and Medium Size Enterprises (SMEs) compared to the other organizational types. Small and Medium Size Enterprises (SMEs) face competitive pressures to pursue exploitation and exploration with the lack of resources they tend to have compared to their larger counterparts. SMEs' lack of resourcing, or

the non-slackness of those resources that they do have, combined with the lack of administrative and hierarchical systems that may help larger firms in managing their conflicting processes (or paradoxes), affect the ambidexterity of the organization.

Moreover, an analysis was carried out in an attempt to create clusters of organizational sizes and/or industries, or a combination of both. However, the study found no real statistical difference between those assumed clusters. The lack of clustering agrees with the research findings – that the achievement of ambidexterity requires the realization of certain processes and the application of certain mechanisms, and that has nothing to do with size or industry.

This study has significant implications for practitioners and scholars in that it proposes taking forward the practices of PPM to establish a link with ambidexterity. This link, once established, can offer new methods for practitioners to enhance the performance of PBOs. Moreover, the theoretical product/outcome of this study extends the theory and applications of ambidexterity and also feeds into the field of portfolio management, its theory, and its applications.

For practitioners, this research provides new means and measures that can be used to assess gaps in organizations, with a particular focus on PBOs. The study suggests ways to bridge those gaps and achieve ambidexterity. Moreover, this new conceptual development in the area of ambidexterity combined with its alignment with PPM practices helps practitioners and managers comprehend the importance and the real influence of this dynamic capability on PBOs, particularly when located in complex and dynamic environments. For scholars, this research provides a new theoretical development in the field of ambidexterity. It also generates the substance of a new paradigm shift in this area of knowledge as indicated in literature. This new shift in paradigm and

the development of a new theoretical framework for ambidexterity can be used as a foundation by scholars to build on for future studies.

Finally, this study offers a new perspective on projects and PPM within the project-based environment. This new perspective solidifies the relationship between operations and projects and PPM in PBOs, an area that is being looked at in recent research.

The study is limited from the perspective of global application in that the empirical data utilized in drawing the study's conclusion was not drawn from a global audience. Moreover, there was no real focus on how organizations in the public and private sectors achieved ambidexterity, or whether ambidexterity mattered in these sectors to the same extent as was shown in the research outcomes for SMEs. This research therefore open doors for future studies to look into this matter and to delve in greater depth into the relationship between SMEs and their organizational ambidexterity.

KEY WORDS: Project Based Organizations (PBOs), Project Portfolio Management (PPM), Organizational Ambidexterity, Exploration, Exploitation, Dynamic Capabilities, Small and Medium Size Enterprises (SMEs)

Chapter 1 Research Summary and Aim

1.1 Introduction

1.1.1 Background and research problem

A recurring theme in the literature is the challenges faced by modern organizations in coping with the various changes affected by dynamic environments (Duncan 1972; Milliken 1987; Teece et al. 1997; Teece 2007; Ambrosini & Bowman 2009; Barreto 2010; Voss & Voss 2013; Birkinshaw et al. 2016; Vahlne & Jonsson 2016). These challenges could be managerial in nature (O'Reilly & Tushman 2008) or operational in nature (Andriopoulos & Lewis 2009; Matthews et al. 2015), or a combination of both. In the face of rapid technological changes for instance, market needs combined with the ever-changing resource requirements and skill sets, require organizations with dynamic capabilities (Barreto 2010; Birkinshaw et al. 2016; Vahlne & Jonsson 2016). Arguably, those dynamic capabilities can be filtered into the notion of *ambidexterity*, with ambidextrous organizations positioned to handle these changes and challenges. In effect, these are organizations which are efficient in meeting today's demands and adaptive in handling changing market conditions (O'Reilly & Tushman 2008; Raisch & Birkinshaw 2008; Chebbi et al. 2015; Jurksiene & Pundziene 2016; Teece et al. 2016). One of the initial discussions on organizational ambidexterity emerged from March's (1991) study on the need of organizations to have simultaneous capabilities of exploitation and exploration to tackle issues arising from the external environment. March's (1991) research on organizational ambidexterity generated a considerable number of studies on inputs, outputs and characteristics of ambidextrous organizations, most of which cite performance of their operations as the focal point of research.

Project Based Organizations (PBOs) could face difficulties in handling dynamic environments due to known rigidities of project management (Ford & Randolph 1992; Hodgson & Cicmil 2007;

Geraldi 2008; Lenfle & Loch 2010; Candi et al. 2013). These rigidities could impede the flexibility needed to manage projects in today's dynamic business and operational environment. It has been recognized that most PBOs could fall short of a holistic view on projects and this may contribute towards these rigidities (Levine 2005). In this regard, the literature suggests that adapting a centralized management of the project management processes, methods, and technologies employed by project managers, better known as Project Portfolio Management (Levine 2005; Thiry & Deguire 2007; Patanakul 2015) could enhance the ambidextrous capabilities that PBOs require to deal with dynamic environments (Lee et al. 2006; Andriopoulos & Lewis 2010; Chandrasekaran et al. 2015). It is suggested therefore in this research that adapting the holistic approach of project portfolio management in PBOs could enable managers to be more efficient in handling the external environment.

Organizational ambidexterity calls for sustainability and yet flexibility in the operation (Gibson & Birkinshaw 2004; Raisch & Birkinshaw 2008; Simsek 2009; Teece et al. 2016; Turner et al. 2015; Tamayo-Torres et al. 2017). Achieving ambidexterity in organizations may not be an easy task, and organizations apply various techniques to achieve such a state (Turner et al. 2015). Among these techniques are structural separation (Lavie et al. 2009) which involves setting up different structural departments to handle exploration and exploitations separately, temporal differentiation (Lavie et al. 2010) which gives the responsibility of exploitation and exploration to a single departmental scope with each of the two functions being handled at different times, and the targeted application of projects and programs (Pellegrinelli et al. 2015); with projects providing more of an exploitation through control, and programs providing more of an exploration through diversity of scope and coverage. The literature is generous with more research that targets other approaches to achieve ambidexterity in the organization (Gibson & Birkinshaw 2004; He & Wong

2004; Venkatraman et al. 2007; Raisch & Birkinshaw 2008; Andriopoulos & Lewis 2009; Simsek 2009). All these approaches try to infuse ambidexterity into the organization and they may all lead to a performance that is envisioned through ambidexterity (Turner et al. 2015) – which leads to the principal of equifinality or internationality in seeing the same solution using various methods (see Eisenhardt & Martin 2000). However, a possible problem that emerges here stems from the *ad hoc* approach which organizations use to achieve an ambidextrous state, particularly in the case of PBOs. This may create inconsistency in the different methods used to achieve the required state of ambidexterity – or an imbalance between exploitation and exploration – which, in turn, may lead to the lack of real performance exhibited by these organizations. An example is the case of BlackBerry. When BlackBerry indulged itself in internal exploitative and sole project management functions and disregarded threats from Apple, this led to the indirect rise of the iPhone (Fingas 2015). While BlackBerry was busy with internal exploitations, Apple managed to achieve this position by carefully balancing between exploration and exploitation to support their current and upcoming projects and their future needs.

To resolve the matter of achieving ambidexterity in project environments, and in reference to O'Reilly and Tushman's (2011) concerns of the lack of real mechanisms needed to achieve ambidexterity, Turner et al. (2013) suggested harnessing the use of Intellectual Capital, as summarized by the Human Capital (HC), the Organization Capital (OC) and the Social Capital (SC) of the organization, to see ambidexterity through. This thesis on the other hand, and in the realm of the different practices and/or the claimed dynamic capabilities and performance of organizations along with business sustainability concerns, proposes the use of project portfolio management (PPM) as a standard practice to establish new mechanisms for ambidexterity in Project Based Organizations. In order to establish such an objective, organizational ambidexterity

is analyzed in this thesis in sufficient detail by way of a systematic review of the literature to understand all its requirements, definitions and applications – to the best of the author's knowledge, this manner of analysis has not been undertaken previously. A comprehensive and a structured definition of ambidexterity will facilitate and enhance the creation and the adoption of these newly claimed practices.

1.1.2 Project summary and research approach

In light of the brief outline of literature in the previous section, this study critically examines organizational ambidexterity through the lens of PPM practices. The thesis seeks to establish a relationship between ambidexterity and PBOs which operate in dynamic environments and, in the process, seeks to evaluate the nature of relationships within the context of organizational events when dealing with internal and external factors within the project-based environment. Achieving this objective requires an assessment and evaluation of these relationships.

The initial choice of research approach entails selecting between inductive (exploratory and/or theory-development) and deductive (explanatory and/or theory-testing) approaches. Barratt et al. (2011) suggested that in making such choices:

- research should always start with a phenomenon, which in this case is organizational ambidexterity and the mechanisms of achieving such a state in the organization, and
- a literature review around this phenomenon.

The second point in Barratt et al. (2011) implies the generation of a theoretical or a conceptual framework when sufficient knowledge is available around the subject under study. This is usually followed by establishing propositions for testing through deduction. However, if sufficient

knowledge was not found around the subject under concern, this calls for a more of an exploratory approach (i.e. induction). Induction in this case would lead into generating new theory.

This research uses an approach that combines deductive and inductive research. The deductive approach was used to decide on variables, constructs and their correlations and regressions, while induction facilitated relevant questions of 'how' and 'why' (Stuart et al. 2002). The deductive approach part of this research resonates with Ketchen et al.'s (1993) comparative research on the various approaches to find the best organizational configurations and their resultant performance. Ketchen et al.'s (1993, p. 1278) research concluded that "deductively defined configurations explained performance better than the inductively defined configurations". This notion underpinned the rationale behind the selection of deduction represented by the quantitative approach to answer performance-related research questions. An inductive approach represented by the qualitative exploration was used to answer questions which require in-depth explanations of organizational events (Handfield & Melnyk 1998; Stuart et al. 2002). The overall approach used in this thesis agrees with a modernist perspective in most of its parts (Hatch & Cunliffe 2013). It also allows postmodernism (Parker 1992; Boje 1995) to take effect through subjectivity. The mix between a modernist perspective (achieved through quantitative approach) and postmodernism (achieved through qualitative approach) allows for triangulating the research results (Jick 1979; Denzin 2012), and this introduces greater reliability to the research outcomes (Denzin 2012).

1.1.3 Sites selection

This research is set within a number of organizations selected from both the private and the public sectors. The private sector was initially selected to facilitate the qualitative data collection due to its perceived ease of access for the researcher (i.e. conducting interviews for example). A quantitative study covered areas and investigated the two sectors in order to enhance the

generalizability of the results by accessing data from both sectors which was not otherwise possible through the qualitative data collection (Holsti 1969; Lincoln & Guba 1985). Secondly, and due to the realized differences between the private and the public sectors in defining organizational configurations (Mercer 1991; Boyne 2002; Van der Wal et al. 2008), this study created clusters for data collection so that findings from the public sector can be compared with and distinguished from data collected from the private sector (Boyne 2002; Jung 2014) – conclusions gathered from the data analysis on this part are presented in the discussions chapter.

Several organizations were approached to conduct the qualitative and the quantitative investigations. Prior to formalizing and finalizing the field survey questionnaire relevant to the quantitative part of this investigation, or the semi-structured questions relevant to the qualitative part, an extensive and a systematic literature review was conducted to help determine the research variables and the probable relationships, after which interview sessions were conducted as part of the qualitative approach. The qualitative approach used in this thesis consisted of investigations through the use of case studies. Semi-structured questions were prepared based on the outcomes of the literature review and the inspection of the research variables to systematically investigate those cases. As per the suggestions of Sandberg (2000) along with Handfield and Melnyk's (1998) recommendations, 12 case studies were selected with each case representing one study organization from countries distributed all over the Middle East.

While conducting and finalizing these interviews for those selected case studies, the questionnaire was revised to take into account comments from the analysis as it progressed; also, a final touch was added to the field survey questionnaire for the quantitative study. A total of 160 responses were collected from various organizations which offer services in dynamic and project-based environments and used for the quantitative study analysis. The number of collected responses

facilitated the production of a statistically viable size which corresponds to methodologies with proven and realistic results in social sciences research (Verma & Goodale 1995; Forza 2002). The aim of the survey was to gather readings from each firm's various organizational levels to establish reliability of the study variables. The quantitative analysis of the collected survey questionnaire was carried out in accordance with guidelines set out in the methodology chapter.

Post the quantitative analysis, both the outcomes of the qualitative and the quantitative research components were assessed for comparison and cross-verification purposes as part of a triangulation exercise to ascertain more reliability for the research results (Denzin 2012).

1.1.4 Research questions

In light of the above introduction, it can be observed that achieving an ambidextrous state in PBOs arms them (the PBOs) against the vagaries of a dynamic project environment. At the heart of organizational ambidexterity is its ability to run simultaneous (or balanced) explorative and exploitative functions (Birkinshaw et al. 2016) which this thesis argues could be achieved through the application of sound PPM practices. The predominant approach in applying PPM practices has its conceptual roots in the project management theory (Patanakul 2015). However, and prior to carrying out investigations into creating or adopting any such practices to achieve ambidexterity, ambidexterity in the project management context shall be investigated and defined in more details. This may entail an extensive literature review on this construct to create a more comprehensive and structured definition for it. Such a comprehensive research on ambidexterity in this context shall act as a foundation for this research moving forward. Therefore, and based on this contention, the first research question to be addressed in this study is:

RQ 1: What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?

This research question, being tied to project management in general and to organizational ambidexterity in particular, is researched and answered through conducting a systematic review of the literature. Recent literature on organizational ambidexterity is rich (O'Reilly & Tushman 2008; Raisch & Birkinshaw 2008; Smisek 2009; Tamayo-Torres et al. 2017), but not in relation to, or specifically about, project management (Pellegrinelli et al. 2015). Also to the best of the author's knowledge, no research has provided a complete or comprehensive definition for ambidexterity in such a way that could facilitate the creation of mechanisms or practices to see it through (O'Reilly & Tushman 2008; Turner et al. 2013). On the other hand, literature on projects and PPM is invariably rich and covers many aspects that are relevant to organization theory and organizational structure (Gobeli & Larson 1985; Gray et al. 1990; Turner & Keegan 1999; Turner & Keegan 2001; Thiry & Dequire 2007; Lechler & Dvir 2010). This implies that prior to establishing such a link between these two areas of knowledge, literature reviews and definitions shall be aligned.

Having addressed what organizational ambidexterity is and how it can be defined within the context of Project Based Organizations (PBOs), our next interest is to investigate the mechanisms required to be applied in organizations to see ambidexterity through. This forms the basis of the second research question which moves from the creation of a comprehensive definition of ambidexterity for its later application to inject a layer of specificity into the study variables and constructs. The second research question is therefore as follows:

RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?

The review of literature on organizational ambidexterity generated some important relationships. For instance, researchers such as Gibson and Birkinshaw (2004), He and Wong (2004), Lubatkin et al. (2006) and Venkatraman et al. (2007) have established relationships between organizational ambidexterity and business performance. On the other hand, studies on PPM and business performance were not explicitly found in the literature, though it was implied that a PBO would benefit from the successful application of PPM practices (Martinsuo & Lehtonen 2007; Voss 2012; Voss & Kock 2012; Beringer 2013; Teller & Kock 2013; Patanakul 2015; Petro & Gardiner 2015). It is not the intention of this thesis to reprove or re-establish the linkage between ambidexterity and performance, or portfolio management and performance or business success. The intention behind this research, as is articulated in the third research question, is to highlight the significance this research has in supporting performance by linking the practices of project portfolio management to organizational ambidexterity to see if the latter can act as a vehicle to carry those mechanisms of ambidexterity within. Therefore, based on this contention, the third research question highlights the direct relationship between ambidexterity and PPM, as follows:

RQ 3: How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?

It is to be noted here that ambidexterity is an organizational characteristic, a state or a capability (Chandrasekarana et al. 2012), any of which can be achieved via different routes. Some studies discuss achieving ambidexterity via the application of innovation strategies being incremental in some cases or radical in others (Jansen et al. 2005; O'Reilly & Tushman 2008; Simsek 2009). Others linked the application of programs to exploratory traits and projects to the exploitative ones (Pellegrinelli et al. 2015). Mom et al. (2007) established a link between the type and direction of knowledge flows in the various organizational layers and the ability of the organization to

becoming ambidextrous. Lubatkin et al. (2006) linked it to the traits and behaviours of the management team. Lavie et al. (2010) talked about the various organizational structures and their means to achieve ambidexterity; in their research they described the following routes to ambidexterity: contextual, organizational, temporal, and domain separation. Turner et al. (2013) used the Intellectual Capital of the organization to propose micro-mechanisms for achieving ambidexterity. This study on the other hand comes with a new proposition to find better practices and solutions that can help see ambidexterity through in organizations, and it links ambidexterity with portfolio management.

1.1.5 Specific aims

This thesis aims to build an understanding of how ambidexterity can be achieved in Project Based Organizations (PBOs). To achieve this, the study suggests to uncover the structure and complexities that these organizational traits and practices may bring about to knowledge and the academic literature. The thesis touches on the relationships between portfolio practices and organizational traits, and investigates correlations and indirect effects on performance.

Based on the aim of the thesis as mentioned above, below are the accompanying specific objectives:

- Review the concept of ambidexterity in order to generate understanding, and review the ambidextrous characteristics of PBOs;
- Examine and identify the range of mechanisms needed to support PBOs in developing ambidextrous capabilities;
- Assess the ability and readiness of PPM practices to support ambidexterity in PBOs.

The rationale behind using project management theory in general and project portfolio management practices (PPM) in particular to define ambidexterity stems from the perceived theoretical connections between the two areas of knowledge (i.e. Ambidexterity and PPM). In this content, an ambidextrous status of an organization refers to its ability to shift between two "perpendicular" functions with dexterity (Gibson & Birkinshaw 2004), while PPM practices vote for allocating resources appropriately to serve the various needs of projects and the operations (Levine 2005). Hence, the optimum selection and allocation of resources becomes of utmost importance to achieve and maintain such an organizational state. On the other hand, PPM interacts heavily with operations and the operational budget and that comprises allocating and reallocating resources to projects, programs, portfolios and the operation. Resources allocation and reallocation reflects the organization's ability in pursuing new investments on one hand, and getting the job done on the other hand. The governance of a portfolio is established by a body that makes decisions about "investment priorities [i.e. exploration functions] for the portfolio, and ensure[s] portfolio management processes are followed to sustain the organization [i.e. exploitation functions]" (PMI 2013c, p.5). Consequently, it is rational to consider here that the effectiveness of PPM practices and applications has a direct effect on organizational ambidexterity as governance aligns strategic directions to internal requirements and external needs (Patanakul et al. 2013).

The above information along with a concise summary of the entire research structure and its intended outcome and theory are summarized in a research map presented in Table 1-1.

Table 1-1. Research map

Research Aim (Purpose)	Research Problem	Research Objectives	Research Questions	Research Rationale	Research Structure	Underlying Theory
This study aims at understanding and explaining how ambidexterity can be achieved in Project Based Organizations (PBOs) through the application of project portfolio management (PPM) practices. In effect, the study is interested in the structure and complexities that organizational traits and practices may draw upon to achieve ambidexterity. The study also explores correlations and effects on performance.	The problem that could be evident here stems from the *ad hoc* approach which PBOs use to achieve an ambidextrous state. This may create inconsistency in the different methods used to achieve the required state of ambidexterity – or an imbalance between exploitation and exploration – which, in turn, may lead to the lack of real projects and business performance.	**First**: Provide a systematic review on the concept of ambidexterity in order to generate understanding, and review the ambidextrous characteristics of PBOs.	**RQ 1:** What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?	The rationale behind the use of PPM practices to define ambidexterity stems from the similar theoretical relationships they have with the challenges that are relevant to working in a dynamic environment (Raisch & Birkinshaw 2008; Simsek 2009; Patanakul 2015). Portfolio management interacts heavily with operations and the operational budget, which involves allocating and reallocating resources to projects, programs, portfolios and the operation. Resources allocation and reallocation reflects the organization's ability to pursue new investments on one hand, and meet targets on the other hand. It could therefore be rational to postulate that the effectiveness of PPM will have an effect on organizational ambidexterity (Patanakul 2015).	This research is partly conceptual in essence as it builds its knowledge from a systematic review of the literature prior to forming its conceptual framework. Knowledge gained from this review is used to articulate a conceptual framework and a methodology for investigation and analysis. The research presents the problem as stated in this section and table and then reviews the literature to support the reader in understanding all the constituent components of the problem (i.e. it explains what ambidexterity is and why it is important; also it explains what PPM is and why it is important). After that, the research answers part of the problem by carrying out a systematic review of the literature. It takes knowledge from that to articulate the conceptual framework which points towards the direction of how the rest of the problem is being addressed and resolved.	The thesis adopts a unique theoretical perspective to define the underpinning theory. This perspective represents a careful merger of the modern perspective and the postmodern organizational perspective proposed by Hatch and Cunliffe (2013). This merger suggests the application of a mixed-method research design in defining and proving theory (Denzin, 2012). A qualitative method that adopts the subjective traits of the postmodern perspective is used to develop the theory through the use of multi-case study design and analysis. A quantitative method that takes on the objective traits of the modern perspective is considered to test some of the specificities generated by this theory.
		Second: Examine and identify the range of mechanisms needed to support PBOs in developing ambidextrous capabilities.	**RQ 2:** What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?			
		Third: Assess the ability and readiness of PPM practices to support ambidexterity in PBOs.	**RQ 3:** How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?			

1.2 Contribution to knowledge

Research has shown that ambidextrous organizations would invariably experience enhanced organizational performance (Gibson & Birkinshaw 2004), projects performance (Serrador & Turner 2015), firm profits (He & Wong 2004; Venkatraman et al. 2007) and firm sustainability (Simsek 2009; Tamayo-Torres et al. 2017). This has been demonstrated in a number of both quantitative studies (Gibson & Birkinshaw 2004; He & Wong 2004; Venkatraman et al. 2007) and qualitative research (Andriopoulos & Lewis 2009). Taking ambidexterity into perspective, and considering ambidexterity as a state that organizations would like to achieve or a competency which organizations would like to have (Chandrasekaran et al. 2012), this thesis proposes integrating knowledge on ambidexterity developed in organizational behaviour literature into the project management discipline by bringing forward the PPM practices. This relationship, once established, will provide a new path for practitioners to consider when looking at new methods to enhance the performance of PBOs and, in the process, arguably contributes to the project management research agenda that seeks to "offer alternative perspectives on projects, project management and project success or outlining how the field is broadening beyond its current limits" (Svejvig & Andersen 2015, p. 283).

Since March (1991) and Duncan (1976) published their research on organizational ambidexterity, scholars have tried to define and discern ambidexterity further. Some of those scholars looked into the benefits of organizational ambidexterity and its effect on the outcomes of the ambidextrous organization (Raisch & Birkinshaw 2008; Simsek 2009). Others theorized how ambidexterity can be achieved on account of innovation (Jansen et al. 2006; Andriopoulos & Lewis 2009), or be reflected in the behaviour and attitude of employees (Gibson & Birkinshaw 2004) and top management (Lubatkin et al. 2006). The role of human capital (Hess & Rothaermel 2008; Turner

et al. 2013) and the use of projects and programs (Pellegrinelli et al. 2015) were also looked at. Little or no research was found in the literature which theorized or established a relationship between portfolio management and ambidexterity. In this regard, this study may be viewed as unique as, to the best of the author's knowledge, it is the first to tread the path to creating and testing such a theory. This theory could have a significant impact on knowledge and the academia due to some of the novelty it brings to the field of study.

1.3 Thesis structure

Figure 1-1 presents an overview of the remaining sections of this thesis. Chapter 1 was the research introductory chapter and that is followed by the literature review in Chapter 2. This literature review chapter includes a conceptual build-up for a comprehensive definition of ambidexterity. This build-up is accompanied by a review on the application of ambidexterity to the project-based environment. The literature review links the ongoing discourse on ambidexterity with a hierarchy of authority in the organization in a way which facilitates its integration with project and portfolio management.

In Chapter 3 a conceptual framework is presented which uses the build-up of the literature and the conclusion of the systematic review of it. In Chapter 4, the research presents a detailed discussion on research methodology. It starts off with a detailed discussion on methodologies and means for selecting the needed method of research. Chapter 5 gathers the results and the outcomes from the qualitative and quantitative research. Chapter 6 discusses the results presented in Chapter 5 and links those back to the literature review and the rest of this thesis. Chapter 7 concludes and provides a summary of the recommendations and implications of the research, its limitation and any directions for future studies. Figure 1-1 below provided a graphical representation for the intended progress of this thesis.

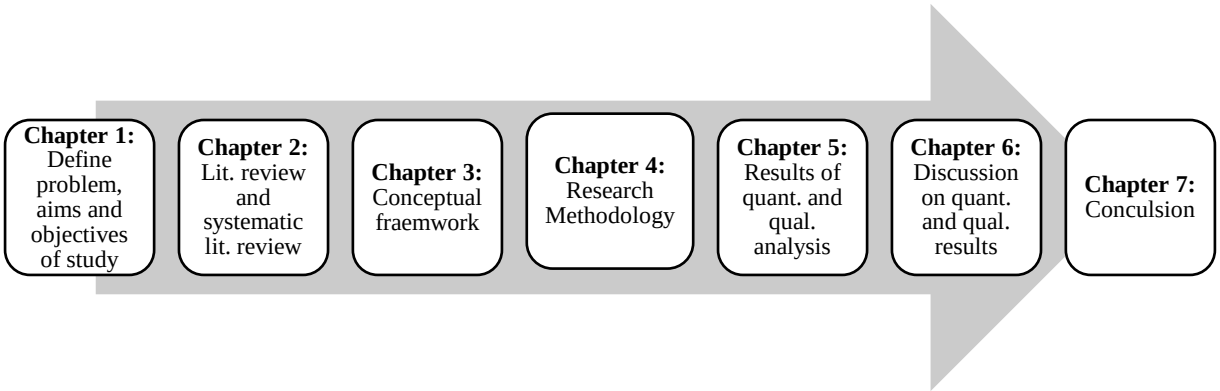

Figure 1-1. Proposed progression of thesis

Chapter 2 Literature review

2.1 Introduction

Drawing from Tranfield et al. (2003) and Rowley and Slack (2004), the aim of this chapter is to undertake a review of the literature and in the process present a synopsis of the subject field that supports the main theories that underpin this study, namely (i) ambidexterity and (ii) project portfolio management and (iii) Project Based Organizational theory. In the process, the literature review will serve as "…a summary of a subject field that supports the identification of specific research questions" (Rowley and Slack, 2004, p. 31).

The first two sections explain organizational ambidexterity in sufficient detail. The terminology "ambidexterity" may not be so common a terminology amongst casual business readers, project management practitioners or even scholars. This research aims not to enhance knowledge of just the scholarly body; it targets practitioners and it aims to benefit the practice of project management and PPM as well. It is therefore important to bring all readers to a similar level of understanding when it comes to discussing one of the major elements of this study. Scholars and practitioners who are knowledgeable about this terminology may skip the next two sections.

Section 2.4 carries out an extensive and a systematic literature review on ambidexterity. The aim is to answer the first research question – to provide a comprehensive definition for ambidexterity. This section therefore uses taxonomical analysis on literature collected since the 1990s with 2017 as a cut-off year to conclude with part of the foundational results presented in this chapter. These results are used throughout this study. Section 2.5 complements the systematic review of the literature and extends it from the theory of paradox revealing various types of tensions in organizations, part of which could contribute to their ambidexterity when resolved virtuously.

Section 2.6 introduces and reviews the literature on Project Based Organizations, their functions and their operations. It then covers their dynamic and project capabilities giving way to their ambidexterity (Turner et al. 2016). Section 2.7 introduces and then analyzes portfolio management practices, their context and their relevance to ambidexterity. The study uses PMI portfolio standards which are internationally known and the most commonly used and links them with the outcome of the systematic literature review and the rest of the research. The study does not disregard the importance of other standards such as APM or CIOB and they are considered in the relevant sections of this thesis.

2.2 Demistifying ambidexterity

2.2.1 Purpose

In this section, ambidexterity is explained in more detail, from its origin to its current consideration in scholarly research. First, ambidexterity and its functions which are "exploitation" and "exploration" are explained. The section then moves on to explaining why organizations chase either exploration or exploitation, or both, and why that is important. It then explains the routes to ambidexterity.

2.2.2 What is ambidexterity – explaining exloration and exploitation

In a seminal article published in 1991, James March published his research on organizational ambidexterity basing his studies on Duncan's (1976) earlier publication on the same subject. Duncan was one of the pioneers in organizational studies, and it was he who coined this terminology. March (1991) published the first systematic study on organizational ambidexterity following on from Duncan's (1976) work which puts him at the forefront of organizational configuration intellectual studies. March's work on ambidexterity was cited more than 15,000 times as of the date of preparing this thesis.

Ambidexterity is defined in The Concise English Dictionary (2004) as "unusual cleverness", or the ability to be "two sided, using both hands with equal facility". This definition when superimposed on organizational sciences implies cleverness of organizations in using their own functions with "equal facility". Exploitation is one organizational function that allows the organization to exploit and use its own knowledge base to implement, deliver and benefit from their own backlog or work to justify their own existence (March 1991; O'Reilly & Tushman 2008). Exploration on the other hand is a second organizational function that permits the organization to expand, look abroad and invest in the future to sustain and infuse trust in the current operation

while justifying their continuity (March 1991; O'Reilly & Tushman 2008). These two functions, as argued by Gibson and Birkinshaw (2004), act in perpendicularity to each other's direction, thus deeming organizations that can successfully exploit them simultaneously as ambidextrous.

Following on March's (1991) earlier research, where he generally described the intentions behind exploration and exploitation, Levinthal and March's (1993) research came into play to set some boundaries to this description and by that they linked both functions to the perception of knowledge capture and learning. They linked for instance exploration to the "pursuit of new knowledge", considering such pursuit a future investment. On the other hand, they attached exploitation to the "use and development of things already known" (Levinthal & March 1993, p.105). Hence, exploration infers variations and big jumps in knowledge – similar to radical innovation, and exploitation calls for the use of existing knowledge with logical and structured variations to the existing knowledge base – similar to incremental innovation (He & Wong 2004).

The distinction between both organizational functions – *exploitation* and *exploration* – has not been so clear and in some cases it triggered a matter of relativity or relatedness to the organization (Lavie et al. 2010). Exploration in some organizations may be viewed as exploitation in others which is a matter of market understanding or perception (Bednarek et al. 2016). On the other hand, exploitation may be viewed as exploration in other organizations which could be a matter of organizational capability (Birkinshaw et al. 2016). This relatively new understanding for the two functions places them on a continuum with each function pointing different ways (Gibson & Birkinshaw 2004; Raisch & Birkinshaw 2008) – this understanding contradicts Gupta et al.'s (2006) notion of "orthogonality" or "perpendicularity" which means that the two functions are perpendicular to each other and cannot exist in one organization simultaneously. The pulling force that each of those vectors assumes can hypothetically determine the degree by which the

organization tries to strategically enforce any of the functions. For example, Apple's continuous new products breakthroughs recognize the company's willingness to invest in exploration and the extent of the force they apply in that direction. On the other hand, Apple's continuous improvement to their existing products in making them more efficient and reliable reflects the company's pulling force towards exploitation. In the context of Apple and the market they have acquired, a new company that tries to enter Apple's market will have to pull hard in the exploration direction rather than in the exploitation direction; once they are successful, they would ease up on the exploration and balance it out with more exploitation. A similar situation occurred when Apple entered the telecommunication market as can be seen from the rise and the fall of the BlackBerry brand. When Blackberry disregarded threats of the iPhone and eased up on exploration, this caused the rise of the iPhone (Fingas 2015). Apple managed to attain this position by carefully balancing out between exploration and exploitation.

The above contention indicates that successful organizations should strive to have a carefully calculated balance between exploration and exploitation (Chebbi et al. 2015). An exploration effort, when successful, would spill over into the exploitation function (Chandrasekaran et al. 2015). An exploitation function would build on the organizational resources and capabilities to allow them to seek further exploration. Figure 2-1 depicts a graphical representation of the association between the two functions as explained above.

The figure denotes that exploration in this context would bring in opportunities, while exploiting these opportunities using company resources would bring in income; this income can then be used to further explore new opportunities. Careful and timely considerations of both functions would keep the ball rolling for the organization and infuse sustainability into its operations.

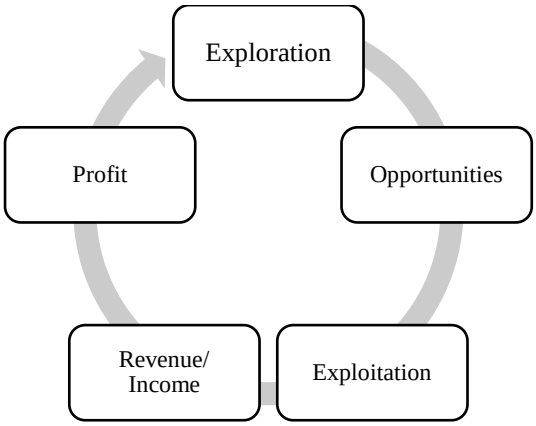

Figure 2-1. Association between exploration and exploitation (source Lavie et al. 2010)

2.2.3 Why ambidexterity – exploration or exploitation

2.2.3.1 The exploration exploitation race

Upon deciding on strategic directions, organizations would set out towards investing in exploitation or exploration or both; the degree of which would be governed by market needs and organizational capabilities. Allocation of resources to these two functions would dictate the intensity the organization would like to throw at either of the directions (Lavie et al. 2010). More resources directed at exploratory activities marks the organization as flexible, and emphasizes its willingness to accept changes (Lewin et al. 1999); which would support it preparedness for the future. On the other hand, direction of resources to exploitative activities denotes the organization as stable and one that would not readily accept changes (Cao et al. 2009).

The above discussion on resources allocation assumes that both exploration and exploitation can be applied in various intensities – intensities which would convert the organization from being flexible at one end, to being inflexible and stable at the other end (Cao et al. 2009). Revisiting the example of Apple overtaking BlackBerry due to exploratory focus from the Macintosh side (Grossman 2007; Duhigg & Bradsher 2012), one can explain the same situation by considering a

deliberate change of resources allocation and their focus (Cao et al. 2009; Koen et al. 2011). Macintosh for instance may have had the capability to overcome such competition with a slight variation to their resources focus. An incremental change to the knowledge base may be viewed as exploitation of Apple's resources rather than full-force exploration as was assumed the first instance this example was presented – i.e. lower intensity exploration in combination with high-intensity exploitation (De Oliveira & Werther 2013; Turner & Kutsch 2016). This variation on explaining Apple's example, and the contention of varying intensities between both exploration and exploitation, assumes that a tensile force acts from within the exploration/exploitation continuum. In such a case Apple claimed their status in the market with the application of their *iTunes*™ "disruptive innovation" (Chiaroni et al. 2016). This tension, if not balanced properly may weaken organizational capabilities to shift, balance or trade-off between the two organizational functions (Sorensen & Stuart 2000; Alblas & Jayaram, 2015).

Performing organizations can manage to adopt both functions simultaneously (Katila & Ahuja 2002; Knott 2002). It is argued that their ability to overcome this tension and tame it towards their own benefits stems from the capability of their senior management team (Katila & Ahuja 2002). Organizations which perform on one side of the exploration/exploitation continuum while neglecting the other side may face tremendous drawbacks in performance (Gibson & Birkinshaw 2004) due to an imbalance in their investment profile versus their delivery capability (Raisch & Birkinshaw 2008; Lavie et al. 2010).

In light of the above, it has been assumed that exploration and exploitation could not be overly separated and hence are "inseparable" as described by Flyod and Lane (2000). In line with this argument, a measure was proposed to capture the value of organizational ambidexterity. He and Wong (2004), for instance, measured organizational ambidexterity by calculating the relative

difference between calculated values for exploration and for exploitation. Gibson and Birkinshaw (2004) used a multiplication function between both to arrive at the same purpose, whereas Lubatkin (2006) proposed combining them. Lubatkin (2006) conducted a comparative study between the three methods of measuring ambidexterity to find that the "additive" method was superior as it managed to produce a better simulation of reality.

2.2.3.2 Exploration or exploitation

This subsection covers the race that has emerged between exploration and exploitation and explains why organizations favor exploration versus exploitation, or vice versa, or both in varying degrees of intensity. The subsection sheds some light on the factors or antecedents which could lead them to take some or all of these decisions.

One of the factors discussed at the onset of this chapter is the dynamism of the environment and its relevance to ambidexterity. A dynamic business environment tends to infuse uncertainty into the market, which in turn would be reflected in the operational side for those organizations that operate from within. Similarly, at the cost of sounding repetitive, a dynamic project environment tends to infuse uncertainty into projects, which in turn would be reflected in the operational side for PBOs that are implementing those projects. Dynamic environments drive unpredictable changes in the market represented by changing technologies, customer tastes or changes in supply and demand (Dess & Beard 1984). Lant and Mezias' (1992) model, by which they simulated organizational learning functions, ascertained that companies would inject more resources into exploratory activities in uncertain market conditions. The intensity of such exploratory activities would vary with the frequency and scale of the environmental turbulence (Kim & Rhee 2009). On the other hand, Lant and Mezias's (1992) model showed that resources injected into exploitative activities would best suit a stable environment.

Under the environmental factors, Lavie et al. (2010) added: “exogenous shocks” denoting sudden and unexpected changes in environmental factors deeming exploration as a must, “competitive intensity” which refers to the severity of attacks from the surrounding competition rendering resources insufficient and market shares as slim; hence, the need for more exploratory activities to capture more of the market, and “appropriability regime” which could render exploratory activities obsolete when governments weaken protection against Intellectual Property (IP) rights.

Other factors which could determine the drive towards exploration or exploitation are relevant to the organization (including PBOs) itself. The organization’s absorptive capacity for instance enhances the organization’s capability in exploratory activities, which capability is nurtured by continuous improvements in organizational learning and the familiarization with its own knowledge base – that in its turn leads to improvement in its intra-unit communications (Rosenkopf & Nerkar 2001). Excess resources – or what both Nohira and Gulati (1996) and Lavie et al. (2010) refer to as “slack resources” – in the organization can be applied to exploratory activities and radical innovation due to the fact that they are slack. However, Lavie et al. (2010) claim that such resources may not have the same drive or motivation the other resources may have due to the fact that they are slack. Moreover, slack or extra resources may not carry the skills set required to drive exploration.

The organizational structure, or the design of the organization, has an effect on the operative use of exploration and exploitation. A mechanistic structure for instance reflects centralization and is associated with more rules and processes’ standardizations. Such a design might not be effective in a dynamic environment (Banner & Gagne 1995; Robbins & Judge 2001), hence it may not be successful in exploration (Lavie et al. 2010). The organic structure on the other hand provides a less rigid entity, where decentralization is possible, and innovation would work best in such an

organizational design. Such a design would be ideal to operate in a dynamic environment and be productive in exploration (Burns & Wholey 1993; Banner & Gagne, 1995; Robbins & Judge 2001).

The design of the organization depends on many factors, which shall be taken into account when thinking about ambidexterity:

(1) Banner and Gagne (1995) and Robbins and Judge (2001) linked the design of any organization to the *dynamism of the environment* – as contested above; a dynamic environment would require a more organic type of structure to make it more effective;

(2) the *size of the organization* determines its design as well – being larger in size requires a mechanistic structure with more of a rigid standardization for rules – contrary to this alleged misconception, Beckman et al. (2004) and Rothaermel and Deeds (2004) arrived at two different conclusions when linking size to ambidexterity;

(3) the *type of technology* being dealt with by the organization – the more complex the technology being handled by the organization the more need for the organic flexibility;

(4) the *cluster of powers and the cultural background* of the organization have a major say in determining its resultant design; and finally

(5) the *strategy* and the *strategic direction* determines which design the organization would use.

Hence, and in reference to those factors and their relevance to ambidexterity, the research has so far assumed that successful organizations shall carry characteristics from both of the designs (mechanistic and organic), and that these characteristics shall be harnessed to serve ambidexterity.

Researchers such as Ford and Ford (1994) and Lewis (2000) claimed that this may not be possible though. On the other hand, Gibson and Birkinshaw (2004) opposed this contention; their research instead advised a certain structural design produced by applying organizational contexts to the two structural characteristics. In their research on organizational ambidexterity, they used Ghoshal and Bartlett's (1994) concept of organizational discipline, stretch, trust and support to create what they termed 'contextual' ambidexterity. They claimed that organizations can achieve an ambidextrous status using this concept.

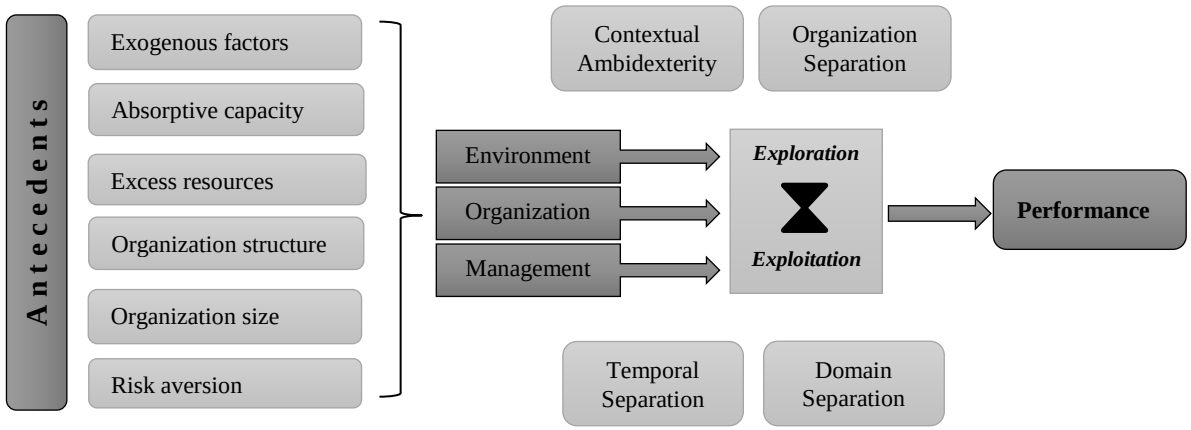

Figure 2-2. A Framework for exploration and exploitation (source Lavie et al. 2010)

Figure 2-2 represents a general framework inspired by Lavie et al. (2010) which explains antecedents of exploration and exploitation. From the framework, one can see the many factors which can affect the decision to exploit or explore – which decision would feed into the tension created between the two organizational functions. Balancing this tension should generate better performance. However, organizations may opt to side towards the less risky option of exploitation, become experienced in it, and consequently think they are in fact performing. These organizations would probably achieve a short-term imbalanced performance, but without balancing that out with

future directions to feed into its pipeline, the wrongly claimed performance would soon lead to the organization's downfall (O'Reilly & Tushman 2008).

2.2.3.3 The performance contest

Continuing from the previous section, the implications for performance as a conclusion from the discussions on the literature can be noted. A short-term performance for instance was linked to exploitation whereas a long-term performance was found to be attached to organizational skills and capabilities in exploration. It has been argued in extant research that performing in both exploration and exploitation at the same time would not bring anything more than a mediocre performance due to an unfocused pursuit, which Wernerfelt and Montgomery (1988) pointed to as an imbalance in "internal consistency". Nevertheless, fairly recent empirical research suggested otherwise (Gibson & Birkinshaw 2004; He & Wong 2004; Lubatkin et al. 2006; Venkatraman et al. 2007).

Several studies have suggested that organizations which pursue both exploration and exploitation simultaneously would exhibit better performance than those that do not. Figure 2-1 presented how the two functions are intertwined, which implies that any attempt to break – or infuse disproportionality to – this relationship would harm the 'now' and 'then'. On this note, Raisch and Birkinshaw (2009, p.392) suggested that firms which invest more in exploration may risk becoming "trapped in an endless downward cycle of search, failure and unrewarding change", whereas those firms which direct more focus to exploitation may achieve good but "not necessarily sustainable results". Floyd and Lane (2000, p.155), on this note also, suggested that an organization should "exploit existing competencies and explore new ones – and more importantly, that these two facets of organizational learning are inseparable".

The above belief on performance requirements to balancing exploration and exploitation in organizations raises questions such as: How much exploitation should counter balance the exploration activities, and vice versa? What factors decide on this proportional mix, and what is the intensity of performance produced by those different mixes? It is to be noted here that the research has not produced enough reliable mechanisms that can be used to achieve ambidexterity with (Turner et al. 2013), or even sufficient enough to be used to balance between exploration and exploitation (Lavie et al. 2010).

The answer to the aforementioned questions is positive as confirmed by various empirical studies and by applying research rationale (Lavie et al. 2010). Although the number of empirical studies on this subject is slim as claimed by various researchers such as Gibson and Birkinshaw (2004) and Raisch and Birkinshaw (2009), these studies can still be viewed as a measure of and an indication about future research implying a level of positivity in this regard. To this note, studies such as O'Reilly and Tushman (2008) and Kim and Rhee (2009) confirmed that the intensity and variability of application for those two organizational functions is dependent on the dynamism of the market. Performing organizations should be able to measure market uncertainty to tweak and vary the application of exploration and exploitation using resource allocations as a capability. Some organizations try to create separate business units and physically separate between both of the functions so that each capability is grown in its own incubator. Venkatraman et al. (2007) on the other hand claimed that working on both of the functions within one business unit and in concurrence would result in negative performance outcomes. Large organizations operate in an opposite direction and they believe they can better perform with no separation due to their size which breeds flexibility (Lavie et al. 2010). Lavie et al. (2010) believe that separating exploration

and exploitation across domains would be more beneficial in terms of enhancing their economic returns since this eliminates overheads arising from trade-offs and allocation management.

2.2.4 How to become ambidextrous – routes to ambidexterity

This section addresses the structural and organizational means that organizations employ to achieve an ambidextrous status. Four structural routes to ambidexterity are discussed here; their origin and benefits of use are highlighted:

(1) *contextual ambidexterity* assumes simultaneously achieving exploration and exploitation functions in the organization;

(2) *organizational separation* assumes two business units operating in the organization, one for exploration and another for exploitation;

(3) *temporal separation* assumes exploration and exploitation are carried out within the same business unit but in different tempos or times; and

(4) *domain separation* assumes exploration activities are carried out by one domain while exploitation is carried out by another one; this route is assumed to lower the overhead structure and enhance on the profitability of the organization.

It is to be noted that other means/approaches of achieving ambidexterity have been covered in the research. Some approaches address ambidexterity by efficiently handling various innovation activities (Jansen et al. 2005), knowledge flow (Mom et al. 2007), management behaviours (Lubatkin et al. 2006) and others. Other approaches to ambidexterity are covered in the following literature for the sake of completeness and their possible considerations in the research.

Contextual ambidexterity firstly originated in 2004 via the work of Gibson and Birkinshaw (2004) and assumes the simultaneous application for both exploration and exploitation. Gibson and

Birkinshaw (2004, p. 209) concluded that a "context characterized by a combination of stretch, discipline, support and trust facilitates contextual ambidexterity". Ghosal and Bartlett (1994) initially suggested such a context, and it assumes that performing organizations borrow their capabilities in achieving an efficient and performing status from the commitment and dedication of their employees. The employees' willingness to go for the extra mile (discipline and stretch), the trust they share amongst each other, and the support they receive from management and their colleagues nurtures their sense of responsibility towards the "we" rather than the "me", and facilitates the simultaneous work on exploration and exploitation.

Organizational separation provides a complete physical separation between exploration and exploitation. While each of those is hosted in a different unit, the senior management of the organization assumes the coordination efforts between both, which sometimes could be hectic due to the cause of separation combined with major operational contradictions. Exploitative units are characterized as large units – centralized and inflexible (Bernner & Tushman 2002; Bernner & Tushman 2003). Their structure resembles a mechanistic one per previous discussion; they have a tight culture and the focus is primarily on process that has the least amount of innovation possible. On the other hand, explorative units are smaller in size, more flexible, and decentralized with a loose culture, hence the contradiction and the dilemma senior management face when trying to coordinate between both units. The separation though could happen across organizational units or across hierarchal levels of the organization (Lavie et al. 2010).

Temporal separation has its concept rooted in the theory of punctuated equilibrium, which is drawn from the evolutionary theory that calls for continuous variation-selection-retention (Aaltonen 2010). Similarly, the punctuated equilibrium theory calls for the continuous transformation of the organization through cycles of convergence and divergence following the

never-ending changes in technology (Lant & Mezias 1992). Hence, based on this concept, temporal separation calls for the timely separation between exploration and exploitation. There would be times when the organization has to carry out exploration activities, which should be followed by quick cycles of exploitation, and vice versa. The risk in such a route to ambidexterity is the transition period between exploration and exploitation; this period requires the development of efficient procedures for the efficient shifting between exploration and exploitation. Lavie et al. (2010, p.134) added to this notion that the organization seeking temporal separation "requires an agile [operation] that excels in managing transitions between contradictory activities".

Domain separation is a fairly new route to ambidexterity with very little coverage in research. Domain separation mainly calls for exploring or exploiting in different domains, and ambidexterity is considered achieved when an overall balance across all domains is achieved. The advantages of this method is the avoidance of trade-offs between exploration and exploitation within one domain, and the reduction in resource allocation management. This method has been mostly used with alliances as an alliance could be considered as a separate domain. Lavie et al. (2009) showed how domain separation can provide a positive impact on profits due to perceived reduction in tension within the one unit or domain. In their study, Lavie et al. (2009) tested a software company that has an alliance which was acting as a separate domain. Apart from Lavie et al. (2009) and a handful of scholars such as Hess and Rothaermel (2008), research on this fairly new subject is still scarce and requires further future considerations and careful approach build-up (Birkinshaw et al. 2016).

Despite all this research and the available literature on ambidexterity and the proposed methods and organizational structures of how to achieve ambidexterity in organizations, micro-mechanisms

used to define a certain and a solid methodology for achieving such a state remain unidentified per O'Reilly and Tushman's (2011, p. 188) stipulation;

> *…what is missing is a clear articulation of those specific managerial actions that facilitate the simultaneous pursuit of exploitation and exploration . . . what is needed is greater insight into the specific micro-mechanisms required for a manager to implement and operate an ambidextrous strategy.*

2.3 Approaches to ambidexterity

2.3.1 Purpose

The purpose of this section is to lay the foundation for how ambidexterity has been conceptualized in various settings in organizations to facilitate our comprehension of the term. The models and processes presented in this section depict a life-like resemblance to how ambidexterity is embedded in the process of organizing. The section starts with a process (horizontal) approach, and a multi-level approach as presented by Simsek (2009), and a paradoxical hierarchical /vertical approach as presented by Andriopoulos and Lewis (2009).

2.3.2 A process approach

Simsek (2009) proposed a simple input-process-output model to explain organizational ambidexterity. This model gathers all the previously discussed components that could be part of ambidexterity. The model presented in Figure 2-3 is inspired by Simsek (2009) work; in that, he intended to organize components of ambidexterity in preparation to a multilevel approach and understanding. The model starts with inputs to the organization that could trigger its need to become ambidextrous – i.e. antecedents of organizational ambidexterity. These inputs initiate a process within the organization which would be determined by the strategic direction of the organization – explorative or exploitative or both. The process phase results in consequences for what the selected strategic direction could bring to the organization, these consequences could be of an enhanced efficiency and the production of better financial performance.

Inputs to organizational ambidexterity have been discussed in the previous chapter and have been referred to as antecedents to ambidexterity, or as the components which cause the organization to decide to select the extent of its application of exploration and exploitation. These components

could consist of environmental, organizational or managerial factors (Lavie et al. 2009), and they contribute to determining what strategic direction the organization shall follow in terms of exploration or exploitation, or both. The *output* in this regard is an implemented strategy and some achieved results are represented in either enhanced efficiency or appropriating better financial results.

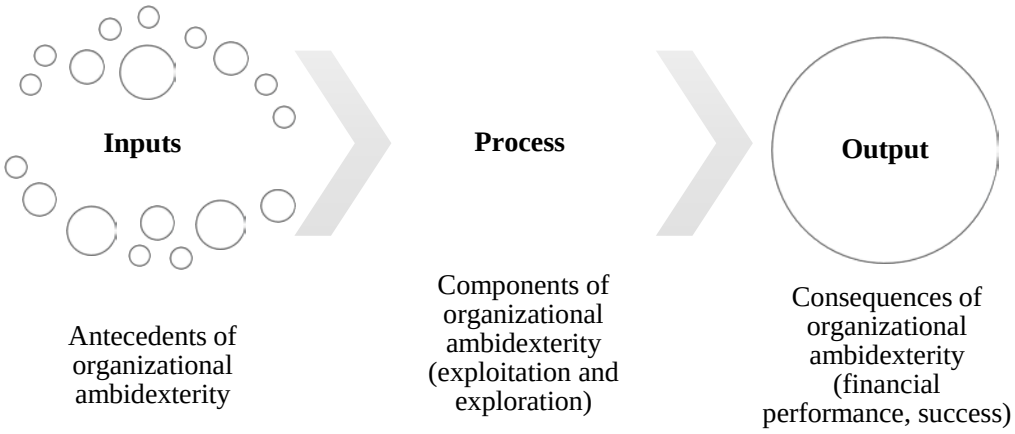

Figure 2-3. An input-process-output view of ambidexterity (source Simsek 2009)

Inputs to organizational ambidexterity have been discussed in the previous chapter and have been referred to as antecedents to ambidexterity, or as the components which cause the organization to decide to select the extent of its application of exploration and exploitation. These components could consist of environmental, organizational or managerial factors (Lavie et al. 2009), and they contribute to determining what strategic direction the organization shall follow in terms of exploration or exploitation, or both. The *output* in this regard is an implemented strategy and some achieved results are represented in either enhanced efficiency or appropriating better financial results.

The *process* part presented in this model hosts the operation of where ambidexterity is (or should be) produced, and it sets out the path to how it is achieved. The appropriate strategic direction is decided according to the organizational inputs and in this instance contributes to the components of organizational ambidexterity. Simsek (2009), in his model, categorized three ways to achieving ambidexterity: structural, behavioural and realized. The structural means of achieving organizational ambidexterity resembles the organizational separation, temporal separation and domain separation proposed by Lavie et al. (2009). It refers to the design the organization assumes in order to achieve ambidexterity. It could refer to producing separate business units, where each of those units is responsible for one of the organizational functions of exploration or exploitation, or it could refer to the systems, processes and competencies needed to see the process of producing an ambidextrous organization through. The structural design of the unit or the organization in this case is a reflection of the organization's strategic direction and intent. The strategic intent of the organization decides on which line of business the organization would be investing in, the number and type of projects that should be in its investment portfolio, and the delivery process needed to deliver these projects through (Meskendahl 2010).

A multilevel approach and understanding of ambidexterity refers to the vertical distribution of organizational responsibilities between exploration and exploitation. For example, more senior management of an organization could assume the responsibility of market exploration (Bednarek et al. 2016). This responsibility results in feeding the organization's backlog of work with the appropriate number and type of projects. The downstream business units in this type of multilevel organizational design and structural unit separation would consist of workers whose prime responsibility lies in producing work. These workers would take into account exploitative

functions delineated in exploitation of the organization's database of knowledge, their skill and capabilities in order to deliver these projects through.

The behavioural means of achieving ambidexterity refers to the behaviour of the members of the organization. It resembles contextual ambidexterity as suggested by Gibson and Birkinshaw (2004) in observing employees' behavioural aspects that carry the organization through in its quest for alignment and adaptability – alignment with its internal capabilities and adaptability to the surrounding environment. The behavioural approach in this case calls for building cultural systems and processes which encourage the correct behaviour towards achieving the best for the organization. This can be achieved via a strong transformational leadership and applying the right behaviour from the management team (Gibson & Birkinshaw 2004). The role of the Top Management Team (TMT) is therefore pivotal in achieving ambidexterity (Lubatkin et al. 2006), and their role becomes visible via many fronts. Apart from the essential role they play in encouraging team members to freely distribute their time to achieve the best of the business through the behavioural framework proposed by Ghoshal and Bartlett (1994), their perceptions could be shared to produce an environment that facilitates conflict resolution and knowledge exchange. A Top Management Team (TMT) with shared perceptions and integrated thoughts could facilitate organizational ambidexterity (Hambrick 1995; Simsek et al. 2005; Li 2016; Venugopal et al. 2017).

The realized approach on the other hand is the approach which calls for an optimized balance between exploration and exploitation and refers to organizations that have achieved high levels of ambidexterity in both exploration and exploitation (Simsek 2009).

2.3.3 A multi-level approach

The previous section took on a process approach to explain ambidexterity. The process was represented by a three-phased model that starts with inputs to the organization. Inputs feed into the process phase; this phase resembles a strategy formulation and implementation phase. The output phase is the result of a successful resolution of the process phase. The process phase manifests in the strategic direction that the organization intends to adopt, which could entail a certain design of the organization with the purpose of achieving ambidexterity, or a specific process design, or a policy reinforcement. In this regard, Simsek (2009) proposed a dual structural design for the process phase as drawn from Simsek et al. (2005) and Hambrick (1995). Simsek's (2009) emphasis was the organization level only – i.e. dual structure, behavioural context and TMT behaviour.

In light of the above brief on the process approach, this section expands on the process phase only to add other levels that could assist in comprehending the interwoven requirements of the ambidextrous organization. The multi-level approach is presented in Figure 2-4 as drawn from Simsek (2009).

The inter-firm level as noted from the model presented in Figure 2-4 views the organization as embedded in a central network with other organizations, individuals and the industry. A central network position is key to the organization in getting the most out of knowledge and resources (Powel et al. 1996, 1999). Centrality can be viewed as a measure for connectivity with other organizations similar in type or field and the industry. Connectivity of the organization, or its closeness (Wasserman & Faust 1994), can facilitate both exploration and exploitation functions by simply achieving its results with the fewest possible links – or distance (Freeman 1979). The closeness of the organization and its access to knowledge and resources as facilitated by centrality provides the organization with higher exposure. This exposure could introduce more social

networks and more knowledge, and even expose the organization to more connected organizations (Powel et al. 1996). It is therefore posited by Simsek (2009) that the more central the organization is and the closer to the network it is, the more chance of it becoming ambidextrous. Simsek (2009) proposes a point of diminishing returns which could trigger unnecessary costs linked to excessive centrality – i.e. the organization would reach a point of saturation with a certain number of connections; beyond this point, more connections may not make a major difference and a marginal cost of centrality would therefore kick in. It is worth noting at this point, however, that Simsek's (2009) theory of diminishing return remains untested. The dynamism of the environment that surrounds the organization may in fact require organizations to always renew their connections and diversify their ties to ensure they maintain a fairly good position in the network and the market.

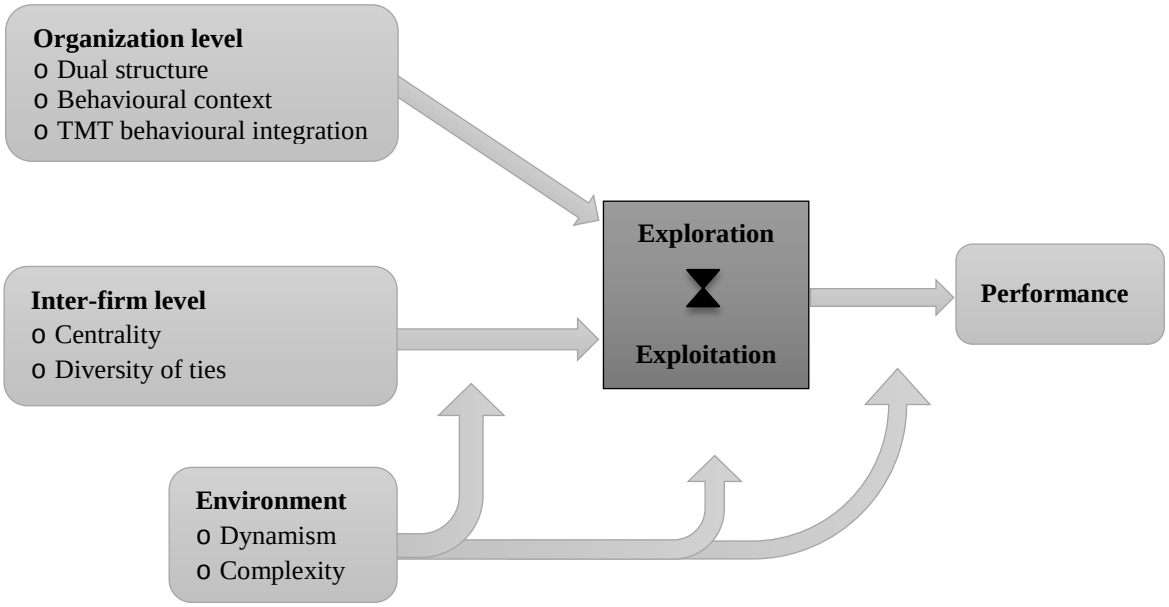

Figure 2-4. A multi-level model of organizational ambidexterity (source Simsek 2009)

The diversity of ties of the organizational networks has its influence on ambidexterity and could dampen the effects of environmental dynamism (Simsek 2009). The diversity of ties can emanate from the types of the relationships between individuals and organizations, or vice versa, and the

extent of the social networks which produced those ties (Powel et al. 1996). It also relates to the type of the information being shared via those ties and the extent to which such information becomes redundant (Granovetter 1973; Burt 1992). Such ties can be formed using various means such as alliances (Wassmer et al. 2016) and partnerships in the form, for example, of supply chains with clients or other stakeholders (Koza & Lewin 1998; Beckman & Haunschild 2002; Beckman et al. 2004).

Diversity of ties (such as networks with other organizations and the market) can facilitate ambidexterity in various aspects of the organizational explorative and exploitative functions (Simsek 2009). Firstly, the organization can benefit from the heterogeneity of ideas when it comes to problem solving (Parkhe 1991). This particular attribute may also benefit exploitative functions within the organization. It could also bring balance to both exploration and exploitation via the facilitation of constructive conflicts, comprehensive analysis and design of problems and solutions. Secondly, diversity of ties could prevent organizations from falling into the familiarity trap when providing solutions – i.e. an organization would, for example, fall into this trap by excessively chasing a particular industry in its quest for exploration. The diversity of ties in this case could infuse a variation into this quest and provide diversifications for it. Thirdly, diversity of ties could also prevent what Simsek (2009) terms the "propinquity trap" (p. 610), which refers to producing solutions from similar previous solutions. Not falling into a propinquity trap could also be viewed as a sign of dynamic capability of the organization (Wang et al. 2015). A propinquity trap can therefore be observed when "success reinforces exploitation of existing competences and crowds out exploration of new competences, hindering the development of dynamic capability" (Wang et al. 2015, p.26). The diversity of ties in this case allows the organization to look into more of an innovative combination of solutions and a creative variation to the course of conducting work.

Similar to the case of network centrality, too much diversity of ties as posited by Simsek (2009) could incur extra costs for maintaining those ties. These costs could be seen in cost excessiveness needed to maintain both centrality and the diversity of ties while the number of ties established already may have reached a point of redundancy, deeming their value as negligible or diminishing. A cost spent on a tie or a relationship which is diminishing in value is therefore considered excessive and may not be overly feasible or beneficial. Moreover, the marginal increase in the cost of maintenance may not be on a par with the benefits received by the organization. Similarly, too much centrality and diversity of ties would impose more requirements on the organization to manage, monitor and maintain those ties.

A well-designed organizational structure could moderate the relationship between inter-firm-level attributes and ambidexterity. A dual structure, for example, can help in distributing the many responsibilities linked to centrality and ties diversification amongst the decentralized business units (Benner & Tushman 2003; Simsek 2009). A behavioural context on the other hand – as posited by Gibson and Birkinshaw (2004) – when combined with the right TMT behaviour would motivate employees to stretch their capacity to manage all such ties. A TMT that is behaviourally integrated with the rest of the team creates an environment of collaboration and joint understanding which would leverage on the ambidexterity produced by centrality and diversity.

Finally, the model by Simsek (2009) presented in Figure 2-4 implies that an understanding of the surrounding environment is imperative when considering ambidexterity as this environment can affect the organization by its dynamism and/or complexity. Dynamism of the environment refers to the rate of change of its inputs and outputs. It could range from being highly dynamic to being highly stable (Dess & Beard 1984). Complexity of the environment refers to the variations that can affect its elements, the type of relationships among its factors, and the methods needed to see

outputs through (Miller & Friesen 1983; Dess & Beard 1984). A highly complex environment characterized by rapid changes to its inputs, outputs and requirements could affect technology, competition, supply and demand and even regulations and policies (Eisenhardt & Bourgeois 1988). An organization that operates in such an environment should be flexible enough to adapt quickly to these changes (Sidhu et al. 2004; Simsek 2009).

In light of the emerging literature, it can be concluded that a highly dynamic environment may not be conducive to ambidexterity (Simsek 2009); however, a highly complex one – while characterized by the complexity of links and relationships (Dess & Beard 1984) – may in fact be. A complex environment requires the organization to act by providing a mix of talents, well-designed activities and methodologies, and many interactions with the outside world to overcome such complexity – i.e. centrality and diversity of ties. Simsek (2009) posits that a complex environment encourages the organization to enhance its centrality and diversify its ties, and hence encourages ambidexterity. On the other hand, though, a dynamic environment is unpredictable compared to a complex environment, hence any designed methodologies specified to overcome complexity may stand obsolete when policies keep on changing or regulations are superseded. A dynamic environment therefore may not have room for innovation and creativity while a complex environment does (Sidhu et al. 2004).

2.3.4 A paradoxical approach

The previously discussed approaches to ambidexterity depicted a horizontal model where information starts off with inputs, then process and ends up with outputs. Inputs to the process phase require a strategic direction and decision as manifested in the multilevel approach. This section proposes a vertical model which simulates the flow-down of ambidexterity from an executive level down to the common employee or knowledge worker level. This flow-down of

information creates a paradoxical tension between the various elements of the organization and feeds into the virtuous cycles of ambidexterity as shown in Figure 2-5 (Andriopoulos & Lewis 2009).

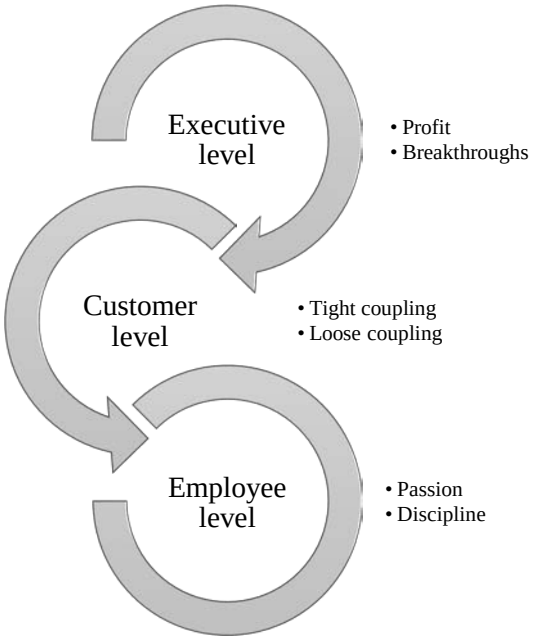

Figure 2-5. Virtuous cycles of ambidexterity (source Andriopoulos & Lewis 2009)

The model presented in Figure 2-5 as inspired by Andriopoulos and Lewis (2009) depicts three tensional cascading categories which could be viewed as paradoxes of organizational innovation. The executive level of the organization produces a nested tension of two paradoxical organizational requirements. An emphasis on generating revenue and seeking profitable investments takes on the exploitation side of the organization, while the need to explore for new breakthroughs represents a paradox that needs to be resolved at a managerial level. Flowing down to the next paradoxical level produces two approaches to delivering customer needs, one that seeks tight abidance to customer requirements, while the other urges divergence from these requirements to seek a more innovative style of delivery. The final flow-down cascades to the employee or knowledge worker level and that creates an internal, sometimes cognitive, paradox – i.e. the

paradox here is between the employee and the instruction received on the degree of abidance with customer requirements.

Those virtuous cycles of innovation within the ambidextrous organization provides a framework for managers and executive to conceptualize how strategy flows down to knowledge workers in the form of projects. Andriopoulos and Lewis (2009, p.708) set it as follows:

> *Executives set the context, providing strategic leadership and allocating resources that determine their firm's portfolio of projects. Directors and project leaders, in turn, guide specific projects, ensuring adherence to clear development processes and encouraging improvisation as well as iterations between work modes. Finally, knowledge workers themselves choose when and how to best apply their discipline and passion to enhance product development. Together, these efforts reinforce each other in a virtuous cycle as ambidexterity becomes pervasive.*

The shift between integration and differentiation efforts in achieving ambidexterity helps reduce the anxiety that may arise from the tension generated within and between the levels as presented in Figure 2-5 (Lewis 2000; Andiropoulos & Lewis 2009). Differentiation calls for an outright segregation of efforts similar to the temporal separation design proposed by Puranam et al. (2006). Gibson and Birkinshaw (2004) suggest that differentiation in this case ensures attention and draws focus to the selected segregated items. Integration on the other hand calls for unifying efforts at executive and behavioural levels. Here, Lubatkin et al. (2006) theorize that this helps in resolving issues arising from contradictory processes. Blending the two roles of integration and differentiation feeds into a virtuous cycle by showing the values of both synergy and distinction (Lewis 2000). Integration, for instance, can work on social and cultural factors relevant to behaviourally combining exploration and exploitation (Gibson & Birkinshaw 2004). Likewise, differentiation draws attention to hard facts such as focusing on project delivery and linking projects to strategy (Andriopoulos & Lewis 2009).

The shift between exploration and exploitation helps enhance the absorptive capacity in the organization (Jansen et al. 2006). An organization's absorptive capacity is its ability to comprehend new upcoming knowledge, assimilate it, and apply it (Dong-Gil et al. 2005). Andriopoulos and Lewis (2009) recognize that exploitative efforts in the organization helps the organization commercially, while if the knowledge pool is not renewed (i.e. absorb new knowledge), then exploitation would come to an end. On the other hand, exploration helps in feeding the organization with new knowledge to keep the ball rolling. This cycle of knowledge exploitation and knowledge creation resembles the innovation cycle where attention needs to be drawn to existing knowledge and the creation of new knowledge (Smith et al. 2005).

2.4 Systematic review on ambidexterity

2.4.1 Purpose

Survival of organizations in today's dynamic environment is dependent on their ability to perform in their present state and adapt to future needs (Beinhocker 2006). The challenges faced by organizations in their quest for survival, and sustainability, stem from their ability to manage resources (owned or acquired) and direct them towards achieving a balance between using own knowledge and technology versus the use of external innovation and acquired reliability (March 1991; Levinthal & March 1993). Organizations with such ability possess what is so-called ambidexterity. Ambidexterity has been discussed above and has been identified as a state which organizations would like to achieve or obtain to enhance on their performance. Nevertheless, what is perceived to have been overlooked in previous discussions and references on ambidexterity is processes or practices needed to achieve such a state. It has been claimed by Gupta et al. (2006), Kauppila (2010) and recently by Bednarek et al. (2016) that any such guidance to build such processes or practices has been neglected by the literature or is not yet in existence. Similarly, scholars afforded no guidance to project managers on how to manage ambidextrously (Aubry & Lièvre 2010; Leybourne & Sainter 2012; Liu & Leitner 2012; Eriksson 2013); nor has any guidance been generated for individuals to act ambidextrously and support their organizations on their quest to build a sustainable, profitable business (Turner et al. 2013, 2014). Therefore, this particular section sheds light on important aspects of ambidexterity generated by conducting a systematic review of the literature. These aspects provide new notions of ambidexterity by introducing *levels*, *dimensions* and *mechanisms* into the mix. These notions may be used to think process and generate a practice.

This section starts by identifying a methodology for conducting a detailed and systematic literature review on ambidexterity. Drawing from the literature on systematic reviews of literature (Tranfield et al. 2003; Dixon-Woods et al. 2006; Armitage & Keeble-Allen 2008; Petticrew & Roberts 2008; Hodgkinson & Ford 2014; Haddaway et al. 2015), the aim of conducting a detailed systematic review, and carrying it out in a methodology-like manner, is to corner what has been identified as ambidexterity within different aspects of an organization, and collect all knowledge that has been published so far on it. The methodology section 2.4.2, discusses the way this review has been carried out to generate what this thesis has called *levels, dimensions* and *mechanisms* of ambidexterity. The levels of ambidexterity were found to be embedded within the hierarchy of tasks in the organization, and they cover the *strategic level, the projects level, the operations level* and the *individual level*. This review concludes that all such levels should act in simultaneity to achieve a state of ambidexterity. These levels constitute *dimensions* which help see ambidexterity through at each level, and ambidexterity at each level and dimension can be achieved using the identified *mechanisms* of ambidexterity. It may be recalled that we had presented the first research question as *RQ 1: What is organizational ambidexterity and how can it be defined within the context of project based organizations?*

The *levels, dimensions* and *mechanisms* of ambidexterity provided answers to the first part of RQ1 (*What is organizational ambidexterity….*), and also provided a foundation to address the second part of RQ1 (*…and how can it be defined within the context of PBOs?*) research question.

Post the systematic review section presented in this section along with the conclusions generated from answering the first research question, section 2.5 describes the various tensions which can occur within the different levels of the organization. It links these tensions to the levels and dimensions of ambidexterity. The aim of presenting this section is to provide more examples of

the various types of paradoxical situations which can be created within *levels* and *dimensions* and which, by their resolution, can generate ambidexterity. This next section provides further support on the objectives achieved by answering the first research question.

2.4.2 Review methodology

2.4.2.1 Methodology for review

This section elaborates on the selected methodology used to carry out the literature review. It first discusses some of the pros and cons of the available methodologies to conclude with the methodology selected for this research. The narrative method for conducting the literature review was compared with that of the systematic and rigorous means of review to find that the latest carried more structure, rigor and reliability into the results and the review process.

A narrative review is carried out by summarizing research outcomes from various selected research articles (Aveyard 2007). The criteria of literature selection and inclusion in the narrative may not always be clear (Cronin et al. 2008). One of the hidden concerns in such type of review is that articles or research materials are hand-picked by the researcher to support a certain proposition, theory or claim. This review generates a critique of the literature in order to support pre-conceptualizations which may or may not be the creation of the research itself (Slavin 1986). The selection criteria may not be presented in the final research and that may create an issue for other interested researchers who may want to apply similar means of researching. Apart from some of the drawbacks that this method carries, it remains one of the more widely-used methods in research due to ease of commissioning (Slavin 1986; Hodgkinson & Ford 2014). Conducting this type of review would certainly cut research time short due to its forwardness in offering critical overviews and generating written and narrative assessments (Rousseau et al. 2008; Rousseau 2012). As a result, the narrative review allows for almost no generalizations as it is stripped out of knowledge

or literature accumulation or any other means of drawing a comprehensive conclusion (Greenhalgh 1997). This method remains subjective and can attract disagreement.

The systematic review of literature carries less ambiguity, as it is more structured and organized (Tranfield et al. 2003; Urquhart 2010). Its beginnings have roots in the meta-analysis method, which calls for exhaustive inclusion of literature (Glass et al. 1981). The development of the meta-analysis method saw Slavin's (1986) contributions with the inclusion of selection criteria that consider best evidence and the size of the study. Slavin (1986) calls this method the "best-evidence synthesis". Opponents to the "best-evidence synthesis" method are concerned that the selection criteria may become mixed with the researcher's own perspective of evidence and perception of selection and quality (Slavin 1986). A systematic review of literature resembles the "best-evidence synthesis" with due consideration to the scientific excellence and less consideration towards size (Tranfield et al. 2003; Hodgkinson & Ford 2014). The systematic review starts by reiterating the importance of its criteria and presenting all its details. The quality of the literature plays a considerable part in the selection criteria and the involvement of more than one assessor may be called for to remove own perception and bias upon selection when based on quality (Andrews 2005; Hodgkinson & Ford 2014). This renders the systematic review more time-consuming and labor-extensive (Denyer & Tranfield 2009). The review and analysis work is exhaustive as well, which characterizes it with more rigor and in-depth reflection (Tranfield & Denyer 2003). The end result, however, is greater reliability in the final outcome of the research and less material that is subject to scrutiny.

Taking the focus of this research into account, and the flow of reliabilities needed between the first, the second and the third research questions, it has been determined that a narrative review may not serve this thesis well due to its subjective means of generating the needed results. Since

this thesis uses its first research question to build a strong foundation that should underpin the final conclusion of this thesis, a subjective answer to this question by means of a narrative review may not provide the envisaged strength to this foundation and this will affect the reliability of the outcome of this thesis. A meta-analysis has also been disregarded due to its extensive means of literature inclusion and exhaustive need for review which may not be considered feasible or valuable at this stage of the research. A systematic review of the literature was therefore selected due to its proven reliability, feasibility, time value and transparency in sharing its methods and criteria.

2.4.2.2 Methodology and data analysis

In order to comprehend what makes various attempts to achieve ambidexterity unique, an understanding of an ambidextrous taxonomical structure was necessary. A taxonomical attempt and a literature analysis were conducted in this thesis by way of a systematic literature review to generate an answer to the first research question. The systematic review effort "provide[d] collective insights through theoretical synthesis" (Tranfield et al. 2003, p.220) and facilitated a conclusive comprehension of what this thesis has called *levels*, *dimensions* and *mechanisms* of ambidexterity.

Traditionally, a systematic review used to consider only those studies with quantitative nature (Noblit & Hare 1988). This view provides good insights into medicinal research, for instance, due to its dependence on objective measures with no allowance for subjectivity when a treatment or a disease is being researched. The systematic review of the literature was originated from these types of research hence the focus on objectivity and positivism (Tranfield et al. 2003). However, management research is eclectic in nature, and a focus on objectivity alone will create ontological and yet probable epistemological misconceptions (Byman 1995). This could lead to losing the

richness of the qualitative literature when not included in the analysis (Petticrew 2001). This could well be exacerbated when such a constraint in research and analysis takes on a subject that is complex in nature such as projects' management and ambidexterity of the project organization (Geraldi et al. 2011). Therefore, current management research methods started considering data from both quantitative and qualitative sources (Pittaway et al. 2004; Farashahi et al. 2005; Knoben & Oerlemans 2006). The review and analysis of the literature considered in this thesis follows lead.

A combination of two databases (EBSCO and JSTOR) was used as the starting point of this research; this was also used to trigger the systematic review needed to address the foundational conceptualization of the first research question. The search in databases was also supported by specific searches in journals that appeared to be leading the field for "ambidexterity" – Organization Science (OS) – and other journals with known support to project management literature such as the Project Management Journal (PMJ) and the International Journal of Project Management (IJPM). The keywords used in the search consisted of: "ambidex*" and/or "project". The search on these keywords varied as to their inclusion in the advanced search functionality of the database with the alternate use of "AND" and "OR" to ascertain that the entire body of literature on ambidexterity with specificities on project management was captured. The first of the research articles found on ambidexterity was published in 1991 by March. Hence the time span of the selected research covered the period from 1991 to date (2016/17). Books, In Press, or unpublished articles were excluded from the selected sample. The initial sample was refined through a combination of steps suggested by Farashahi et al. (2005), Petticrew (2001) and Tranfield et al. (2003), with slight adjustments by the author to take into account the quality of the

journal and the number of times the article was cited in comparison with the year of publication. Each search and the number of used and analyzed publications is summarized in Table 2-1.

Table 2-1. Number of publications by each refining step

Search option	Database/journal	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
"ambidexterity" or "ambidextrous" or "ambidex*" and/or "project" in the body of the publication	EBSCO	1,052	700	46	74	45	**24**
	JSTOR	408					
	OS	17					
	IJPM	22					
	PMJ	27					

2.4.2.3 Literature selection

The following steps were taken to filter out the initial identification of publications. These steps coincide with Farashahi et al. (2005), Petticrew (2001) and Tranfield et al. (2003), with slight adjustments by the author as discussed previously:

(1) Identification of publications – this phase comprised the use of the keyword "ambidex*", and/or "project" in databases of EBSCO and JSTOR, and in IJPM, PMJ and OS journals.

(2) Focus on academic papers and remove any duplication between databases and the search in journals – this phase consisted of firstly removing any overlap between each of the databases and among the journals as well – an export to an Excel sheet was used for this purpose. Second, In Press, non-peer-reviewed and unpublished works were removed from the search results.

(3) Focus on project management, project organizations and ambidexterity – the abstract of the remaining articles, title and the conclusion section were checked to further refine the sample and remove articles where the subject was irrelevant to the aim of this thesis. Also,

articles which did not contribute to the ambidexterity literature and/or its linkage with project management or the project organization were disregarded.

(4) Checking completeness – the references of the remaining articles were checked for relevance to ensure that no relevant article was missed out from the search. This has contributed to the addition of 28 extra journal articles to the pool of search results.

(5) Focus on quality – two quality checks were conducted – first, the quality of the journal itself; any articles which came from journals with a low-quality stream were disregarded; and second, the number of citations of the concerned article in combination with the year of publication and the quality of the journal was checked. That said – if a very relevant article came from a low-quality journal but carried significance in the number of citations that exceeded at least 100 citations accumulated in the last five years, this article was not disregarded.

(6) Final check with focus on "ambidexterity" in the relevant context – a consideration was provided towards articles which carried a qualitative or quantitative means of analysis. Most of the theoretical papers and sole literature reviews were dropped, but only after considering their list of references per step (4). The taxonomical levels of ambidexterity have been constructed based on this final step. However, some of the disregarded papers at steps (5) and (6) were considered in the study to identify indicators and attributes used to support the conceptualization arrived at this thesis.

Upon plotting the research which was filtered out per step (2) of the selection criteria against the time of publication, an interesting trend started taking shape. This trend shows that the research on ambidexterity started picking up in 2004. Another round of research proliferation in this area can be seen in the 2010 then again in 2015. This trend is presented in Figure 2-6. Therefore, the selected

publications per the above criteria were captured between 2004 and 2016 – during the peak of research as shown Figure 2-6 – seemingly due to the significance ambidexterity brought to the research post its conceptualization by March (1991) which may have taken a few years to materialize. Table 2-2 shows an overview of the selection at step (5).

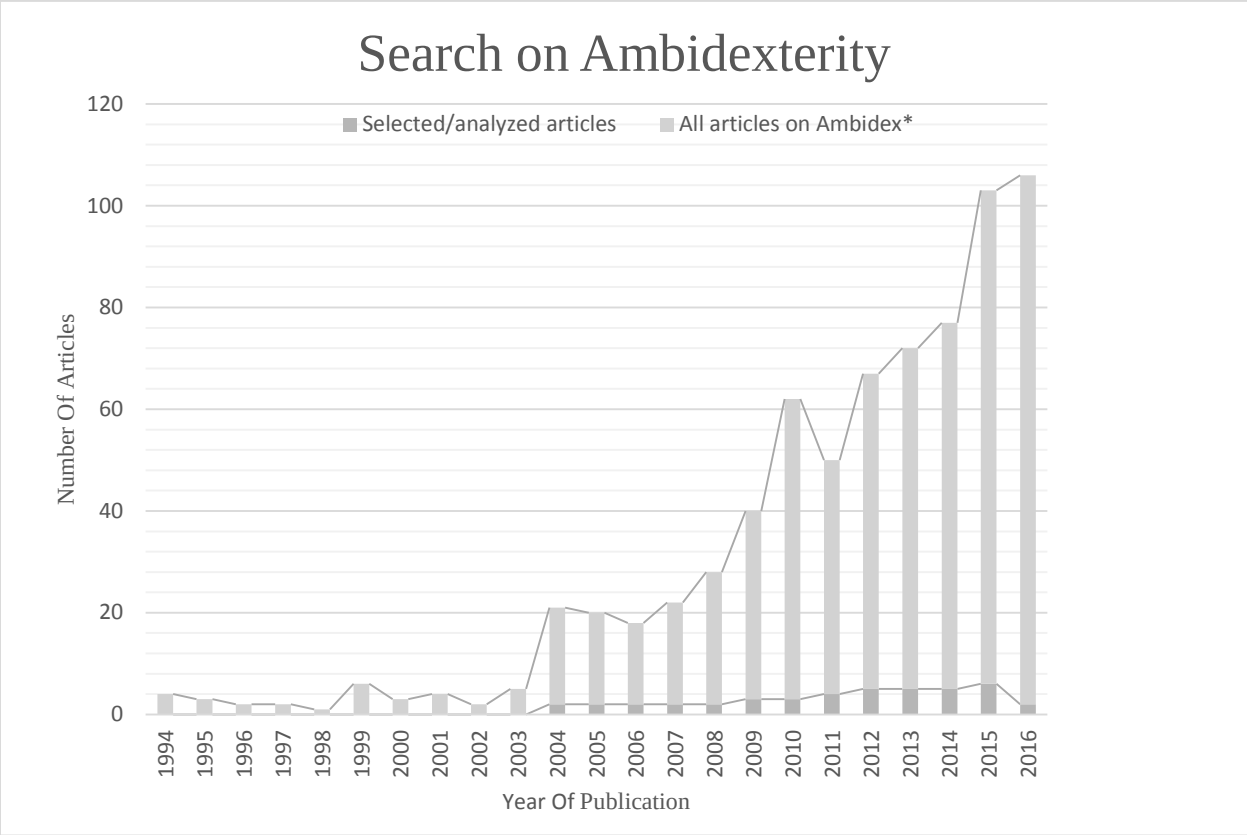

Figure 2-6. Plot of all research on ambidexterity against time of publication up to 2016

Table 2-2. Overview of the selected sample of the 24 papers per step (6)

Type of paper	
Theoretical	2
Qualitative	8
Quantitative	14
Publication year	
2004:2007	5
2008:2011	4
2012:2015	10
2016:2017	1
Industry	
Construction and Engineering	3
R&D	1
Management consulting	1
Telecommunication	2
Financial services/banking	4
Manufacturing	4
Technology	4
General	5

2.4.3 Analysis of the literature

Analysis of the literature herein was inspired by Geraldi et al. (2011). Geraldi et al.'s (2011) five steps for analyzing the literature were customized to fit the purpose of this research. In the first three steps, the frameworks, definitions and attributes of ambidexterity were identified from the relevant literature and further scrutinized to draw conclusions from them. In the last two steps, suitable indicators were identified to confirm the initial findings and the conclusions this analysis has gathered.

The first step extracted frameworks, definitions and attributes, sowing the seeds towards conceptualizing the notion *levels of ambidexterity*. The second step consisted of grouping and meta-grouping efforts for those identified frameworks, definitions and attributes. This has led to the realization of the different levels of the organization where ambidexterity can work in or be

applied to. Inserting the year of publication into the effort of grouping and meta-grouping revealed some interesting results which accompanied the development of those levels over time. The timeframe analysis for *levels* has identified their progression through time as can be seen in Figure 2-7. Figure 2-7 shows that ambidexterity has started with a heavy conceptualization at an individual level (Gibson & Birkinshaw 2004; Beckman 2006; Lubatkin et al. 2006; Mom et al. 2007; Swart et al. 2016; Zimmermann & Birkinshaw 2016) with a slight consideration towards an operations level (He & Wong 2004; Jansen et al. 2005). Post 2009, Andriopoulos and Lewis (2009) introduced ambidexterity at a strategic level with their conceptualization of a paradox of profits versus breakthroughs. Kortmann et al. (2014) conceptualized strategic flexibility in a trade-off with operational efficiency, while Chandrasekaran et al. (2012) introduced an ambidextrous strategic level with the presentation of "decision risks" as they occur at a leadership level. Ambidexterity at a projects level (Eriksson 2013; Pellegrinelli et al. 2015; Turner et al. 2015; Bednarek et al. 2016) and at an operations level (Voss & Voss 2013; Kortmann et al. 2014; Turner et al. 2014; Matthews et al. 2015) started picking up post 2014 with a slight consideration towards a strategic level. Although literature which covers ambidexterity at projects' and strategic levels is new, it remains deficient in regards to its coverage (Pellegrinelli et al. 2015; Turner et al. 2015). This is indicated graphically as presented in Figure 2-7. The thickness of the borderline presented in Figure 2-7 represents the emphasis on publication and the coverage of research in the respective year. The thickness of the borderline was designed taking into account the systematic review carried out for the relevant literature. If any, this deficiency in literature confirms the benefits this research brings on board, not only by addressing but also by reinforcing the notion of ambidexterity at a projects' (and portfolio level). Since a portfolio conceptualization touches on the strategic

level of the organization, this research can provide benefit towards this side as well. More details of and identifiers for these levels as derived from the literature are provided in Table 2-3.

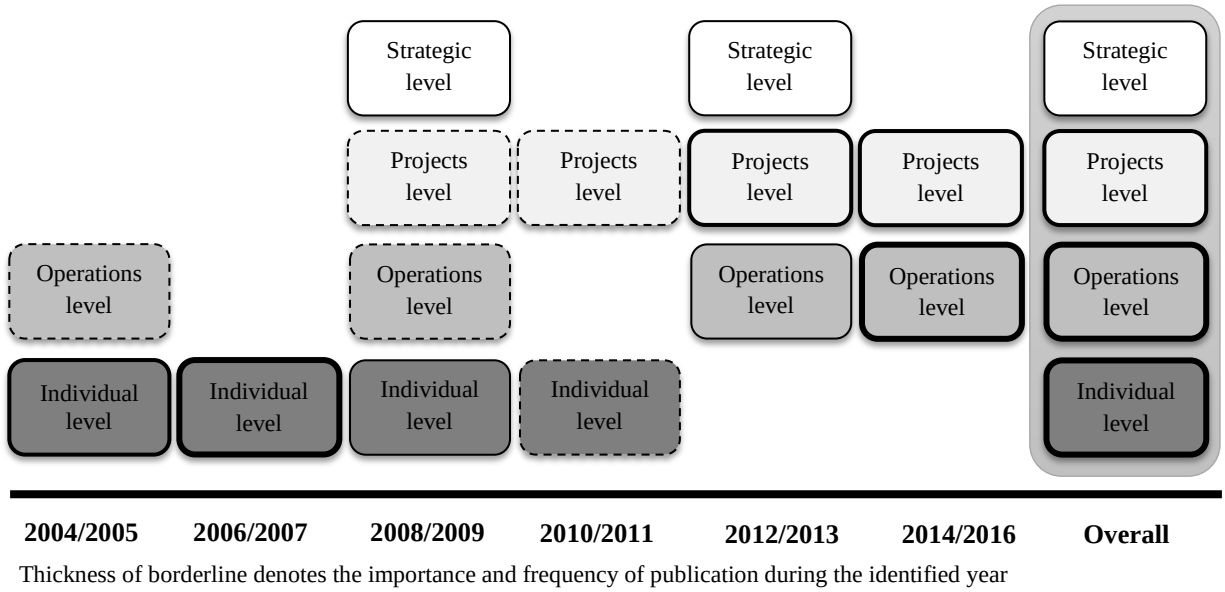

Figure 2-7. Historical development for the levels of ambidexterity

Grouping and meta-grouping efforts carried out in the second step of the analysis did not only contribute in generating a conceptualization towards the notion of levels; they also generated other notions – the *dimensions of ambidexterity* and the *mechanisms of ambidexterity*.

Dimensions of ambidexterity refer to those functions within the organization which have the capability of creating a paradox within which a resolution is required for better performance and sustainability. The second step of the systematic analysis generated four dimensions of ambidexterity: (1) a knowledge dimension, (2) a behaviour dimension, (3) a technology dimension, and (4) a process dimension. For instance, March's (1991) initial conceptualization of ambidexterity aimed to resolve the paradox which occurs within a *knowledge dimension* when he differentiated between exploiting "old certainties" versus exploring "new possibilities". Other scholars such as Andriopoulos and Lewis (2009), Mom et al. (2007) and Turner et al. (2014)

followed March's (1991) lead. Researchers such as Gibson and Birkinshaw (2004) took on a *behaviour dimension* of individuals as another dimension for ambidexterity. Within this dimension, Gibson and Birkinshaw (2004) provided a resolution to the paradox generated within the attitude and behaviour of employees. This paradox is generated between "hard elements" of behavioural aspects – discipline and stretch, and "soft elements" – support and trust. A *technological dimension* was adopted by scholars such as Chandrasekaran et al. (2012), He and Wong (2004), Rothaermel and Alexandre (2009) and Voss and Voss (2013). This dimension covers aspects of technological innovation (He & Wong 2004) or product exploration and exploitation (Voss & Voss 2013). A *process dimension* simulates a trade-off or a resolution that takes effect between process variation versus process reduction and control (Matthews et al. 2015), or a trade-off between operational efficiencies and strategic flexibilities (Kortmann et al. 2014), the provision of control through projects implementation versus exploration ventures via the use of an overseeing program (Pellegrinelli et al. 2015), or the use and trade-offs within the processual intellectual capital in organizations (Turner et al. 2015). More details and identifiers for these dimensions as supplied by literature are provided in Table 2-4.

Mechanisms of ambidexterity refer to strategies which ambidextrous organizations adopt to resolve tension created within a paradoxical situation or dimension as stated above. The second step of the systematic analysis generated four mechanisms or strategies used to resolve a paradox or a tension: (1) structural mechanisms, (2) learning mechanisms, (3) selection/allocation mechanisms, and (4) communication mechanisms. *Structural mechanisms* were the most mentioned in the literature with many indicators or attributes which fell under this strategy. For instance, resolving tension by altering organizational structure using temporal differentiation compared with structural or spatial separation (Lavie et al. 2009), or balancing versus combining exploratory and/or exploitative

activities (Cao et al. 2009), or the use of integration and differentiation methods to resolve a paradox (Andriopoulos & Lewis 2009) all fell under *structural mechanisms*. Learning through process innovation versus learning through process control (Matthews et al. 2015), learning through applying emergent strategy compared to rationalization and adapting a deliberate and tested strategy (Mintzberg 1994; Aubry & Lievre 2010), learning synergies through the interplay between exploration and exploitation (Jansen et al. 2006) and the absorptive capacity when applying new knowledge (Andriopoulos & Lewis 2009) all fell under *learning mechanisms*. The allocation of resources to meet market demands (Fernhaber & Patel 2012), balancing resources to equalize between codified knowledge and new knowledge (Matthews et al. 2015), the adaptive allocation and the use of resources to achieve better strategic flexibility (Kortmann et al. 2014) and the appropriate selection and/or allocation of alliances (Koza & Lwein 1998; Rothaermi & Deeds 2004; Lavie & Rosenkopf 2006; Wassmer et al. 2016) or client portfolios (Bednarek et al. 2016) to enhance matter of knowledge transfer (Nonaka 1994; Eisenhardt 2000; Skjølsvik et al. 2007; Turner et al. 2014) or technological innovation (Rothaermel & Alexandre 2009; Voss & Voss 2013) are all part of *selection/allocation mechanisms*. Decentralization and centralization of processes (Tushman &O'Reilly 1996; Christensen 1998; Benner & Tushman 2003; Jansen et al. 2005; Raisch et al. 2009; Jansen et al. 2012; Eriksson 2013), formalization and communication of rules (Mom et al. 2009), and the direction of flow of knowledge (Mom et al. 2009) are all means that pour into *communication mechanisms*. More details and identifiers for these mechanisms as supplied by literature are provided in Table 2-5.

The literature also revealed some of the influencers or limiting factors which shall be taken into account when determining which level ambidexterity is being captured at or applied to, what dimension is being considered, and what mechanism is being applied to these dimensions or levels.

These factors consist of external environmental factors (Lavie et al. 2010), internal influencers such as the availability of resources and the size of the organization (Jansen et al. 2012; Choi & Phan 2014) and the dynamic capabilities of the organization (Anand et al. 2009; Rothaermel & Alexandre 2009; Fernhaber & Patel 2012). Figure 2-8 provides a graphical representation of these factors alongside the levels of ambidexterity, dimensions and mechanisms.

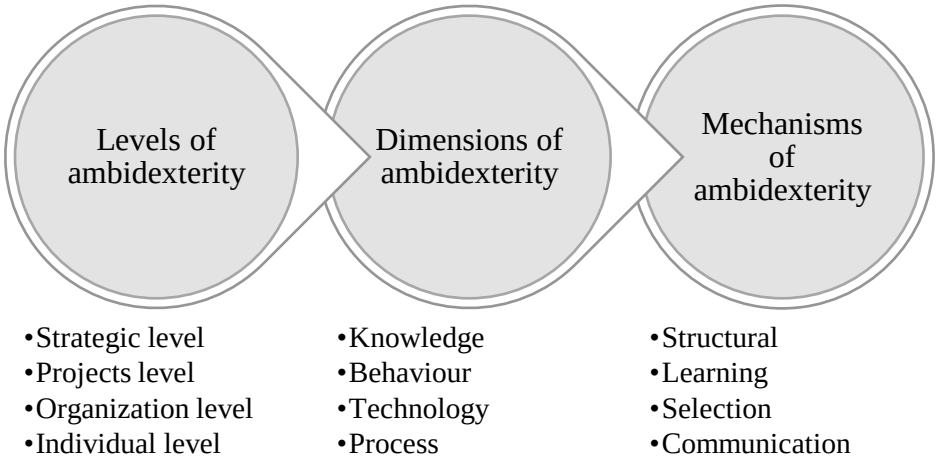

Figure 2-8. Levels of ambidexterity, dimensions and mechanisms

The third step of the analysis revalidated the notion of levels by revisiting 20 of the most relevant articles from the 24 originally filtered out per selection criteria. Identifiers, attributes or definitions and frameworks were extracted from those 24 articles and were used to create Table 2-3. Table 2-3 provides a general understanding of the various levels of ambidexterity with sufficient evidence as to their coverage.

Table 2-3. Analysis for levels of ambidexterity through the review of literature

Key publications	*Motivation of the study*	*Industry*	*Method*	*Strategic level*	*Projects' level*	*Operations level*	*Individual level*
Matthews et al. (2015)	To explore process improvement through the theoretical lens of organizational ambidexterity	Building contractor Engineering consultancy Management consultancy Telecom firms	Qualitative			Process control versus process innovation Operational process improvement	
Eriksson (2013)	To study how Project Based Organizations manage exploration and exploitation paradox at a project implementation level	Construction project management	Theoretical		R&D activities to be diffused through projects		
Jansen et al. (2012)	To study the effect of unit-level ambidexterity on performance taking decentralization of multi-units, their resource dependence and munificence into account	Financial services	Quantitative	Organizational/ strategic level decentralization of sub-units and their resource dependence fall under strategic decisions of the organization			
Chandrasekaran et al. (2012)	To prove that ambidexterity is a competence that resides at three levels of the organization: strategic, projects and meso	R&D projects and high tech business	Quantitative	The initial decision of exploration and exploitation cascades from a strategic decision initiated by senior leadership	Two types of projects have been explored for fit to ambidexterity; exploratory and exploitative types. Incentives are provided to see balance between these projects through		
Gibson and Birkinshaw (2004)	Promotes the notion that contextual ambidexterity mediates behavioural elements in the organization	General	Quantitative				Contextual ambidexterity is achieved by building a context that encourages individuals to make their own judgment of how to best divide their time between conflicting demands

Kortmann et al. 2014	To try to balance between operational efficiency and strategic effectiveness through the use of the mediating role of mass customization (i.e. production)	Manufacturing	Quantitative	Balance between strategic flexibility at a strategic level and operational efficiency at operations level		Balance between strategic flexibility at a strategic level and operational efficiency at operations level	
Aubry and Lievre (2010)	Exploring the tensions between different modes of action that a project manager uses throughout a project	Expedition projects	Qualitative				A project manager is caught in tension between two modes of actions
Andriopoulos and Lewis (2009)	To study nested paradoxes of innovation that cover various levels in the organization: strategic, project and individual	Product design	Qualitative	Applies differentiation and integration techniques to profits versus breakthroughs	Leverages synergies between project constraints and takes emerging possibilities into account Loose coupling versus tight coupling with client during project delivery		Passion versus discipline during delivery as exhibited by knowledge workers
Pellegrinelli et al. (2015)	To study the complementary roles of projects and programs in providing ambidexterity	Retail banking	Qualitative		The complimentary use of projects and programs produce ambidexterity		
Jansen et al. (2005)	To study environmental and organizational antecedents and their effects on ambidexterity	Financial services	Quantitative			Ambidextrous units are characterized with decentralization and formalization of rules	Ambidextrous units are characterized by individuals' connectedness
Cao et al. (2009)	To study how to better operationalize ambidexterity and how to apply it in either a balanced or a combined mode	High tech	Quantitative			The allocation of resources on exploration or exploitation activities is dependent on the way of how ambidexterity is being operationalized	

Turner et al. (2015)	To study the use of intellectual capital and means of achieving ambidexterity	Technology projects	Qualitative		Project based working is dominant work in contemporary organizations and it relies heavily on exploration and exploitation		
Bednarek et al. (2016)	To explore the use of dynamic client portfolio as source of ambidexterity	Global reinsurance industry	Qualitative	The selection of clients is a strategic decision and is very relevant to selecting the portfolio of projects for the organization	The selection of clients is a strategic decision and is very relevant to selecting the portfolio of projects for the organization		
Voss and Voss (2013)	To examine ambidexterity within and across organizational functions and test the effect on performance	Service sector	Quantitative			Ambidexterity is theorized and tested at a functional level: product and market	
Mom et al. (2007)	This study tests the influence of managers' knowledge flow direction on ambidexterity	Electronic industry	Quantitative				Managers' communication means has an effect on ambidexterity
Rothaermel and Alexandre (2009)	To study the effect of internal-external technology sourcing om ambidexterity	Manufacturing	Quantitative			Deciding on the source of technology used is a functional/ operational decision	
Turner et al. (2014)	To develop a framework to capture knowledge requirements of projects at multiple organizational levels	Telecomm.	Qualitative		Capture knowledge at a project level to build exploration and exploitation capabilities		
Lubatkin et al. (2006)	To study how top management team behavioural integration affects organizational-level ambidexterity	Small to medium sized firms	Quantitative				The behavioural integration of TMT has a major effect on ambidexterity

He and Wong (2004)	To examine how exploration and exploitation can jointly influence performance in the context of technological innovation	Manufacturing	Quantitative			Exploration and exploitation requires different structures, process, strategies and capabilities
Wei et al. (2014)	To examine the effect of exploration and exploitation activities on firms with proactive and responsive market orientation	General	Quantitative	Studies the role of strategic orientation of market approach on ambidexterity		

The fourth step of the analysis revalidated the notions of dimensions and mechanisms of ambidexterity. Similarly, identifiers, attributes or definitions and frameworks were extracted but from the larger pool of literature, which consist of 45 articles, and were used to create Table 2-4 and Table 2-5. The intention behind this exercise was to gather the greater pool of research to explore all possible mechanisms of ambidexterity and categorize them for ease of use and identification. This step moves the research from using abstract definitions of ambidexterity towards providing a more definitive solution, and promotes a wider coverage and usage of this organizational ability.

Table 2-4. Analysis of dimensions of ambidexterity through the review of literature

Dimensions	*Attributes and/or identifiers*
Knowledge	Diffuse knowledge that results from R&D activities to projects (Eriksson 2013); codify knowledge to achieve control and codify expertise to obtain new ideas and innovation (Matthews et al. 2015); depart from existing knowledge to pursue radical innovation (Jansen et al. 2006; Jansen et al. 2012); manage innovation paradoxes (Andriopoulos & Lewis 2009); the development of deep knowledge structures to refine existing business, processes and products (Rowley et al. 2000; Jansen et al. 2005); proficiency in exploitation equips the organization with new capabilities of recognizing and assimilating new knowledge (Cao et al. 2009); exploitation and exploration have a direct effect on the absorptive capacity of the organization (Cao et al. 2009); the use of the "stock of knowledge" of the firm has a direct effect on ambidexterity (Turner et al. 2015); clients and portfolio of clients are a new and an external source of knowledge (Im & Rai 2008; Bednarek et al. 2016); knowledge intensive firms can be considered as ambidextrous with the correct processes in place (Bednarek et al. 2016); knowledge about market assists in building ambidexterity (Lubatkin et al. 2006; Wei et al. 2014); knowledge sharing between TMT's (Lubatkin et al. 2006); flow of knowledge and the direction of flow has an impact on ambidexterity (Mom et al. 2007); and projects are knowledge-based activities (Turner et al. 2014).
Behaviour	Managers use cognition to assign exploration and exploitation activities (Kaplan 2008; Walsh 2008; Chandrasekaran et al. 2012); ambidextrous and motivated individuals make their own judgment to distribute their own time among conflicting demands (Gibson & Birkinshaw 2004); balance between stretch & discipline and support & trust (Gibson & Birkinshaw 2004); contextual ambidexterity – alignment and adaptability (Gibson & Birkinshaw 2004); resolve the cognitive tension between two modes of action (Aubry & Lievre 2010); discipline versus passion during the course of delivery (Andriopoulos & Lewis 2009); defenders provide exploration while prospectors provide exploitation (Auh & Menguc 2005); team composition and company affiliation (Beckman 2006); and the ability of managers to simultaneously produce radical innovations during daily operational duties (O'Connor & DeMartino 2006).
Technology	R&D and technology projects (Chandrasekaran et al. 2012); mass customization and production and their effect on ambidexterity – operational efficiency (Kortmann et al. 2014); innovation in New Product Design industries (Andriopoulos & Lewis 2009); product exploration emphasizes developing new product technologies and capabilities (Voss & Voss 2013); internal versus external technology sourcing has an effect on ambidexterity (Rothaermel & Alexandre 2009); and technological innovation (He & Wong 2004).
Process	Ambidexterity through process improvement versus process control (Matthews et al. 2015); operational efficiency versus strategic flexibility (Kortmann et al. 2014); loose coupling versus tight coupling during delivery (Andriopoulos & Lewis 2009); projects offer a process oriented approach and programs offer flexibility and change (Pellegrinelli et al. 2015); process structures in business can see ambidexterity through (Rowley 2000; Jansen et al. 2005); process of attaining knowledge through client portfolios (Bednarek et al. 2016); process innovation (Zahra & Das 1993); ambidexterity used in production process to manage flexibility and efficiency (Adler et al. 1999); successful organizations exercise simultaneous autonomous strategic processes (Burgelman 1991; Burgelman 2002); and sensing opportunities requires set of routines such as strategic ones (O'Reilly & Tushman 2008).

The final step of analysis provides a crisscross analysis between levels of ambidexterity and its dimensions as represented in Table 2-6. This final exercise helps understand what dimensions of ambidexterity are expected at each level of the organization. A crisscross analysis was also applied between dimensions of ambidexterity and its mechanisms as represented in Table 2-7. This exercise also helps prepare managers with methods they need to apply at each level and for each dimension.

Table 2-5. Analysis of mechanisms of ambidexterity through the review of literature

Mechanisms	*Attributes and/or identifiers*
Structural	Organizational structure for multi-unit firms as either centralized or decentralized can affect ambidexterity (Jansen et al. 2012); resource dependence across units (Jansen et al. 2012); structural separation between exploratory and exploitative projects (Chandrasekaran et al. 2012); advancing in mass customization in the operations side (Kortmann et al. 2014); partitioning involves separation between projects depending on their degree of innovativeness (Kortmann et al. 2014); complementary tactics through integration and differentiation across all levels (Andriopoulos & Lewis 2009); the application of a structural process to balance between projects and programs (Pellegrinelli et al. 2015); the use of portfolio management (Pellegrinelli et al. 2015); decentralization of the various structures of the organization (Jansen et al. 2005); balancing versus combining exploitative and exploratory activities (Cao et al. 2009); the selected use of mechanistic and organic organizational structure (Turner et al. 2015); cross functional combination of exploitative and exploratory effort in both product and market domains (Voss & Voss 2013); pursue an ambidextrous organizational design (He & Wong 2004); organizational separation, temporal separation and domain separation (Laive et al. 2010); the simultaneous use of structures enhances performance (Bradach 1997); ambidextrous organizations consist of tightly coupled sub-units (Benner & Tushman 2003); and two parts of the organization operate in different ways (Kaplan & Henderson 2005).
Learning	Exploitative learning to reduce process variation through process control versus exploratory learning to increase process variation (Matthews et al. 2015); switching tasks between resources through cross-resources learning (Kortmann et al. 2014); learning through rationalization versus emergent learning through adaptation to future state (Aubry & Lievre 2010); the interplay between exploratory and exploitative activities enhances the absorptive capacity of the organization (Jansen et al. 2006; Andriopoulos & Lewis 2009); execute projects with learning versus execution with efficiency (Edmonson 2008; Turner et al. 2014); and existing competencies versus new competencies (Danneels 2002).
Selection	Selecting procurement methodologies to facilitate ambidexterity (Eriksson 2013); select project teams in a way that facilitates ambidexterity (Eriksson 2013); allocate incentives for teams to accomplish their assigned exploratory or exploitative projects (Chandrasekaran et al. 2012); adaptive allocation of resources to achieve strategic flexibility (Kortmann et al. 2014); employees' "enrichment" with various tasks comprising routes for innovation- and/or efficiency-oriented tasks (Kortmann et al. 2014); allocation of resources to portfolio of projects by executives (Andriopoulos & Lewis 2009); allocate resources to exploratory or exploitative projects depending on the size of the organization and availability of resources (Cao et al. 2009); selection of the portfolio of clients (Bednarek et al. 2016); prioritize resources for technological innovation (He & Wong 2004); strategic orientation contributes to resources allocation (Wei et al. 2014); exploration beyond organizational boundaries has more impact than exploration within organizational boundaries – source selection (Rosenkopf & Nerkar 2001); capture knowledge from external resources such as clients (Bednarek et al. 2016); internal versus external technology sourcing (Rothaermel & Alexandre 2009); reconfiguring requires reallocating resources from declining business to growth opportunities (O'Reilly & Tushman 2008); and projects' type selection (Pellegrinelli et al. 2015).
Communication	The use of decentralization/centralization to facilitate communication and diffusion for R&D activities (Eriksson 2013); resource dependence across units in a multi-unit context may increase/decrease reliance on communication (Jansen et al. 2012); decisions on ambidextrous efforts such as "decision risk" is communicated downward from executive management (Chandrasekaran et al. 2012); communication from top management to encourage employees to adapt to a certain ambidextrous responsive behaviour (Gibson & Birkinshaw 2004); connectedness of employees, social interaction and knowledge flow (Jansen et al. 2005); the use of dense social networks to communicate knowledge (Turner et al. 2015); the flow and communication of knowledge (Mom et al. 2007); knowledge flow and behaviour of TMTs (Lubatkin et al. 2006); and diversity of ties (Simsek 2009).

Table 2-6. Literature crisscross analysis between levels and dimensions of ambidexterity

	Knowledge	***Behaviour***	***Technology***	***Process***
Strategic	Knowledge sharing across strategic units (Jansen et al. 2012); benefit from knowledge that comes from a strategically selected portfolio of clients (Bednarek et al. 2016); strategic orientation and knowledge of the market (Wei et al. 2014)	Cognition of executives helps decide on exploratory and exploitative strategies (Chandrasekaran et al. 2012); identify leadership conditions to manage strategic contradictions (Smith & Tushman 2005)	Decision of technological exploration versus exploitation is strategized at the top level (Chandrasekaran et al. 2012)	Operational efficiency versus strategic flexibility (Kortmann et al. 2014); successful organizations exercise simultaneous autonomous strategic processes (Burgelman 1991; 2002)
Projects	Benefit from knowledge that comes from a strategically selected portfolio of projects and clients (Bednarek et al. 2016); diffusion of knowledge for R&D activities (Eriksson 2013); the use of intellectual capital (IC) to communicate knowledge within projects (Turner et al. 2015); projects are knowledge-based activities (Turner et al. 2014)	Project manager's behaviour in project delivery, the use of rationalization versus efficiency during delivery (Aubry & Lievre 2010)	Exploratory and exploitative technology projects are incentivized for better performance (Chandrasekaran et al. 2012); technological innovation projects (He & Wong 2004)	Projects provide control and they act as a process to see if learning took place (Vits & Gelders 2002); tight coupling process of delivery versus loose coupling (Andriopoulos & Lewis 2009); projects used for process control and programs used for flexibility (Pellegrinelli et al. 2015)
Operations	Codification of knowledge provides control – exploitation (Matthews et al. 2015); exploration and exploitation build absorptive capacity to make the organization accept new knowledge (Cao et al. 2009)		Codify expertise (exploration) and codify knowledge (exploitation) (Matthews et al. 2015); mass customization, operation and technology of production (Kortmann et al. 2014); focus on new product development versus improve current products (Voss & Voss 2013); decide on the source of technology – internal or external (Rothaermel & Alexandre 2009); prioritize resources to technological innovation (He & Wong 2004)	Process improvement versus process control (Matthews et al. 2015); codification of processes provide control (Matthews et al. 2015); decentralization of process and formalization of rules (Jansen et al. 2005)
Individual	Connectedness and social interaction for better knowledge flow (Jansen et al. 2005); flow of knowledge has an effect on ambidexterity (Mom et al. 2007); knowledge sharing and integration between TMTs (Lubatkin et al. 2006)	Individual behavioural activities lead to achieving contextual ambidexterity (Gibson & Birkinshaw 2004); two modes of cognitive actions in tension (Aubry & Lievre 2010); passion versus discipline in delivery (Andriopoulos & Lewis 2009)		

Table 2-7. Literature analysis between dimensions and mechanisms of ambidexterity

	Structural	***Learning***	***Selection***	***Communication***
Knowledge	The use of complementary tactics (Andriopoulos & Lewis 2009); the use of various organizational structure such as organic or mechanistic (Turner et al. 2015)	Interplay between exploration and exploitation to build absorptive capacity (Andriopoulos & Lewis 2009); learning from clients: nurturing, investigating, holding and watching (Bednarek et al. 2016); execution as learning (Edmonson 2008; Turner et al. 2014); classify new projects based on existing competencies versus new competencies (Danneels 2002)	Allocation of resources to exploratory and exploitative tasks improves on the absorptive capacity of the organization (Cao et al. 2009); the selection of clients' dynamic portfolios to obtain new sources of knowledge (Bednarek et al. 2016); resource allocation based on knowledge about market and the strategic orientation of the organization (Wei et al. 2014)	Knowledge sharing between TMTs (Lubatkin et al. 2006); flow/communication of knowledge (Mom et al. 2007); decentralize knowledge for diffusion (Eriksson 2013); resource dependence & sharing knowledge through communication across units (Jansen et al. 2012); connectedness & social interaction to share knowledge (Jansen et al. 2005); the use of heavy social networks (Turner et al. 2015)
Behaviour		Rationalization versus adaptation for the situation in hand (Aubry & Lievre 2010)	Select behaviourally ambidextrous employees during hiring process	Communication from top management that encourages employees' adaptation to contextual ambidexterity (Gibson & Birkinshaw 2004)
Technology	Project partitioning or separation according to degree of innovativeness (Kortmann et al. 2014); complementary tactics to gather various technological aspects between projects (Andriopoulos & Lewis 2009); combining exploratory and exploitative product and market development (Voss & Voss 2013); organizational design for ambidexterity (He & Wong 2004)	Resources capabilities of switching between technologies and technological projects (Kortmann et al. 2014); classify new projects based on existing competencies versus new competencies (Danneels 2002)	Select project team to facilitate ambidexterity (Eriksson 2013); select procurement methods to facilitate ambidexterity (Eriksson 2013); incentivize project teams to work on exploratory/exploitative projects (Chandrasekaran et al. 2012); select the source of technology – internal/external (Rothaermel & Alexandre 2009); prioritize resources' allocation to technological innovation (He & Wong 2004); resources allocation to projects portfolio (Andriopoulos & Lewis 2009)	Decisions of exploration and exploitation cascades down and communicated from top management (Chandrasekaran et al. 2012)
Process	Complementary tactics (Andriopoulos & Lewis 2009); the application of portfolio management to balance between projects and the overarching program (Pellegrinelli et al. 2015); decentralization of processes (Jansen et al. 2005)	Learning through process innovation versus learning through process control (Matthews et al. 2015); employees learnt capabilities by switching (Kortmann et al. 2014); classify new projects based on existing competenceis versus new competencies (Danneels 2002)	Resources allocation to projects portfolio (Andriopoulos & Lewis 2009); employees' enrichment (Kortmann et al. 2014)	Formalization of rules (Jansen et al. 2005); communication processes through decentralized structures (Jansen et al. 2005)

2.4.4 Levels, dimensions and mechanisms of Ambidexterity

The systematic review and analysis of the literature differentiated between several elements of ambidexterity. These elements included four levels (strategic, project, operations and individual), four dimensions (knowledge, technology, process and behaviour), and four mechanisms (structural, learning, selection, communication). To start with, a distinction between levels of ambidexterity was found in the literature and in research. This entails that ambidexterity is found and can be applied at different levels of the organization, those are the strategic level, the projects level, the operations level and the individual level. Similarly, the literature identified dimensions of ambidexterity, defined in this thesis as those features of the organization which have the ability to create a paradox within which a resolution is required for better performance and sustainability. Four dimensions of ambidexterity were found in the literature, those are the knowledge dimension, the behaviour dimension, the technological dimension and a processual dimension. The literature also distinguished between strategies by which paradoxes within these dimensions can be resolved; these strategies use the following mechanisms – structural, learning, selection and communication.

The analysis of the literature carried out a cross-dimensional examination by applying a crisscross analysis between levels and dimensions (Table 2-6), and between dimensions and mechanisms (Table 2-7). This analysis concluded that each level in the organization consists of four dimensions of ambidexterity in most of the cases, and each dimension can be resolved by using four mechanisms in most of the cases. For example, the strategic-level ambidexterity consists of four dimensions relevant to this level; those are strategic knowledge (Jansen et al. 2012; Wei et al. 2014; Bednarek et al. 2016), behaviour of executives and the board of directors (Chandrasekaran et al. 2012), technological sourcing (Chandrasekaran et al. 2012), and strategic processes (Burgelman 1991, 2002; Kortmann et al. 2014). The paradox within the knowledge dimension in

this case can be resolved using four strategies – structural (Andriopoulos & Lewis 2009; Turner et al. 2015), learning (Edmonson 2008; Andriopoulos & Lewis 2009; Turner et al. 2014; Bednarek et al. 2016), selection (Cao et al. 2009; Wei et al. 2014Bednarek et al. 2016) and communication (Jansen et al. 2005; Lubatkin et al. 2006; Mom et al. 2007; Jansen et al. 2012; Eriksson 2013; Turner et al. 2015). Those levels, dimensions and mechanisms are presented in Figure 2-9. This figure presents a general framework for ambidexterity depicting the levels of the organization and the mechanisms needed to be applied to achieve ambidexterity in each of those levels. A discussion per level with their relevant dimensions and mechanisms is presented in the following sections with each section containing a similar figure to Figure 2-9 with an emphasis shown as a highlight on the relevant level of discussion.

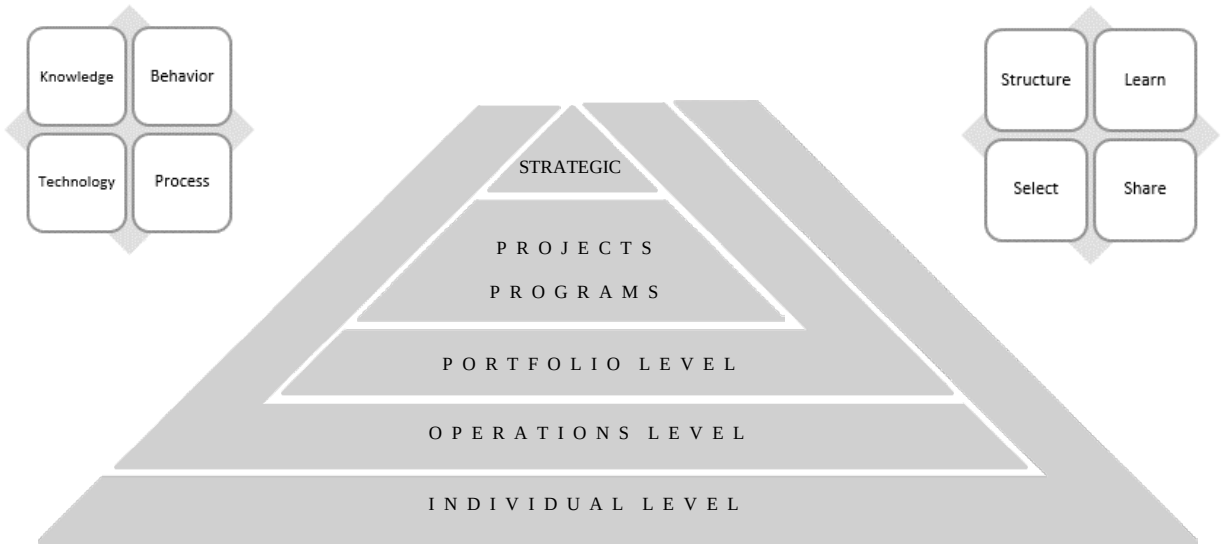

Figure 2-9. Levels, dimensions and mechanisms of ambidexterity – General framework

2.4.4.1 Strategic level, dimensions and mechanisms

A strategic-level ambidexterity targets the highest authority in the organization and works at its very top. It is at the apex of the organization that a decision on degrees and means of achieving exploration and exploitation is generated (Chandrasekaran et al. 2012). Decisions on centralization

and decentralization within the multiunit structure are generated at this level (Jansen et al. 2012). A strategic level determines the degrees of strategic flexibility an organization needs to invest in to see ambidexterity through (Kortmann et al. 2014). Strategic selection of clients in a way that generates new knowledge about the market falls under strategy and strategizing (Wei et al. 2014; Bednarek et al. 2016). A determination on a strategic market orientation in relation to knowledge about market – combined with internal and external knowledge and capabilities – can be used to resolve the paradox of knowledge at this level (Wei et al. 2014). The design of a client portfolio that follows a strategic orientation, and the selection of partners and alliances (Koza & Lewin 1998; Holmqvist 2004; Lavie & Rosenkopf 2006; Tiwana 2008; Wassmer et al. 2016), benefits the organization with a mixture of imported and existing high-level knowledge that can be used at a strategic level (Bednarek et al. 2016). Figure 2-10 below represents this level with an emphasis on its dimensions and possible mechanisms.

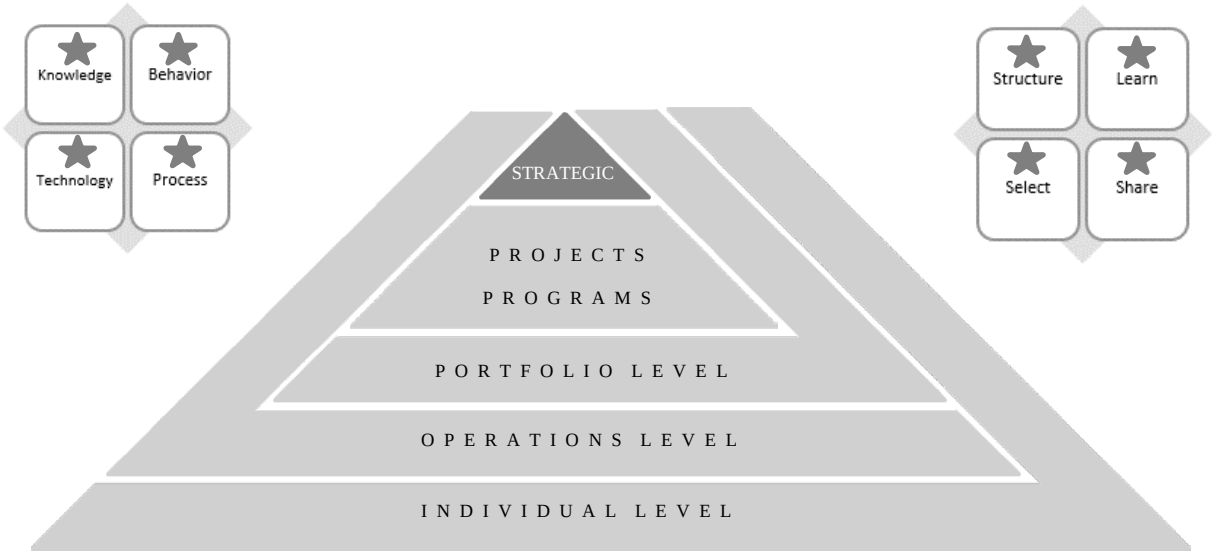

Figure 2-10. Strategic-level ambidexterity

A knowledge dimension that sits at a strategic level addresses issues that are strategic in nature. Simply put, this dimension resolves the tension generated between appropriating new knowledge

versus keeping old knowledge, generally this knowledge addresses issues of strategy, client, market orientation and the likes. These various types of knowledge necessitate sharing between the strategic units to see ambidexterity through (Jansen et al. 2012). Although White (1986) sees decentralization between these units as a mean for enhancing growth, communication mechanisms by way of knowledge sharing amongst decentralized situations remains a must for knowledge diffusion and tension resolution (Eriksson 2013). Knowledge diffusion reduces conflicting demands between units when decentralization takes effect and that has a role in alleviating interdepartmental and multi-unit relevant tension (Orton & Weick 1990).

A behavioural dimension at a strategic level is linked directly to the cognition of senior leadership employed in choosing among exploratory and exploitative activities (Chandrasekaran et al. 2012). It is at this level that leadership can identify and manage strategic contradictions (Smith & Tushman 2005). A technological dimension is similar to that of the knowledge but it deals with the technological component of knowledge after processing (Burgelman 1991, 2002). This dimension may not be apparent at a strategic level apart from determining the source of technology; this effort could as well fall under operations. A process dimension at a strategic level deals with aspects relevant to producing efficiency in operations while dealing with flexibility needs for the organization (Kortmann et al. 2014).

A knowledge dimension and a technology dimension can benefit from structural resolution mechanisms by way of differentiation and integration techniques (Andriopoulos & Lewis 2009). The selection/allocation of resources to strategic projects or portfolio of clients (Bednarek et al. 2016) falls under selection resolution mechanisms and can be part of the integration techniques. Externally induced relationships with clients (Kauppila 2010; Nosella et al. 2012) and strategic partners (Koza & Lewin 1998; Holmqvist 2004; Lavie & Rosenkopf 2006; Tiwana 2008) can help

resolve tension created between the various modes of attaining knowledge. Clients' and/or partners' selection in this instance should not focus on mere profitability and revenue generation; strategizing for growth and "knowledge-development" (Fosstenlokken et al. 2003, p. 869) should be a constituent part of the selection criteria. A mixture between exploratory and exploitative selection types at a strategic level generates better sustainability, growth and performance (Starbuck 1992; Sarvary 1999; Skjølsvik et al. 2007). Learning mechanisms can be seen at this level with Minzberg's (1994) differentiation between deliberate (planned) strategy and emergent (based on learning) strategy. Resolving tension between both can help to achieve a balanced strategy implementation which could lead to better performance and sustainability (Mintzberg 1994).

2.4.4.2 Projects level, dimensions and mechanisms

A projects-level ambidexterity addresses the level where the actual and/or physical work is carried out. This level consists of three sublevels: the projects level, the program level and the portfolio level. This research treats them as one for simplicity but takes their separate effects into account. Figure 2-11 below represents this level with an emphasis on its dimensions and possible mechanisms.

Project-based working and PBOs has prevailed in contemporary organizations (Davies & Hobday 2005; Maylor et al. 2006; Winter et al. 2006; Liu & Leither 2012; Turner et al. 2015). To build ambidexterity in this environment, PBOs distinguish between two types of projects: the exploratory type and the exploitative type (Chandrasekaran et al. 2012). To ensure the success of the two types, executives provide targeted incentives to see ambidexterity through (Chandrasekaran et al. 2012). Andriopoulos and Lewis' (2009) research on the other hand sees ambidexterity in the method of project delivery. They distinguish between "loose coupling" and

"tight coupling" methods for delivery. Loose coupling entails innovation in delivery and loose abidance with specifications and client requirements – this gives way to creativity upon delivery. Tight coupling is the complete opposite as it provides rigid controls and tight abidance to project requirements and client needs. The two approaches imply different ways to handle ambidexterity. While Chandrasekaran et al.'s (2012) research calls for ambidexterity of projects in the organization, Andriopoulos and Lewis's (2009) work calls for ambidexterity in projects themselves – see also Eriksson (2013). Both however contribute towards an overall projects-level ambidexterity in the organization with each at a different sublevel. Chandrasekaran et al.'s (2012) research addresses a portfolio sublevel ambidexterity and Andriopoulos and Lewis (2009) research addresses a single project delivery sublevel.

Figure 2-11. Projects-level ambidexterity

Pellegrinelli et al.'s (2015) research introduces a program sublevel ambidexterity and uses benefits offered by the flexibility accounted for during programs management. In their research, Pellegrinelli et al. (2015) mix the rigidities and controls offered by the project management delivery process with the flexibilities offered by overarching programs in the organization. The

combination between flexibility and control kicks in ambidexterity at the projects level. This entails mega-project organizations with the lack of flexibility offered by an overarching program or a flexible organizational design as susceptible to high failure possibilities (Van Marrewijk et al. 2008; Davies et al. 2009).

A projects-level ambidexterity has dimensions that are similar to those of the strategic level with few hierarchal differences. A knowledge dimension at a projects' level differs slightly from that of the strategic level; while a strategic-level ambidexterity views knowledge as relevant to market knowledge, clients' understanding, strategic growth and the likes, the knowledge dimension at a projects level views knowledge as real/physical and hardcore that requires processing and distribution. This knowledge exists in the form of raw data, information or expertise (Nonaka 1994) and is used during the course of project delivery. Eriksson (2013) uses knowledge produced by R&D activities to diffuse it to other projects, programs and portfolios to see their benefits through the entire portfolio and the organization. A projects-level behaviour dimension addresses the attitudes and the behaviours of the project team, and their discipline and commitment in splitting their time between exploratory and exploitative project activities (Gibson & Birkinshaw 2004). A behaviour level is also linked to the project manager's ability to rationalize during project delivery while using adaptive techniques (Aubry & Lievre 2010). A technology dimension follows through from innovation, R&D activities and the knowledge dimension (He & Wong 2004; Chandrasekaran et al. 2012). A process dimension distinguishes between a process control achieved from the abidance with project management rules (Vits & Gelders 2002; Pellegrinelli et al. 2015) and a process variation that takes place through implementing continuous improvement projects (Anand et al. 2009; Matthews et al. 2014).

As the dimensions of knowledge and process are the most apparent in this level, structural and selection mechanisms can be most instrumental in this case. That of course comes without disregarding the importance of communication and learning mechanisms. Structural mechanisms can occur within projects and within the organization. Structural mechanisms within projects include the physical separation between projects in a way that differentiates between those projects with the exploratory type and those with the exploitative type (Chandrasekaran et al. 2012). A differentiation mechanism between projects along with benefits' integration generates an overall ambidextrous effect to the organization (Andriopoulos & Lewis 2009). A separation with regards to projects' degree of innovativeness falls under structural means as well (Kortmann et al. 2014); and structural mechanisms within the project organization also targets the structural design of the organization. A functional structure that is shaped around a matrix structure and that offers flexibility in distributing resources between projects and the operation, embedded in an overarching mechanistic structure that offers control, provides a sustainable effect in managing and has an effect on the overall performance of the organization (Turner et al. 2015). Selection mechanisms on the other hand sees through the appropriate selection and allocation of resources among the portfolio of projects (He & Wong 2004; Cao et al. 2009; Eriksson 2013), the selection of the various procurement strategies to tackle issues of design aspects versus construction aspects in the engineering and construction field (Eriksson 2013), the selection of the source of technology to be used in project delivery (Rothaermel & Alexandre 2009), and the selection of the source of knowledge (Wei et al. 2014; Bednarek et al. 2016) are all part of selection strategies that are appropriate for use at the projects level.

Although communication and learning mechanisms seem to be less in use at this level compared to other techniques, their effect cannot be ignored. In communication, disseminating

communication between the various projects and enhancing the social connectedness between the projects' resources shields the organization against the obstructions of decentralization (Eriksson 2013; Turner et al. 2015). In learning, learnings that take place through projects implementation facilitate future adaptation of resources (Edmonson 2008), enables future placement for resources in the various types of projects (Danneel 2002) and builds on the switching capabilities of resources (Kortmann et al. 2014).

2.4.4.3 Operations level, dimensions and mechanisms

An operations-level ambidexterity links the strategic-level ambidexterity with that of the projects level. This level works on translating strategic decisions into executable actions and sees them through via the implementation of projects (Chandrasekaran et al. 2012). This level consists of processes, standards, practices and routines which would require constant improvements and innovation to enhance the ambidextrous capabilities of the organization at the process or operations levels (Kortmann et al. 2015; Matthews et al. 2015). These processes, standards, practices and routines normally work on transforming strategies into actions, knowledge into technology, and technology into deliverables (also transforming exploration to exploitation, or vice versa). A focus on improving ambidexterity at a strategic level with no or slight consideration for the operational aspects reduces prospects of economies of scale (Kortmann et al. 2014). Such prospects are necessary for exploitations and short-term gains for the organization (Grewal & Tansuhaj 2001; Kaplan & Norton 2001). Figure 2-12 below represents this level with an emphasis on its dimensions and possible mechanisms.

Figure 2-12. Operations level ambidexterity

Similar to the other levels, an operations level has four dimensions of ambidexterity. Not much support was found in regards to the behaviour dimension though. More support was apparent in the knowledge, technology and (mostly) the process dimensions. A knowledge dimension is seen in the codification of knowledge as suggested by Matthews et al. (2015); this arrangement generates control and more of an exploitative use of this dimension. A technology dimension sees itself in the codification of expertise which could also lead to generating new ideas (Matthews et al. 2015). The codification exercise combines knowledge and technology into a process-like structure for ease of tracking and development. This process structure builds on the absorptive capacity of the organization and allows it to receive more of the new knowledge and technology (Cohen & Levinthal 1990; Zahra & George 2002; Cao et al. 2009). A technological dimension also considers the source of technology in the operation (Rothaermel & Alexandre 2009). A decision to bring in an internal source of technology, or an external source, or a combination of both is an operational decision and is one that can invite ambidexterity into the mix (He & Wong 2004) – this decision could be a strategic one depending on the extent of technology to be used.

Operations that do not consider this mix into their decision making expose themselves to various types of risks. For instance, a tendency to only use internal sources of technology puts the operation under the risk of "obsolescence" (Powel et al. 1996; Teece et al. 1997; Eisenhardt & Martin 2000), while a tendency to use external sources of technology holds the organization hostage and impedes it from reaching an absolute competitive advantage (Teece 1986). Organizational and technological boundaries of the organization shall be taken into account when selecting the source of technology (Rosenkopf & Nerkar 2001). This careful consideration allows the organization to leverage on its own competence and mitigate any of its weaknesses (Nicholls-Nixon & Woo 2003).

The process dimension at this level covers many of the previously mentioned aspects of technology selection. It looks into the process of obtaining technology or knowledge to convert them into projects or deliverables. Such a process follows through what O'Reilly and Tushman (2008) called 'sensing'. Sensing requires the use of carefully crafted routine structures which enable the organization to sense external opportunities (O'Reilly & Tushman 2008). This dimension sees ambidexterity through the application of process innovation and process control (Zahra & Das 1993) – also radical process variations versus process control (Matthews et al. 2015). This allows the organization to jump start and move forward with large but carefully studied steps. A learning mechanism would kick in during such a process improvement plan to allow for learning from previous experiences for the radical jumps to be realistically implementable (Danneels 2002; Matthews et al. 2015).

2.4.4.4 Individual level, dimensions and mechanisms

Ambidexterity at an individual level addresses the workforce allocated within the different levels of the organization. Similar to the projects level, this level contains several sublevels: the top management/executive level (Lubatkin et al. 2006), the mid management/project managers' level

(Mom et al. 2007; Aubry & Lievre 2010) and the knowledge worker level (Ghoshal & Bartlett 1994; Gibson & Birkinshaw 2004; Andriopoulos & Lewis 2009). Figure 2-13 below represents this level with an emphasis on its dimensions and possible mechanisms.

An individual level ambidexterity started with Gibson and Birkinshaw's (2004) notion of contextual ambidexterity as defined by Ghoshal and Bartlett's (1994) framework of discipline, commitment, stretch and support. Executives play a significant role in installing systems and processes which allow such a context to emerge (Burgelman 1983; Ghoshal & Bartlett 1994). Once ambidexterity at an individual level is achieved, each individual transforms into an effective and an efficient engine with built-in self-cognition. This cognition leads to better management of paradoxical situations at the various levels of the organization, and better management of the time spent on exploratory and exploitative activities at each of these levels (Gibson & Birkinshaw 2004). For instance, ambidexterity achieved at an executive level describes executives' cognition of what needs to be done at a strategic level to achieve both flexibility and efficiency (Chandrasekaran et al. 2012), ambidexterity achieved at mid-management level addresses mid- and project managers' means of resolving tensions within and between projects and the operation (Aubry & Lievre 2010), and ambidexterity achieved at the knowledge worker level addresses the paradox that occurs between passionate delivery which breeds creativity versus disciplined delivery which retains control (Andriopoulos & Lewis 2009).

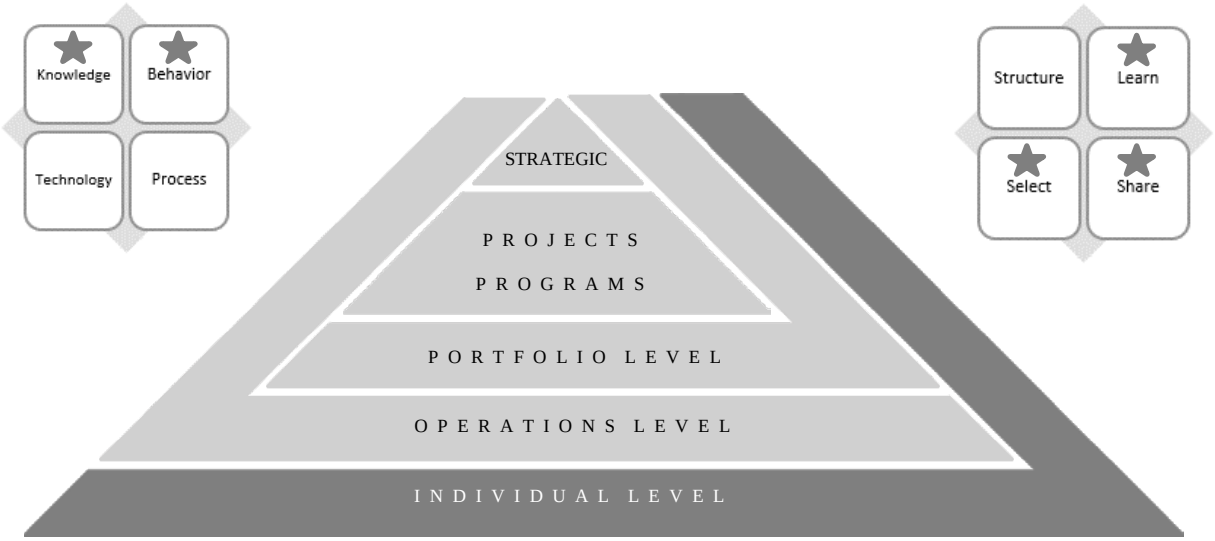

Figure 2-13. Individual-level ambidexterity

An individual-level ambidexterity consists of two dimensions: the knowledge dimension (Jansen et al. 2005; Lubatkin et al. 2006; Mom et al. 2007), and the behaviour dimension (Gibson & Birkinshaw 2004; Andriopoulos & Lewis 2009; Aubry & Lievre 2010). At least this has been the case as far as the systematic review has revealed – this should not prevent other dimensions to be suggested for this level in future studies. Scholars such as Aubry and Lievre (2010), Edmonson (2008), and Turner et al. (2014) suggested the application of learning mechanisms to resolve tension, and scholars such as Daft and Lengel (1986), Egelhof (1991), Jansen et al. (2005) and Mom et al. (2007) suggested the use of communication mechanisms.

For learning mechanisms. Ambidextrous individuals have the ability to learn from previous events to enhance application for future circumstances. Also, they have the ability to learn as they go to adapt to current and new situations (Aubry & Lievre 2010). Learning can be applied at various hierarchal levels. Executives for instance learn from previous strategies (Chandrasekaran et al. 2012), or clients (Bednarek et al. 2016) or strategic partners (Koza & Lwein 1998; Rothaermi & Deeds 2004) to apply and enhance their decision-making capabilities. Project managers apply "two

modes of cognitive actions"; first they rationalize delivery and second they use adaptations and execute as they learn (Mintzberg 1994; Edmonson 2008; Aubry & Lievre 2010). Knowledge workers use cognition and learning mechanisms to balance between their passion to be creative upon delivery and learning on new situations as they go versus their abidance to project requirements (Andriopoulos & Lewis 2009).

For communication mechanisms. Knowledge sharing and communication are key to achieving ambidexterity (Daft & Lengel 1986; Egelhof 1991; Jansen et al. 2005; Mom et al. 2007). Firstly, an improved level of communication allows integration at all levels of the organization. Integration at the knowledge workers' level can be achieved through heavy social networking and this generates "trust and reciprocity" (Turner et al. 2015). Trust and reciprocity allows behavioural integration and dissolves unwillingness to share information (Granovetter 1985; Coleman 1990; Uzzi 1997). A behavioural integration at the Top Management Team (TMT) "influences how its members deal with the contradictory knowledge processes" (Lubatkin et al. 2006, p.647) and facilitates "the processing of disparate demands essential to attaining ambidexterity" (Lubatkin et al. 2006, p.646). Secondly, the direction of flow of knowledge carries a significant effect on achieving ambidexterity. Top-down knowledge flow at a managers' level breeds exploitation (Mom et al. 2007). In this flow direction, managers pass down information that they know about and that they are already familiar with. This information could be used to solve a certain problem and would be stripped out of exploration due to the source and the direction it came from (Daft & Lengel 1986; Egelhof 1991). Bottom-up knowledge flow is immersed in exploratory thinking along with suggestions and "out of the box" thinking and solutions proposed by knowledge workers; hence, this stimulates exploratory thinking (Burgelman 1983; Sanchez & Heene 1996).

Table 2-8 below summarizes the levels of ambidexterity along with their corresponding dimensions as concluded post the systematic review and analysis of the literature. Table 2-8 presents each dimension with an example of possible paradoxical situation most probably seen in ambidextrous organizations. Other possibilities of paradoxical combinations can be concluded from this baseline example.

Table 2-8. Paradoxical situations within dimensions and levels of ambidexterity

Level/ Dimension	***Knowledge***	***Behaviour***	***Technology***	***Process***
Strategic	New knowledge of market from a client or a partner ***versus*** Knowledge about market from internal sources	Cognitive decisions on investment on exploration ***versus*** Cognitive decisions on investment on exploitation	Outsourcing technology for the entire organization ***versus*** Using internal technology	Investing in providing flexibility ***versus*** Investing in efficiency of production
Projects	Applying new knowledge in project delivery ***versus*** Applying known knowledge	Passion for delivery and providing an exploratory attitude ***versus*** Disciplined delivery and strictly following project requirements	The use of new and an untested technology ***versus*** The use of known technology	The application of process improvement via venture projects ***versus*** The use of projects as means to control process of delivery
Operations	Codify old knowledge ***versus*** The use of new ideas, or codify expertise		Outsourcing technology at operations/projects ***versus*** The use of internal known technology	Radical process improvement plans ***versus*** Process control
Individual	Top-down knowledge flow ***versus*** Horizontal flow though social network and connectedness	Passion for delivery and providing an exploratory attitude ***versus*** Disciplined delivery and strictly following project requirements		

2.4.5 A comprehensive definition of ambidexterity

Organizational ambidexterity is a competency (Chandrasekaran et al. 2012) acquired by organizations which can help them achieve performance (Mom et al. 2007; Voss & Voss 2013), growth (He & Wong 2004) and sustainability (Starbuck 1992; Sarvary 1999; Gibson & Birkinshaw 2004; Skjolsvik et al. 2007; Turner et al. 2013, 2014). This competency however has been broadly defined and applied in research (O'Reilly & Tushman 2011; Turner et al. 2013). Such general and abstract definition deprives organizations from fully understanding or structuring mechanisms to help obtain this competency (Gupta et al. 2006; Kauppila 2010). In a recent shift in modern organizations towards the use of projects as the basis of organizing (Davies & Hobday 2005; Maylor et al. 2006; Winter et al. 2006; Liu & Leither 2012; Turner et al. 2015), understanding what ambidexterity means and what it requires in such a context becomes important.

The point of departure for this research therefore has been the need to provide a more comprehensive definition and description of organizational ambidexterity in the context of project organizations. The purpose for this more comprehensive and yet targeted definition is to build a solid foundation to use as a basis to achieve the overall research purpose. This foundation is tended towards building a deep understanding of ambidexterity to facilitate establishing proper practices that can help organizations achieve this competency. This research has so far conducted a systematic review for the literature to generate a taxonomical analysis for elements and components of ambidexterity. Based on this analysis, ambidexterity elements were defined, regrouped and divided into four hierarchal levels (the strategic level, the projects level, the operations level and the individual level) which overlap at certain levels and sublevels. The taxonomical analysis has also promoted a link between the abstract levels of ambidexterity with what the research has identified as dimensions of ambidexterity. Those dimensions were also a

product of grouping and regrouping exercise, and they represent those organizational functions which have the capability of creating a paradox; within this paradox a resolution for better performance and sustainability is required. Those dimensions are: the knowledge dimension, the behaviour dimension, the technological dimension and the process dimension. The analysis of the literature has also generated resolution mechanisms which could be applied to dimensions and levels of ambidexterity. Those mechanisms are: structural, learning, selection and communication mechanisms.

In light of the detailed analyses, grouping and regrouping exercise, and with the purpose of this research in mind, the following more comprehensive definition of ambidexterity in the PBOs is presented:

> *Ambidexterity is the ability of the organization to employ structural, learning, selection and communication techniques to resolve paradoxical challenges within intellectual, behavioural, technological and processual dimensions in the various levels of the organization - these levels (strategic, projects, operations and individual) can be separate or interwoven - to overcome situations of external dynamicity and competitive environments, considering internal limiting factors such as size, resources availability and absorptive capacity of the organization.*

The researcher posits that this definition of ambidexterity brings a more comprehensive understanding to this capability for use by both scholars and practitioners. Scholars can benefit from this structured definition to widen the pool of research, create more defined variables and constructs out of it, and harness it for the use in other fields as appropriate. Practitioners on the other hand can learn how to enhance performance in their organizations by converting this structured definition into a tool that measures and analyzes ambidexterity in their organizations. They can also use it to develop processes and routines which help them achieve and maintain ambidexterity.

Organizational ambidexterity has taken the shape of a research paradigm in the organization theory research (Raisch & Birkinshaw 2008). A research paradigm is a theoretical framework of a certain discipline which encompasses theories and testing methods altogether (Kuhn 1962). Based on the work of Dubin (1978) and Fry and Smith (1987), theories require four conditions to affect a paradigmatic shift, those are the units of interest in the theory, congruence between these units, the boundaries within which a theory can be applied, and the contingency effects. This research has contributed so far with variables and elements which support the development of the new shift in paradigm. This new development could help scholars and practitioners work within definitive boundaries of ambidexterity instead of creating own conceptualizations and testing methods for it.

2.5 Tension in organizations

2.5.1 Purpose

The previous section provided a systematic review on the ambidexterity literature and concluded with a comprehensive and more structured definition for ambidexterity. The comprehensive definition and the review of literature on ambidexterity proposed resolution mechanisms for paradoxical situations and tensional forces which can occur in organizations. It was explained that these tensional forces were necessary and that, by their resolution, those ambidextrous organizations step into a world of sustainability and better performance. The previous section has identified cases or situations of paradoxes generated within dimensions of *knowledge*, *behaviour*, *technology* and *process* as embedded in *strategic*, *projects*, *operations* and *individual* levels of the organization. It has also identified resolution mechanisms for paradoxes generated within those dimensions. To support this conclusion, this section sheds more light on tensional forces in organizations and provides more knowledge on resolution mechanisms through what is called the theory of paradox.

2.5.2 The theory of paradox

Strategizing raises the need for organizing and putting systems and processes through (Mintzberg 1990). Organizing things by way of creating systems and processes leads to the creation and intersection of physical structures, social structures, cultures and technology (Hatch & Cunliffe 2013). Therefore, while working on the product of this intersection, organizations face multiple internal tensions (Smith & Lewis 2011). Internal tensions within the organization can either be inherent in the system of organizing, or can be viewed as a product of the social actors' own perceptions and appreciation of the organization surroundings (Clegg 2002; Papachroni et al. 2016). Tension for instance can result from the act of collaboration and control within the

organization (Sundaramurthy & Lewis 2003; Papachroni et al. 2016), the drive to efficiency when preventing inflexible tendencies (Adler et al. 1999), radical innovation compared to incremental innovation (Andriopoulos & Lewis 2009), exploration versus exploitation (Smith & Tushman 2005), social responsibility versus growth and profit generation (Margolis & Walsh 2003), and personal passion versus disciplined delivery of projects or tasks (Andriopoulos & Lewis 2009).

Modern organizational theories, such as the contingency theory, offer collaborative means for coping with tension (Woodward 1965). Contingency theory for instance calls for identifying "the key contingencies in each situation … to determine the best fit between them" (Hatch & Cunliffe 2013, p.32). It tries to find the best organizational alignment with internal processes and external environmental constraints to ease any tension which could arise from within the organization (Lawrence & Lorsch 1967). Smith and Lewis (2011) call the contingency theory's strategy for dealing with tension *acceptance*. That is, contingency theory accepts tension and tries to find the best organizational fit for the conditions that are causing the tension (Hofer 1975). Smith and Lewis (2011) on the other hand add a new strategy in response to this tension, which is *resolution*. Smith and Lewis's (2011) *resolution* complements the contingency theory's *acceptance* by way of dealing with tension – i.e. it deals with tension with openness. In other means, Smith and Lewis (2011) call for exploring tension to see if contradicting elements can be worked out simultaneously – similar to Gibson and Birkinshaw's (2004) notion of contextual ambidexterity. In their research on contextual ambidexterity Gibson and Birkinshaw (2004) established that exploration and exploitation can progress hand in hand and in a simultaneous rhythm by paying a close attention to the behavioural context of the organization (Ghoshal & Bartlett 1994). Smith and Lewis's (2011) means of achieving efficiency from this tension follows a theory of paradox which calls for embracing a "dynamic equilibrium" model for organizing.

2.5.3 Tension in organizations

Those internal tensional forces generated in organizations can be understood as inherent in the system of organizing, particularly when exposed to external influencers (Cameron & Quinn 1988). Friction with the external world arises between the boundary of the organization and the complex human system (Smith & Berg 1987). An example of that is the tension which arises between two different functional groups, or a group and a sub-group, or an individual and a group, where one belong to a different system or has an external influence. Tension on the other hand can be socially constructed in the minds of social actors when placed in a certain situation or if they have certain pre-constructed experiences (Ashcraft et al. 2009). This type of tension can be observed when employees interpret different meanings for the various organizational messages they receive (Putnam 1986; Argyris 1988). Another example of that is the tension observed at a particular situation or a location (Poole & Van de Ven 1989).

Smith and Lewis' (2011) research draws from the literature of organizational tension and theorizes that balanced tensions, similar to the concept of ambidexterity, can breed sustainability. However, in order to achieve sustainability, tension should be one that is healthy and paradoxical in nature. In that, Smith and Lewis (2011, p. 382) define a paradox with the set of "contradictory yet interrelated elements that exist simultaneously and persist over time". In this regard, Smith and Lewis (2011) – based on the literature review by Lewis (2000), Luscher and Lewis (2008) and Quinn (1988) – defined four organizational paradoxes which represent the core elements of organizations to a certain degree. These paradoxical elements, when managed appropriately, can lead to sustainability (Smith & Lewis 2011). The four categories are represented in Figure 2-14; they are the learning paradox, the belonging paradox, the performing paradox and the organizing paradox.

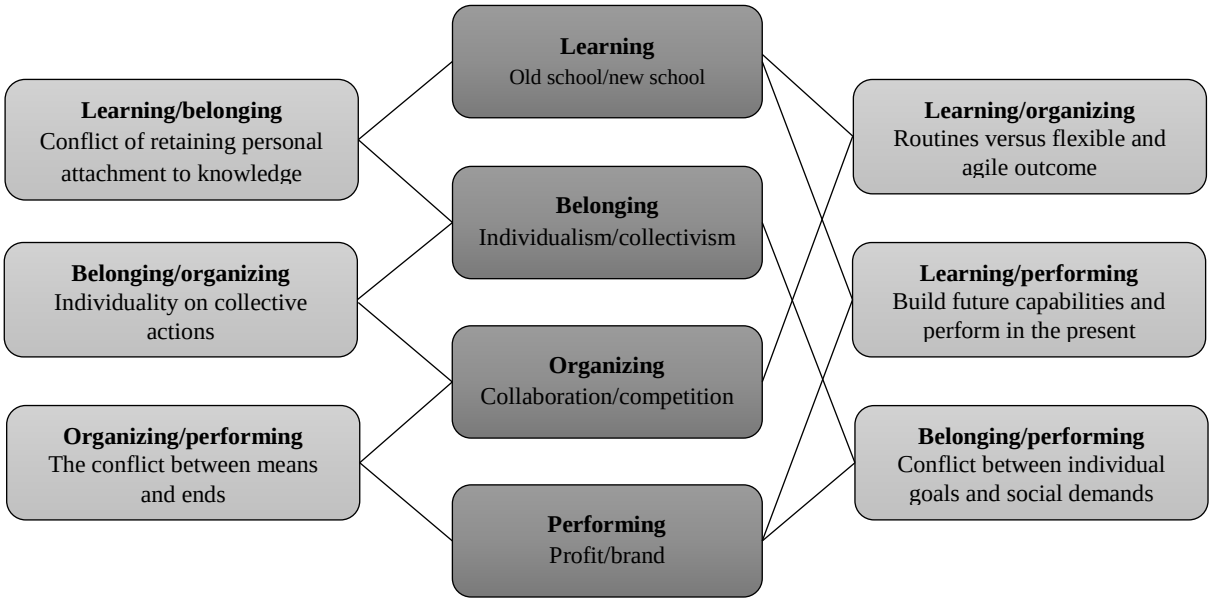

Figure 2-14. Organizational tensions (source Smith & Lewis 2011)

The learning paradox refers to internal tension observed at the organization which deals with adding new knowledge into its knowledge base, thereby forcing the abandonment of old knowledge (O'Reilly & Tushman 2008). This tension could also be observed via the incremental and radical changes in innovation that could well occur during any knowledge base enhancement or update (Andriopoulos & Lewis 2009). It also could refer to the speed of the update on the knowledge base (Weick & Quinn 1999) and the type of information added to it (Quinn 1988; March 1991; Ghemawat & Costa 1993). The belonging paradox, as defined by Smith and Lewis (2011), refers to the tension that could arise between individuals with their own thoughts of belonging, and the direction that their group intends to take which may oppose the individuals' own belonging (Brewer 1991; Markus & Kitayama 1991; Pratt & Foreman 2000; Huy 2002; Badaracco 1998; McKenna 2006). The organizing paradox, as defined and constructed by Smith and Lewis (2011), refers to the tension that arises from the way the organizational system is directed to see emerging designs or products through (Ghemawat & Costa 1993; Denison et al.

1995; Adler et al. 1999; Flynn & Chatman 2001; Siggelkow & Levinthal 2003; Luscher & Lewis 2008). Designing for competition can suppress collaboration for example (Murnighan & Conlon 1991). The same applies to the differences which are inherent in a routine system that seems to be put in place in a prophylactic measure to oppose any change to the system (Denison et al. 1995; Gittell 2004). Last is the performing paradox; this paradox is relevant to the contradictory requirements of the various stakeholders who wish to see their requirements delivered through the vehicle of the organization (Donaldson & Preston 1995; Margolis & Walsh 2003; Denis et al. 2007; Jarzabkowski & Sillince 2007). For all these paradoxical tensions, relinquishing to any of their sides resembles a modernist approach to achieving performance – i.e. acceptance strategy in the contingency theory. Such a strategy may see performance in the short term but would not guarantee a longer term sustainable solution (Smith & Lewis 2011).

These categories of paradoxes can create tension amongst themselves as well. For example, a paradox can be observed between the combination of learning and belonging (Ibarra 1999; Fiol 2002; O'Mahony & Bechky 2006) – an individual belonging to a certain school while learnings of that school became history: Likewise, the combination of learning and organizing (Teece & Pisano 1994; Eisenhardt & Martin 2000) – when organizing for a certain system while the learnings behind that system became history. In the performing paradox and the belonging paradox (Dukerich et al. 2002; Kreiner et al. 2006) tension arises from the generation of opposing goals by the various stakeholders each with goals which reflect their own identity. Finally, the performing paradox and the organizing paradox refer to the tension created between *means* and *ends* (Kaplan & Norton 1996; Gittell 2004; Eisenstat et al. 2008). Smith and Lewis (2011) conceptualize that tensions can also exist among and in between each of the levels and layers of the organization.

2.5.4 Tension resolution

Two strategies for resolving internal tensions were explained briefly: *acceptance* which is the outcome of a modernist perspective to organizational theory (Woodward 1965; Lawrence & Lorsch 1967; Hatch & Cunliffe 2013), and *resolution* following on from the theory of paradox proposed by Smith and Lewis (2011).

Acceptance as a strategy refers to social actors coping with tension. This strategy requires social actors to "shift their expectations for rationality and linearity to accept paradoxes as persistent and unsolvable matter" (Smith & Lewis 2011, p. 385). Based on this notion, and in alignment with the precepts of the contingency theory, performance can be achieved. However, such performance would be that of a short-term nature since it is achieved via the alignment of the organization's internal processes with current tensions as they arise from the external environment (Woodward 1965; Lawrence & Lorsch 1967). Taking an example from the organizational ambidexterity literature: an external environmental change that entails an immediate effect on some technological need would influence organizations to align their internal systems and processes accordingly. This would entail shifting resources to the exploration side of the business and easing up on the exploitation side (O'Reilly & Tushman 2008). Such a shift may harm the long-term profitability and sustainability of the business. However, it resolves an immediate and a pressing need which makes the organization see through a short-term performance or need (Smith & Lewis 2011; Hatch & Cunliffe 2013). Cameron (1986) sees this as relinquishing with the aim of refueling, which may be short-sighted but is an absolute necessity and may also stimulate creativity (Beech et al. 2004).

Resolution on the other hand is an invite for restructuring the relationship between elements under tension (Bartunek 1988). Under this strategy, Poole and Van de Den (1989) suggested strategies for handling tension to resolve conflicting demands (Argyris 1988). Some of these strategies call

for a structural separation between competing elements (Lavie et al. 2010). Structural separation is the physical separation between elements under tension by way of departmental separation, for example. Temporal separation is another strategy which uses time to separate between elements under tension – e.g., exploration in the ambidextrous organization can be carried out at different times of exploitation to relieve some of the workload from shared resources (Lavie et al. 2010). Synthesis tries to bring all tensional forces together in a bid for integration (Poole & Van de ven 1989; Andriopoulos & Lewis 2009). This resolution resembles the behavioural perspective in achieving ambidexterity (Gibson & Birkinshaw 2004; Simsek 2009).

In light of resolution, Smith and Lewis (2011, p. 386) adopted Bartunek's (1988) notion for reframing "the relations between polarized elements" to create an "integrative model" which seeks to achieve a dynamic equilibrium among contributing factors. Different than a static model, which measures equilibrium when all of its components are at rest, a dynamic equilibrium achieves such a state when all incoming and outgoing components – i.e. the flow of information and conflicting demands – produce an equal flux of energy. Achieving such a balanced state would not only stabilize the system – it will help improve on it (Nonaka & Toyama 2002).

Smith and Lewis (2011) proposed an integrative model – presented in Figure 2-15 – which is based on the integration of acceptance and resolution. The integrative model proposes a dynamic equilibrium between vicious and virtuous cycles of tensions. The model presented propositions for the theory of paradox which stood untested. Smith and Lewis's (2011) model starts with the paradoxical tensions presented in Figure 2-14. Smith and Lewis (2011) envisage that these tensions would start off as hidden (latent) until brought to the surface by external stimuli. When this happens, these tensions become noticeable (salient) with a requirement of an intervention. Without intervention, these tensions can drive the organization into what Smith and Lewis (2011) identified

as “vicious cycles”. These cycles are characterized by personnel denials and resistance to change or collaboration (Cialdini et al. 1995). Such vicious personal drivers could feed into the organizational system and create an overall body that is resistant to change (Henderson & Clark 1990; Eisenhardt & Martin 2000; Gilbert 2005).

Acceptance as depicted in the dynamic equilibrium model presented in Figure 2-15 feeds into *resolution*. This denotes that individuals who have capabilities to manage tensions paradoxically (i.e. *resolution*), should have an *acceptance* capability as a prerequisite. Accepting tension on one of the sides and working through this tension on the opposite side reveals the individual’s or the organization’s creativity tendency (Beech et al. 2004), and facilitates the appreciation for and comprehension of the tension backgrounds and links (Smith & Berg 1987). However, in order for an individual or an organization to obtain these capabilities, Smith and Lewis (2011, p.391) propose training oneself on gaining “cognitive and behavioural complexity, emotional equanimity, and dynamic organizational capabilities”.

An individual’s cognitive complexity is their tendency to comprehend such tensional interrelations and the creativity that they can bring in to resolve this tension (Smith & Tushman 2005; Beech et al. 2004). Their emotional equanimity refers to their calmness in dealing with situations that are under tension (Huy 1999). The dynamic capabilities of the organization is directly related to the processes within the organization itself that allows its leaders to foster a culture of dynamicity (Teece 2007), integration (Smith & Lewis 2011), collaboration (Ghoshal & Bartlett 1994; Gibson & Birkinshaw 2004) and learning (Zollo & Winter 2002).

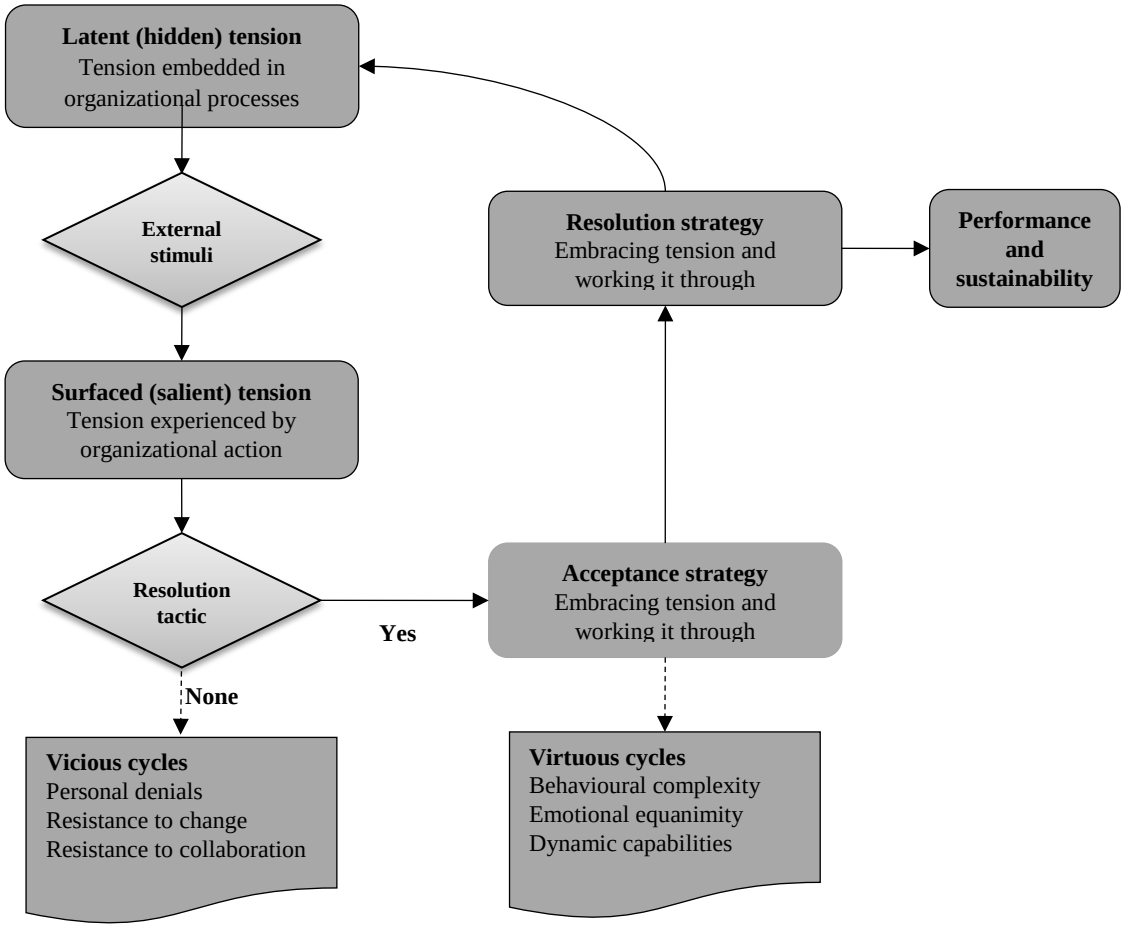

Figure 2-15. A dynamic equilibrium model of organizing (source Smith & Lewis 2011)

Based on this, it can be concluded that adopting one strategy to resolve tension may not bring the utmost optimization required to see performance or sustainability through. This notion proves that both strategies are not mutually exclusive and that they should be applied in complementarity to each other. Applying this notion in the perspective of an organizational context, the following proposition may take predominance:

> *Acceptance as a strategy could facilitate a short-term resolution which feeds into a short-term success or performance, while at the same time this strategy could lay the path for a later resolution that takes on the longevity of the solution. However, working on the two resolutions in complementarity could reinforce the harmonization of the two strategies for the betterment of the organization.*

This means that both strategies should feed into each other, and that one cannot decide on a resolution strategy separate from the other one. An example of this is the short-term solutions provided by exploitative efforts in an organization seeking sustainability while setting the path for long-term exploratory solutions. For example, for-profit organizations would accept carrying out a job at a loss in the short term in anticipation of long-term benefits. Long-term benefits in this particular case could be building up the company's resume and experience, or, branding, or using current resources in projects lest they lose them to competition. In this example, the resolution towards a long-term solution could lead to interim acceptance and the application of the short-term contingency theory. This example depicts a short-term acceptance of a situation that renders the company non-profitable for a short period of time, while the longer term strategy would be performance and sustainability, protection of brand, and maintaining key resources.

2.5.5 The theory of ambidexterity

The theory of paradox presented by Smith and Lewis (2011) contributed with four categories of paradox – these are the learning, the belonging, the performing and the organizing paradoxes – while the systematic literature review on ambidexterity produced levels, dimensions and mechanisms of ambidexterity. A high level of similarity can be noticed when comparing the theme brought up by levels and dimensions with the four categories of paradox. This similarity supports the notion raised by the systematic review of the literature on ambidexterity. The theme of a learning paradox, for instance, resides at a projects level and can be found as well in strategic and in operations levels. A belonging paradox can be found in an individual level with all its sublevels. A performing paradox can be found in both the projects and the strategic levels, and an organizing paradox can be found in the operations level. Similarly, the dimensions of ambidexterity can be mapped against the categories of paradox through their relevant level(s) in the organization.

Table 2-9 presents an exercise of mapping between levels, dimensions and categories of paradox. The mapping shown in Table 2-9 can be presented in other ways, basing the comparison against levels or dimensions rather than using the categories of paradox for this purpose. The end result however will not see any difference.

Table 2-9. Categories of paradox with levels and dimensions of ambidexterity

Categories of paradox	Levels of ambidexterity	Dimensions of ambidexterity
Learning *Old school/new school*	Projects level Strategic level Operations level Individual level	Knowledge Behaviour Technology Process
Belonging *Individualism/collectivism*	Projects level Strategic level Operations level Individual level	Knowledge Behaviour Technology Process
Organizing *Collaboration/competition*	Projects level Strategic level Operations level Individual level	Knowledge Behaviour Technology Process
Performing *Profit/brand*	Projects level Strategic level Operations level Individual level	Knowledge Behaviour Technology Process

With this mapping in mind, more paradoxical situations or new tensional forces can be thought of. Thinking of new paradoxical situations or generating more areas where tension could occur helps us understand the mechanism of organizing and how organizations work. When this understanding is achieved, mechanisms for resolving tension can be made more efficient. To start with, generating new tensional forces by means of introducing the categories of paradox can support and augment the initial conclusions on tensions and dimensions presented in the previous section. Introducing Smith and Lewis's (2011) categories of paradox into levels and dimensions redefines how tension is shaped in the organization. This introduction suggests that tension can transcend the levels of the organization while respecting the dimensions of ambidexterity. For instance, taking the tension which can occur between the learning paradox and the belonging paradox as a case example; a sub-tensional force which combines the relevant levels or sublevels attached to

learning and belonging can be thought of. In this particular case, and in reference to Table 2-9, it can be found that tension can happen between a projects level and an individual level around the knowledge dimension; i.e. own individual knowledge may contradict that of a project's knowledge – a project could use old school knowledge and a team member may view this as an old way of thinking. The successful combination between those two levels at the knowledge dimension produces (or calls for) ambidexterity. Another example is the tension created between the learning and the performing paradoxes. In this case example, a tension could be found to be generated between a learning paradox at the strategic level and a performing paradox at a projects level around the process dimension; i.e. long-term strategy may infuse into a process of learning on the job, while project managers push back to achieve a process that sees through solid performance and better productivity. More examples and more combinations of paradoxical situations or tensional forces between levels and/or sublevels that require resolution can be thought of. Understanding this mechanism of tension generation and resolution sheds light on what is going on in the organization, which helps design a better system that overcomes unresolved situations. It is not the intention of this thesis, however, to think of and present all possible situations or combinations of tensions and paradoxes in organizations. The thesis has so far presented examples and arguments which aim to stimulate the thinking of the reader towards this particular matter and to carry it over to the final conclusion of this thesis. Moreover, this argument has so far contributed to the addition of the identifier *interwoven* to the definition of ambidexterity presented in the previous section. *Interwoven* in this case represents the tension's ability of transcendence through levels of the organization which requires complex organizational capabilities to capture and resolve it.

Finally, the theory of paradox presented an important aspect on resolution mechanisms which require consideration. The dynamic nature of resolution mechanisms invited two strategies as discussed previously; those are *acceptance* and *resolution*. *Acceptance* votes for short-term recognition and approval of the status quo while *resolution* looks for long-term goals. The dynamic application for both strategies shall be taken into account during the application of mechanisms of ambidexterity discussed earlier (i.e. structural, learning selection and communication). Each of these mechanisms can be thought of as a continuum with two extents – those extents could represent exploration and exploitation, acceptance and argumentation, or any other polarized events or situations. For structural mechanisms for example, these two extents could resemble the acceptance of a current inflexible structure versus the introduction of an opposing flexible structure, or vice versa – see Turner et al. (2015). In learning, these could represent the acceptance of old school ways (exploration) versus arguing on new learnings (exploration). In selection, these could be represented by accepting – or not changing – current staff (exploitation) versus adding new staff who infuse new talents/clients/technologies/skills (exploration). In communication, this could be represented by the acceptance of instructions cascading from top management down to employees (exploitation) versus counter-arguing those with a bottom-up better informed communication emanating from employees and their surroundings (exploration) – see Mom et al. (2007).

2.6 Project Based Organizations

2.6.1 Purpose

The purpose of this section is to shed light on project-based arrangements in organizations and the function of Project Based Organizations (PBOs) along with a description of their dynamic capabilities. The aim of this research is build an understanding of how ambidexterity can be achieved in PBO, for that it looks into the performance and ambidexterity of organizations embedded in project-based environments, which is the case in most business arrangements today. The Project Based Organization hosts many projects and it dedicates its operation to the management and delivery of those projects and their overarching programs. These organizations mostly use project portfolio functions and practices as the core of their operation. Davies and Brady (2016) argued that these functions and practices provide the organization with its dynamic capabilities.

In light of this, this section starts off with explaining the nature and the requirements of project management and defines what a project is and how it contributes in forming what is so-called a "temporary organization". It then sheds light on program management as a management function used to manage multiple projects with aligned benefits. Next, it discusses project portfolio management practices, the origin of these practices and their applicability in the operation of PBOs. The section then describes what a PBO is and how it gathers all such functions beneath one umbrella. Finally, this section covers the dynamic capability requirements under such an organizational arrangement.

2.6.2 Project management

This section provides a brief discussion on the general conception and the definition of projects and project management. The discussion starts off with laying out general definitions for projects,

project management and the temporary organization. It then hints on the classical handling of projects and project management with a mention of the modern conceptualization of project management and the temporary organization.

The discipline of project management – or the classical/traditional project management (Svejvig & Anderson 2015) – goes back to the 1950s with claims that it even dates back to the 1930s (Svejvig & Anderson 2015). The scholarly body has defined a project as a temporary endeavor, attempt or exercise (Turner 1990, 1993, 1999) that has a beginning and an end (Barnes 1989), and that involves human interaction with the aim of creating an impact or a change (Anderson & Grude 2009), which is complex and requires the input of compounded efforts to burn a budget and achieve a scope and a schedule (Cleland & King 1983) for the sake of delivering a unique product or service (Smith 1985). Projects are the building blocks of the modern organization (Grundy 2000), and they have long been used to deliver its strategy. Project management is the collection of processes, practices or methodologies needed to see the outcomes of the project through (PMI 2013a). The successful delivery of projects leads to the success of the organization and the achievement of its strategy (Thiry & Deguire 2007; Meskendahl 2010). Literature however differentiated between two modes of success; one that is of a short-term nature (Cooke-Davies 2002), which Serrador and Turner (2015) identified as *efficiency* to mark the efficient use of tools and techniques in the delivery organization. The efficient use of tools and techniques may not necessarily lead to the success of the organization rather than the success of the project management process on its own (Cooke-Davies 2002). The long-term success of projects (Cooke-Davies 2002), which Serrador and Turner (2015) called *effectiveness*, looks at the benefits the project provides to the organization and looks at its long-term strategy, its sustainability, and the longevity of its effect (Shenhar & Dvir 2007). The two modes of success are of critical importance

for the Project Based Organization as it affects it shorter and longer term strategies combined (Shenhar & Dvir 2007).

The literature review carried out by Turner and Muller (2003) considered a project a "production function", where its function resides in the organization (Varian 1987; Hart 1989), by which a project manager is looked at as a salesperson who buys and sells inputs and outputs in the "open market" (Turner & Muller 2003). Turner and Muller (2003) also considered a project as a "temporary organization" with the project manager acting as its CEO (Cleland & Kerzner 1985), or an "agency of change" where Anderson and Grude (1987) looked at it as a vehicle which carries a set of objectives and the project using its inertia to deliver the changes promised with these objectives. A project can also be considered as an "agency for resources utilization" in the organization (Turner & Muller 2003). The project in this case acts as a vehicle which helps assign resources with specific tasks in the organization (Cleland & Kerzner 1985). Carroll (1995) linked the success of organizations to their ability to attract and assign resources in this case, whereby these resources can be taken forward to deliver change in the organization. Finally, Turner and Muller (2003) looked at the project as an "agency for uncertainty management". The uncertainty of the product and the process has a major effect on deciding the contract and the contract management in a project organization taking into account the principal and agent theories (Muller & Turner 2005).

Academics such as Anderson (2008), Lenfle and Loche (2010) Shenhar and Dvir (2007) and Svejvig and Anderson (2015) may be seen as initiators of a movement towards a new way of thinking about projects and project management. The discipline of project management is old and its practices have not been renewed. This triggered the need for a fresh look at the so-called traditional or classical project management. For instance, in the traditional or the classical view of

project management, a project was looked at as a tool (Packendorff 1995), or a set of tools and techniques (Jugdev et al. 2001), with their aim to just finish the project on time and on budget (Shenhar & Dvir 2007) with the application of a simplistic life-cycle model (Winter et al. 2006; PMI 2013a). The project was seen to be task-oriented (Anderson 2008) and infused with routine forthcomings and repetitive solutions to overcome uniqueness (Lenfle & Loche 2010). The new movement of project management, so-called "re-thinking project management", looks at the project as a temporary organization (Karrbom-Gustavsson & Hallin 2015; Burke & Morley 2016; Ebers & Maurer 2016; Peters & Pressey 2016; Tukiainen & Granqvist 2016), its management as holistic with the aim of achieving innovation combined with effectiveness and efficiency (Prado & Sapsed 2016), its success is measured by effectiveness, efficiency and innovation (Jugdev et al. 2001), its aim is to achieve business results rather than a one-time goal (Shenhar & Dvir 2007), and it uses more complex models which recognize the complexity of uncertainty (Winter et al. 2006; Geraldi et al. 2011). The new movement toward the modern project management has a major role in building this thesis as it plays an important part in forming the so-called Project Based Organization.

2.6.3 Program management

This section provides a brief discussion on program management, how it is defined, and why/how it is linked to strategy. This discussion also covers a review on program success, how it is looked at, and how it is being conceived.

A program is a collection of components, each of which could be a collection of tasks, projects or even smaller programs and other components (PMI 2013b). These components need to be managed all together in a coordinated fashion to achieve the benefits of the program (PMI 2013b; Thiry 2015). Program management is the coordinated management of these components in a way

which leads to the achievement of the overall strategy of the organization through attending to and managing the program benefits (PMI 2013b).

Literature has strongly linked strategy with program delivery, the scope of which works in most cases at an organizational strategic level (Thiry 2015). An organization's strategy which is delivered via a program cascades down to projects, programs and portfolios – as an effect of it being emergent (Mintzberg 1990, 1994). In other words, the strategic implementation of programs could result in producing more strategic projects, programs or even portfolios where they all link back to the strategic direction of the organization, which could in its turn change during a program or a project implementation.

To mention some of the relevant literature on programs and to highlight the direct link they have with strategy: (1) Murray-Webster and Thiry (2000) equipped program management with modern techniques to integrate the benefits realized from projects with the organizational strategy, which leads to the formation of programs. (2) Thiry (2007) linked programs with the long-term strategic intent of the organization rather than the short-term achievements of project management, taking a slightly different view from what was perceived as traditional in project management. (3) The Guide to Project Management Body of Knowledge (PMI 2013b) adopted a similar thought to Thiry (2007) in aligning program management with the strategic direction of the organization combined with the envisaged objectives and goals of the program.

The review on project management success introduced two acronyms for success as discussed in the previous subsection: *project efficiency*, as defined by Serrador and Turner (2015), which promotes the efficient management of projects in satisfying the "golden triangle" of scope, cost and quality (Gardiner & Stewart 2000), and *project effectiveness* which takes into account the

project strategic success. The latter links success and project outcomes to the benefits the project should realize which, in turn, would help the organization achieve its strategy.

The success of programs is measured differently. It is measured against the realization of benefits which is set during the formation of the program and its strategy (Thiry 2007; Shao et al. 2012). Those benefits should not be confused with any of the program or project deliverables as they represent objectives and goals which emanate from strategy. The strategy which produces programs can be viewed as being emergent due to its vulnerability to evolving program needs, outcomes and the changing requirements of stakeholders, and the never-ending technological breakthroughs (Mintzberg & Waters 1994). Program success looks into the effectiveness of delivery, and hence promotes benefits management via the delivery of its constituent projects. Program delivery is characterized by the longevity of solution and the delivery process (Thiry 2015); hence its envisaged benefits are always susceptible to change (Thiry 2002). Measuring program success against such changing benefits involves a cumbersome effort and requires major attention to stakeholders' management combined with a careful management of the cascaded strategy.

Shao and Muller (2011) identified four constructs against which a program's success can be measured. These refer to (1) the efficient management of the program taking into account the impact on the program team (as being part of stakeholders), and stakeholders, as their satisfaction carries a significant weight, (2) business success as it relates to strategy, (3) the preparedness for the future, and (4) the social effects the program brings about. It is, however, imperative to consider programs within their contextual settings when taking a view on success. The context of a program is the "dynamic cultural, political and business environment in which the program operates"

(Pellegrinelli et al. 2007, p. 41). Due to its dynamicity, it is influential in determining success of programs under execution.

Basing their research on Shao and Muller (2011) and Pellegrinelli et al.'s (2007) context and success, Shao et al. (2012) considered four measures for program success: (1) the "delivery capability" of the organization, which coincides to a great extent with the project level – this measure includes time, budget, functionality, member satisfaction, user satisfaction, customer satisfaction, supplier satisfaction, sponsor satisfaction, other stakeholders' satisfaction and achieving business results; (2) the "operational capability" which looks at the process of delivery and the capability of the organization to deliver – although this was defined to be of a program, Turner et al. (2009) used it to measure project success; (3) the "marketing capability" which looks at repeat business and the power to influence other businesses, and (4) the "innovative capability" looks at new technologies and technological leverage.

A program and the management of programs can be looked at as a major constituent of the Project Based Organization which is dependent on the scope and the coverage of the organization in comparison with the scope and coverage of the program.

2.6.4 Portfolio management

This section provides a brief introduction on project portfolio management, how it conceptually originated, and how it facilitates the link between project management and operations. Portfolio success or its effectiveness is not covered in this section in a similar fashion to the preceding discussions on projects and programs. A section on portfolio success and effectiveness is laid out separately in the following literature review under section 2.7.4 to allow a smooth flow of literature in alignment with the study objectives and research questions.

The discipline of project management began to grow in the 1950s, but it was not until recently that organizations started realizing the impact that projects would have on businesses' overall profitability (Dinsmore 1999; Levine 2005). This has called for the evolution of what is known as enterprise project management (Dinsmore 1999; Szymczak & Walker 2003). Enterprise project management looks at leveraging the knowledge and learnings out of all projects within the organization for the betterment of its operation (Szymczak & Walker 2003). Executives started realizing the importance of the holistic management of projects within their organizations and began to look at how this is linked to the overall business performance and sustainability (Levine 2005; Brook & Pagnanelli 2014; Petro & Gardiner 2015). This alerted executives to grasp the importance of knowing what type of projects shall be taken on board by the organization, the number of these projects, and their relevance to the operation and strategy. A mere enterprise project management ceased to achieve this objective. This objective therefore has called for changing the concept of the enterprise in extracting the knowledge out of projects and adapting to the projects operations side. This discipline is now called project portfolio management (PPM) (Levine 2005). Project portfolio management can be seen as the link between operations and project management (Turner & Keegan 1999, 2001; Levine 2005; PMI 2013c). Operations management provides for the management of strategies, objectives, overall performance, stakeholders, resources availability and cash flows, while project management involves the management of the project schedule, project cost, project performance, scope control, resource utilization and cash usage (Levine 2005). Project and operations management should report to each other to infuse in efficiencies into the business (Petro & Gardiner 2015), and sustainability of the business and its products may not be easily achieved (Brook & Pagnanelli 2014). Not only does project portfolio management facilitate bridging the gap between operations and project

management; it also provides a backward feedback loop between projects' performance and operations to amend project selection and termination criteria (Unger et al 2012). Projects' selection and termination are considered as main subsets to project portfolio management and are enforcers to its strategy (Meskendahl 2010).

Levine (2005, p.23) defined PPM as the "management of the project portfolio as to maximize the contribution of projects to the overall welfare and success of the enterprise". Hence, and in this regards, projects shall be aligned with the strategic direction of the organization, its culture and values. They shall also contribute to the cash flow for "for-profit" organizations, or value to the social organization, and they shall ensure effective usage for the available resources. Levine (2005) divides PPM into two phases: the prioritization or the project selection phase and the project management phase. The first phase guides the organization towards defining business needs for these projects for them to be selected or prioritized (Srivannaboon & Milosevic 2006), it also helps determine their benefits to the organization (Cooke-Davies 2002), and identifies any risks that they may impose on the overall organizational results (De Reyck et al. 2005; Olson 2008). This phase also decides on the availability of resources needed to execute projects (Archer & Ghasemzadeh 1999). The second phase deals with the traditional project management for those selected projects. This phase entails the application of traditional project management processes and procedures per any of the known standards or practices such as APMBOK (APM 2012), CIOB (CIOB 2014), PMBOK (PMI 2013a), or PRINCE2 (Bentley 2010) or the likes. The traditional management of projects in this case should allow for the backward feedback loop to the organizations' executives.

A portfolio manager under the title of Chief Operation Officer (COO) or Business Director (BD) would normally assume the responsibility of leading the business project portfolio or portfolios to see the above through. The functional departments of the (matrixed) organization (Galbraith 1971)

would normally provide the resources needed for these projects. Project portfolios in this case, as they have their own internal planning, should align with the functional department resources' future plans and envisaged engagements (Blichfeldt & Eskerod 2008). This requires project portfolio management to be integrated with the marketing operation to facilitate the smooth and non-risky application of project portfolio management processes (Cooper et al. 1999). Marketing in this case would tally with exploratory functions of the ambidextrous organization, and project management and the effective use of the available resources would tally with its exploitative functions.

Many studies and standards that emerged more recently in the 2000s suggested ways of dealing with project portfolio management and its processes and practices. The Project Management Institute for instance produced a standard that hosts processes of project portfolio management (PMI 2013c). PMI (2013c) defines PPM as the "coordinated management of one of more portfolios to achieve organizational strategies and objectives" (p. 5). The third edition of the standard for portfolio management identifies the importance of applying project portfolio management for all types of relevant organizations and their projects. This standard covers projects and organizations categorized as for-profit, NGOs, or governmental organizations that have internal or external projects managed through them, among others. The standard promotes the consistent use of vocabulary of portfolio management to systemize its application across all disciplines.

In a bid to systemize and standardize portfolio management, the PPM standard suggested three process groups for management. It starts with the *portfolio definition* group, which covers all processes relevant to defining strategy, business objectives and the required relation to projects. The second group covers the *alignment processes* which filters though the selection and termination criteria of projects within the portfolio. The third group of processes emphasizes

monitoring and controlling the portfolio in relation to operations. The third group is set towards allowing the portfolio to achieve its intended objectives such as ROI or strategy implementation KPIs. Other researchers also proposed frameworks and processes for portfolio management. Archer and Ghasemzadeh (1999) proposed an integrated framework for this purpose, Cooper et al. (2001) and Cooper et al. (1999) applied their own framework to new product development and added functions that are relevant to marketing and market exploration, and Benko and McFarlan (2003) proposed a framework that aligns portfolio objectives to strategy. This thesis focuses more on using PMI processes as a base due to the breadth of its processes and the detailed inclusion of tools and techniques for PPM.

Project portfolio management can be (and should be) considered as a major constituent of the management of the PBOs (Thiry & Deguire 2007). It can also be looked at as a major supplement to sustain dynamicity and dynamic capabilities in these organizations (Davies & Brady 2016); these capabilities are discussed in the following sections.

2.6.5 Project Based Organizations

This section integrates the views and definitions for projects, programs and portfolio management from the previous sections under one umbrella which is the Project Based Organization (PBO). It then defines PBOs starting from their origin and link them to the general theory of organizing displaying an initial conceptualization of how the structure of these organizations looks like.

Organizations nowadays look at the business world and business ventures as projectified activities (Thiry & Deguire 2007; Geraldi et al. 2011). It is to this extent that the emergence of what has been called a Project Based Organization (PBO) has come into play (Sydow et al. 2004). It is per Grundy's (2002) conceptualization of projects as building blocks or vectors of the strategy which

has led to the thought of combining the general management of organizing with the temporary management of its constituent projects (Thiry & Deguire 2007). These thoughts have drawn increased attention to this form of organizing which held temporality in its folds (DeFillippi & Arthur 1998; Hobday 1998; Keegan & Turner 1998; Gann & Salter 2000; Lindkvist 2004; Sydow et al. 2004). Hobday (1998, p.874) defined a Project Based Organization as an organization where "the project is the primary business mechanism for coordinating and integrating all the main business functions of the [organization with] no formal functional coordination across project lines". Thiry and Deguire (2007) added the necessity of integrating that with the IT functions within the organization to achieve a holistic capture of the project and portfolio management functions and the knowledge generated from the entire portfolio of projects within the organization. Hobbs and Aubry (2005) inserted the function of the Project Management Office (PMO) or the Program Management Office (PgMO) to maintain a smooth flow of information amongst all projects and programs of the PBO along with a certain level of compliance with a standardized set of tools and techniques for their management. Martinsuo and Dietrich (2002) called for implementing the practices of Project Portfolio Management (PPM) for the management of the PBO to see through a holistic management of its projects and programs along with an enhancement of the PBO's dynamic capabilities as inherited from the use of PPM practices (Davies & Brady 2016).

Subsequently, the organizational structure of a PBO started looking much like the normal organization as adopted by the general management of organizations (Hodgson 2000; Bredillet 2004; Jamieson & Morris 2004) – see Figure 2-16. Projects and their execution team sit at the bottom of the hierarchy with a layer of program management atop; a PMO or a PgMO sits at the side to ensure sufficient support is provided for the two layers; the Human Resources function

(HR) or the commercial management function could either preside as external support or could reside in any of these supportive functions; and the portfolio management sits at the leadership and senior management level and it has direct links to the top management where strategy is being formulated.

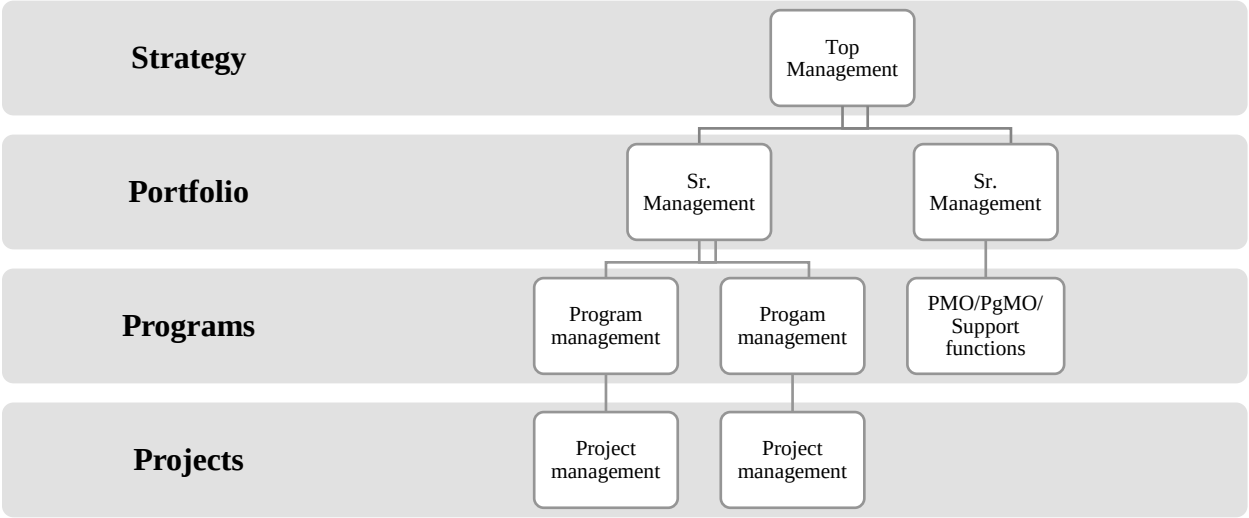

Figure 2-16. A typical simplistic organizational structure for a PBO (source Thiry & Deguire 2007)

The typical organizational model presented in Figure 2-16 seems simplistic and may not simulate the complex nature of a PBO, particularly when embedded in a dynamic environment – which most of the PBO cases are. Hobday (1998), for instance, viewed PBOs as structural innovative bodies which form and reform strategies and structures around projects. Authors such as Bredillet et al. (2005), Bresnen et al. (2004) and Thiry and Deguire (2004) linked PBO structural models to the emergent strategy, which by nature change in accordance to the requirements of the projects, programs or the environment (Mintzberg 1994).

This has called for a change in the conceptualization of a PBO's structural model to something which is more accurate and something that allows the emergence of a strategy that is capable to kick in when needed, and also something which caters for complex situations (Zuboff & Maxmin 2002).

Thiry and Deguire (2007) in their turn proposed an organizational structural model which caters for a horizontal integration and management for all projects from one end to realize their benefits through program management, and a vertical integration for the projects that links them with the corporate strategy through portfolio management – Figure 2-17. Here, they emphasized integration to see the benefits of the PBO through as follows (Thiry & Deguire 2007, p.652):

> *… a well integrated PBO would be expected to display strong interrelationships between its projects and both its business and corporate strategies; in such an organization project managers would be expected to be appointed in senior management roles, or senior manager would be expected to view project management as an integrative process. A less integrated PBO should reveal focus on resource allocation and data gathering; project managers would be expected to play a purely product delivery roles.*

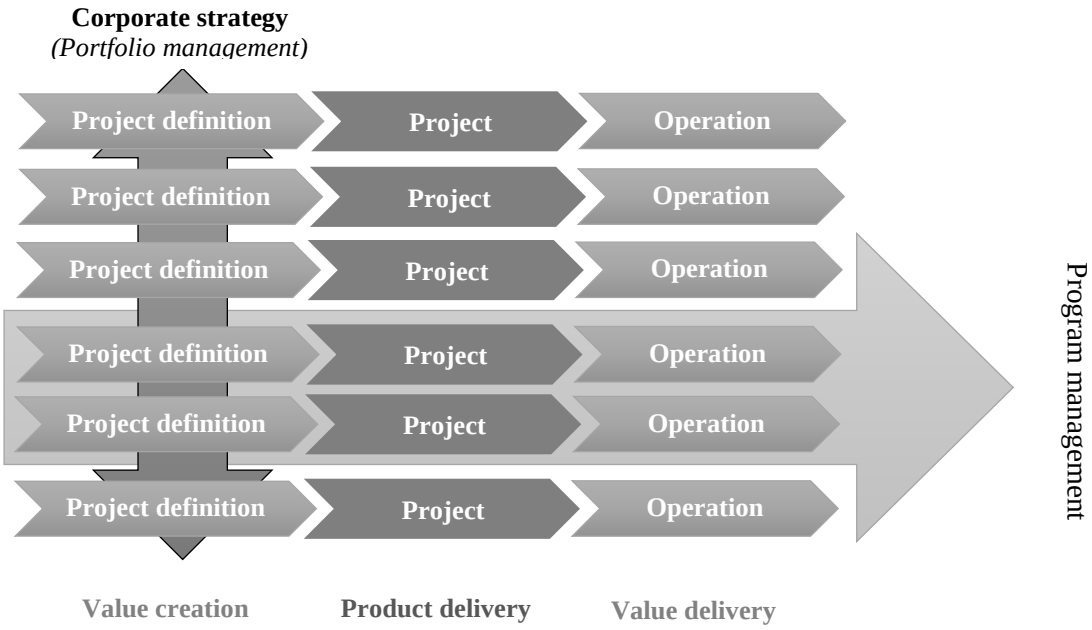

Figure 2-17. Vertical and horizontal integration in PBOs (source Thiry & Deguire 2007)

A PBO is therefore looked at as one of the latest forms of a modern organization and how modern organizing should take place (Thiry & Deguire 2007). This form allows the presence of dynamic capabilities to nurture the system of organizing. These capabilities enable PBOs to cater for a surrounding dynamic environment as presented in the simulation in Figure 2-17 and as discussed in Davies and Brady (2016).

2.6.6 Dynamic capabilities in Project Based Organizations

This section provides a foundational guide which helps understand organizations' dynamic capabilities, PBOs' dynamic capabilities, and their relevance to operational and project capabilities. The section starts with defining what an organizational capability is; it then links it with what dynamic capabilities for an organization should be, then how and why a PBO should have dynamic capabilities of its own and what these should entail. This section also sheds light on organizational "operational capabilities" and emphasizes their "project capabilities" to show how project and dynamic capabilities are linked.

Organizational capability is the organization's ability to process knowledge, pursue, comprehend and learn new knowledge, and understand the dynamics behind strategic growth (Chandler 1990). These capabilities are organization-specific and they develop through their own employees with the use of trial and error and feedback loops. Chandler (1990) distinguished between *operational* capabilities and *strategic* capabilities. Operational capabilities, per Chandler (1990), are those that the organization needs to run its day-to-day operations, such as the human resourcing operation, the financial management operation, production, general management and general operations. On the other hand, strategic capabilities as defined by Chandler (1990) are those needed at the top management level and they are relied upon to guide the strategic direction of the organization, the allocation of its resources, and the allocation of its investments. The strategic capabilities for an organization perform a similar role to its dynamic capabilities (Teece 2010). Organizational ambidexterity for instance is considered as part of the organization's dynamic capability (O'Reilly & Tushman 2008) – i.e. organizational ambidexterity is the organizational capability which an organization uses to prioritize its investments towards exploration and exploitation and to drive future investments (Chandrasekarana et al. 2012).

Davies and Brady (2016) argued that Chandler's (1990) definition and conceptualization of operational capabilities does not include that of the project capabilities. Davies and Brady (2016) and Brady and Davies (2004) drew their theoretical understanding on project capabilities from March's (1991) conceptualization of organizational learning and organizational ambidexterity. They argued that project capabilities are those capabilities applied to the management of projects and programs, and those capabilities support the strategic force of the organization. By that, their argument consisted of the need for the fluidity/adaptability of the organization's strategic base within a volatile environment with the use of exploratory projects that introduce new ideas, creative ventures and innovation. This move is of a bottom-up nature, which feeds to the strategic direction from the lower end of the organization's hierarchy. Once this move in the organization's strategic base takes the form of routine work it switches to a top-down feedback of exploitative routines (Davies & Brady 2000) – this is what an evolutionary theory entails (Winter 1995).

To provide more clarity on this subject, Davies and Brady (2016, p.319) described the relationship between project capabilities and dynamic capabilities along with ambidexterity by identifying two types of projects:

> *…(1) 'routine projects' which exploit the existing base, utilize proven technologies and mature products, and address current customer demands; (2) 'innovative projects' which support base-moving strategies that explore innovative alternatives, experiment with new ideas, scheme and approaches, and create entirely new technologies and markets.*

By that, Davies and Brady (2016, p.322) distinguished between project capabilities and dynamic capabilities as follows:

> *Project capabilities refer to the management of knowledge, structures and tasks required at the operational level to deal with different types of individual projects (project management for innovative and routine projects) or interrelated sets of projects (programme management), whereas dynamic capabilities are required to achieve a firm's longer term strategic objectives (portfolio management).*

Drawing from the above definitions and conceptualization of the relationship between project capabilities and dynamic capabilities, Figure 2-18 provides a graphical representation of the relationship between the two as embedded in various types of environments (volatile, moderate and stable). Davies and Brady (2016, p.314) concluded that this relationship is "reciprocal, recursive and mutually reinforcing" due to the need for continuous feedback to create routine. In that context, projects and programs can be looked at as project capabilities due to their involvement in delivery, life cycle and benefits management (Morris 2013), while portfolio management can be identified and looked at as part of the organization's dynamic capability due to its role in high-level planning, prioritization of investments and strategizing (Morris & Jamieson 2005; Morgan et al. 2007; Martinsuo 2013; Jonas 2010; Davies and Brady 2016).

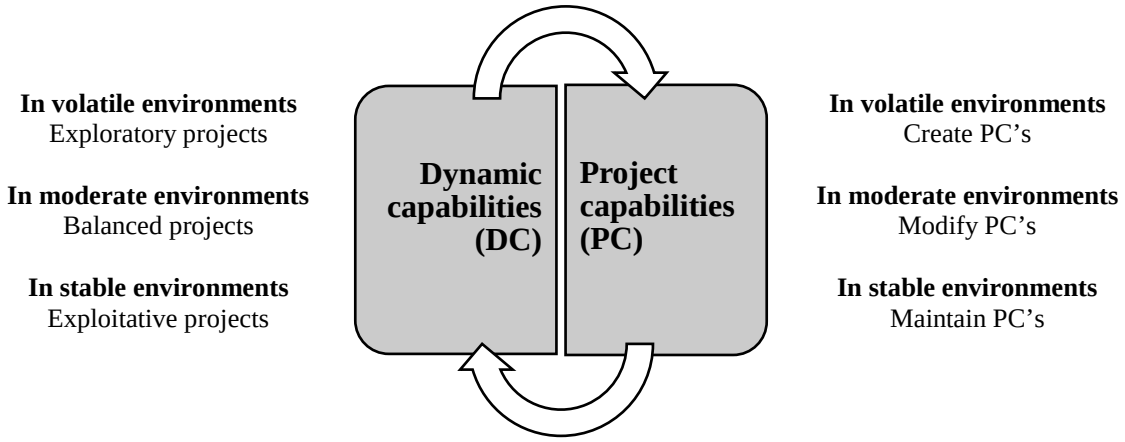

Figure 2-18. Dynamic and project capabilities (source Davies & Brady 2016)

Dynamic capabilities are associated with two traditions, perspectives or views: the resource-based view (RBV) and the evolutionary theory (Peteraf et al. 2013; Di Stefano et al. 2014). The importance and the functionality of these views are discussed as follows:

The *Resource-Based View (RBV)* looks at the dynamic capability as the organization's and the top management's ability to allocate resources, change allocations swiftly and appropriately to fit with the requirements of the external environment (Teece 2007, 2010). This ability implies top management's understanding of the market and the surrounding environment and their ability to sense and seize opportunities as feasible and as appropriate (Teece 2007, 2010). Eisenhardt and Martin (2000) added to the RBV view a contingency perspective, whereby they distinguished between "moderately dynamic markets" where change is frequent but mostly predictable – dynamic capabilities in this case resemble the normal and sometimes complex operating procedures (Cyert & March 1963) – and the "high velocity markets" where operating procedures should revert back to simple and non-complex routines (Eisenhardt & Sull 2000). On the other hand, an *evolutionary theory's* view of dynamic capabilities refers to Winter's (1995) conceptualization of learning, adaptation and changing in routines to adapt with the dynamic environment (Zollo & Winter 2002; Helfat & Peteraf 2003). The evolutionary theory takes into account what is termed "metaroutines" to help identify routines which are no longer working when change occurs (Knott 2001; King & Tucci 2002; Wezel et al. 2006). Metaroutines in this case include a process of learning, comprehending and seeking appropriate feedback to modify those old and non-working routines (Amburgey et al. 1993; Adler et al. 1999).

2.7 Project portfolio management frameworks and practices

2.7.1 Purpose

The purpose of this section of the literature review is to shed light on PPM-relevant frameworks and practices, their importance, and their effect on the portfolio success in particular and the business and the organization in general. The purpose of this thesis was made clear at its onset by its inclusion of PPM practices to study their effect on organizational ambidexterity as a mediator to success and performance. Organizational ambidexterity has been studied and analyzed in sufficient detail in this thesis. This study and the analysis have contributed so far to generating a comprehensive definition for this mediating construct. This definition was facilitated by way of a systematic review which was carried out using top-tier academic journals and high-quality qualitative and quantitative research. This comprehensive definition is carried over in this thesis to help link organizational ambidexterity with portfolio management and its practices. As an initial suggestion, this thesis proposes the use of the *mechanisms of ambidexterity* as generated from the systematic review of the literature for this purpose as highlighted in the below carried-over definition:

> *Ambidexterity is the ability of the organization to employ* ***structural, learning, selection and communication techniques*** *to resolve paradoxical challenges within intellectual, behavioural, technological and processual dimensions in the various levels of the organization - these levels (strategic, projects, operations and individual) can be separate or interwoven - to overcome situations of external dynamicity and competitive environments, considering internal limiting factors such as size, resources availability and absorptive capacity of the organization.*

PPM practices come into play in this section of the literature to lay the path for establishing relationships between PPM practices and organizational ambidexterity through the mechanisms of ambidexterity. The establishment of such a relationship may contribute in generating

enhancements to known portfolio management practices for future considerations by scholars and practitioners.

This section of the reviewed literature is divided into three main subsections. The first subsection addresses known PPM frameworks and adopts the one presented by Meskendahl (2010) due to its relevance to the study. The second subsection addresses and reviews the practices of portfolio management. The third subsection is a review of the effectiveness of these practices through the introduction of a measure for PPM effectiveness, and exploring the various studies which have used such a measure before. This measure is used later in this study to represent PPM practices in the quantitative study part in Chapter 5.

This section addresses and supports providing an answer to the third research question and links it to the answer provided to the second research question. The second and the third research questions are repeated below for ease of reference:

RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations?

RQ 3: How can project portfolio management as a process support ambidexterity in Project Based Organizations?

Firstly, mechanisms of ambidexterity were identified in this thesis by providing an answer to the second research question. This has been partly provided through the systematic review of the literature carried out earlier in this chapter and verified later during the field investigations as presented in Chapter 5. Secondly, portfolio management practices are linked to those mechanisms via conducting a comparative review of the literature as presented in the coming sections of this chapter, and later through the qualitative and quantitative studies presented in Chapter 5.

2.7.2 Project portfolio management framework

The strategic orientation for organizations has an effect on determining the processes and practices within which those organizations operate (Meskendahl 2010). The strategic direction or orientation is not easily measured or quantified as executives sometimes choose to narratively construct it (Andrews 1997) and holistically refer to it as part of business plans (Venkatraman 1989). It may therefore be subject to various interpretations (Sharma 2000). Strategy may also be mixed up with other organizational functions such as operational effectiveness (Porter 1996). Venkatraman's (1989) research has therefore created constructs to ease the quantification of strategic orientations. These comprise a combination of organizations' aggressiveness in exploring or exploiting, their appetite for risk, the ways they prepare for the future, their means they employ to defend their territories, their proactiveness, and their means of analyzing market internally and externally (Venkatranman 1989; Shepherd et al. 2008). These constructs and their dimensions formed a strong basis for strategic measurements and found their way into many similar studies, such as in Morgan and Strong's (2003) business performance improvements, Rauch et al.'s (2009) study on the effect on entrepreneurship orientation, and Talke and Hultink's (2003) research on the impact of new product launch strategy on corporates.

Meskendahl (2010) adopted three organizational dimensions from Venkatraman's (1989) research that an organization would normally consider in constructing its strategic orientation. These are its analytic posture – which is the organization's means of understanding and analyzing its surroundings (Morgan & Strong 2003; Shepherd et al. 2008), its risk-taking posture – which is the organization's appetite to risk taking and the extent of uncertainty that it agrees with (Courtney et al. 1997; Talke & Hultink 2003; Talke 2007), and its aggressiveness – which refers to the extent of the organization's hostility in the market place and its behaviour upon exploring new

opportunities (Covin & Covin 1990; Fombrun & Ginsberg 1990; Lampkin & Dess 2001). The strategic orientation as such has a major effect on filtering market opportunities and the way the portfolio is formed with its evaluation and selection criteria (Muller et al. 2008; Meskendahl 2010). For example, an organization that adopts a high analytical posture with its opportunities would normally have a more formalized approach towards projects' selection and resources' exploitation (Meskendahl 2010), while organizations which agree with major market hostility and risk-taking postures may provide less formalized means in adding projects to their portfolio to fulfill a yielding portfolio selection and evaluation criterion. Examples of that would be hostile takeovers (Hirshleifer & Titman 1990; Shivdasani 1993) or endeavoring to enter new market sectors in a quick strategic response to changing technology (Utterback 1994; Shepherd et al. 2008).

Meskendahl (2010) conceptualizes that strategic orientation has an effect on the structure of the organization's portfolio of projects as depicted in Figure 2-19. The portfolio structuring is the organization's means of setting the relevant projects' evaluation, assessment, prioritization, selection and termination criteria (Archer & Ghasemzadeh 1999; Cooper et al. 2001; Blichfeldt & Eskerod 2008; Killen et al. 2008). Portfolio structuring refers to: (1) the consistency of selection and termination and the consistency of applying the relevant criteria to the entire portfolio of projects within the organization (Jamieson & Morris 2004), (2) the integrations of the various operational functions within the organization with portfolio management – such as marketing, finance, production or IT (Kahn et al. 2006; Coulon et al. 2009), (3) the portfolio means (or formalization) in obtaining data on projects, applying analysis methods, and its transparency in applying rules and procedures of selection (Payne 1995; Fricke et al. 2000), and finally (4) the portfolio's diligence in bringing in the right number and type of projects in comparison to the number and type of committed resources in the delivery organization (Nobeoka & Cusumano

1997; Martinsuo & Lehtonen 2007). The structuring of a portfolio in such a manner is highly affected by the strategic orientation of the organization, which in turn is affected by the external environment (Petit 2012). The external environment would dictate certain rules, or impose a new technology which would activate the strategic orientation dimensions to trigger a certain portfolio structure. The portfolio consistency, formalization, integration and diligence would be affected by such an imposition (Meskendahl 2010). Choosing the right portfolio structure leads therefore to better organizational performance, business success and portfolio success (Muller et al. 2008; Meskendahl 2010).

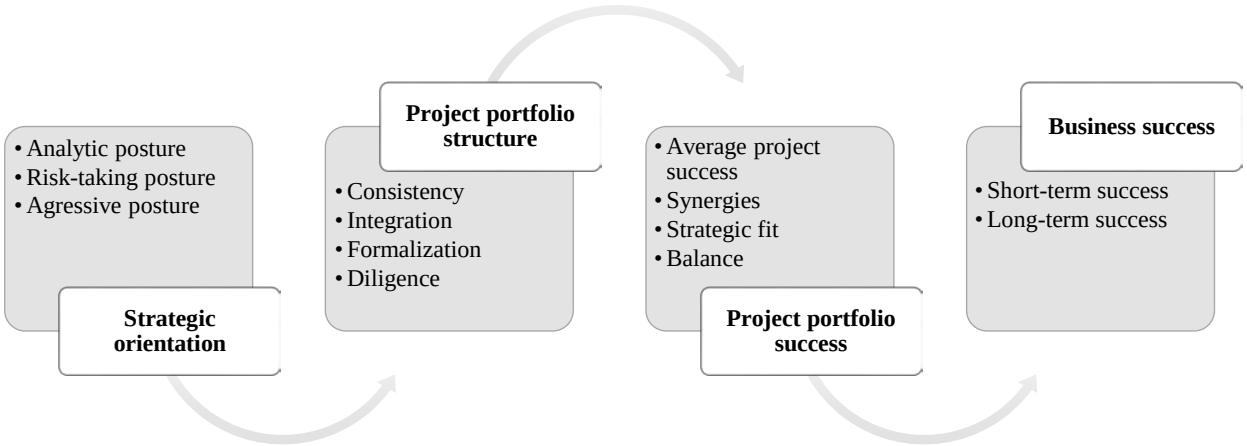

Figure 2-19. Strategic orientation effect on portfolio success (source Meskendahl 2010)

The drivers behind the success of a project portfolio has been researched by many scholars (Shenhar & Levy 1997; Shenhar et al. 2001; Petro & Gardiner 2015). The outcomes of most of this research converge into the four portfolio success dimensions proposed by Meskendahl's (2010) conceptual framework presented in Figure 2-19. The first dimension of a portfolio success is the average success for those projects within the portfolio (Atkinson 1999). This success entails the satisfactory completion of those projects in terms of scope, quality, budget (Pinto & Prescott

1988), and stakeholder and client satisfaction (Griffin & Page 1996; Dvir et al. 1998). The second dimension of success is the use of synergies in management and coordination for those projects (Platje et al. 1994). A coordinated management leads to better benefits management and realization, the realization of which exceeds the sum of all individual benefits (Dickinson et al. 2001). Coordinated management would also enhance overall savings which could emanate from the application of shared services or functions such as sharing in market explorations (Loch & Kavadias 2002; Pattikawa et al. 2006), or resources and knowledge exploitations (Verma & Sinha 2002). The third dimension is the strategic fit (Patanakul 2015), or the alignment of the coordinated and managed project goals with the strategic direction of the organization (Srivannaboon & Milosevic 2006). This entails the alignment of projects' objectives, resource skills and capabilities and portfolio results with the set strategy of the organization (Dietrich & Lehtonen 2005). This constitutes a backward link to the organization's strategic orientation. The fourth and final dimension per Meskendahl's (2010) conceptual framework is the portfolio balance which calls for constructing a balanced portfolio that reduces unreasonable or unexpected risks (Mikkola 2001). This could entail the balance between short-term and long-term benefits (Cao & Kavadias 2008; Cao et al. 2009), the adequacy of resources to deliver all projects within the portfolio (Killen et al. 2008), or the constant usage of resources across all projects within the portfolio to guarantee a continuous cash flow into the business (Mikkola 2001).

Business success is directly related to portfolio success in the Project Based Organization (Meskendahl 2010; Petro & Gardiner 2015). Business success can be short term in nature, where it leans on the economic success and financial performance, or long term, where it refers to the continuous planning for the future to secure the sufficient backlog of projects, cash and resources (Shenhar et al. 2001). The economic success constitutes market performance and commercial

success (Shenhar et al. 2001). Market success refers to the success in securing a good market share (Anderson et al. 1994; Rust & Zahorik 1994), achieving target sales, and achieving the minimum required volume of sales to support the operation (Czinkota & Johnston 1983). Commercial success on the other hand refers to the achievement of financial figures such as profits and ROIs (Buzzell et al. 1975; Savitz 2012). The preparation or planning for the future dimension resembles the exploratory function in the ambidextrous organization which seeks to secure projects or opportunities for the organization. This dimension takes into account the creation of new markets (Dougherty 1990; Griffin & Hauser 1996) and the development or enhancement of old or new technologies or processes (Brown & Eisenhardt 1995; Hargadon & Sutton 1999).

2.7.3 Project portfolio management practices, context and standards

2.7.3.1 Practices

Meskendahl's (2010) framework presented in Figure 2-19 and represented in a simplified manner in Figure 2-20 shows that the external environment gears up the strategic orientation of the organization, which in turn has a major effect on the portfolio structure which embodies the practices of PPM. Portfolio structure in this case contains many elements some of which are formalization, consistency, integration with the organization and diligence. All such constituents of the portfolio structure rely on applying best practices of project portfolio management. Formalization is a measurement of the degree of abidance to rules, process and procedures (Jang & Lee 1998); this includes the consistent use of practices or defined methodologies for conducting business. In project management this refers to the consistent use of tools and techniques of project management (Liu et al. 2008). This can take place in the portfolio level as well (Teller et al. 2012). Integration of formalizations at both the project and the portfolio levels leads to portfolio effectiveness and organizational success (Teller et al. 2012). Diligence in this case refers to the

consistent and fair use and selection of projects, portfolios and resources (Nobeoka & Cusumano 1997; Martinsuo & Lehtonen 2007), and the fair and consistent application of practices and methodologies (Teller et al. 2012).

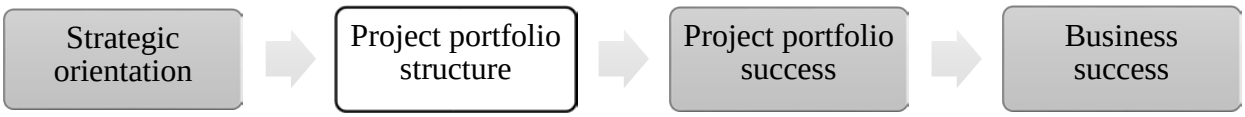

Figure 2-20. Portfolio management framework – project portfolio structure (and practices)

Practices for both project and portfolio management have long been established via international known standards and protocols. These standards include the guide to the Project Management Body of Knowledge (PMI 2013a), the Standard for Portfolio Management (PMI 2013c), the Organizational Project Management Maturity Model (OPM3) (PMI 2008), the Association for Project Management's Body of Knowledge (APM 2012), the IPMA Competence Baseline (ICB) (Gaupin 2006), the Standard on Portfolio, Programme and Project Offices as published by the Office of Government Commerce (OGC 2008), and the Capability Maturity Model Integration (CMMI) established by the Software Engineering Institute (SEI 2010). All these standards comprise practices for project and portfolio management which can be used to affect good performance in PBOs. However, and as the focus of this research is that of portfolio management – and due to the resemblance noticed in most of these standards, combined with the detailed inclusion and presentation of processes and practices in the PMI standard – the Standard for Portfolio Management as published by PMI will be mostly referred to in this thesis, without discounting the importance of and the relevant reference to other standards as and when needed.

Although the use of standards and practices of portfolio management is being pushed forward to organizations to improve on their performance (Rousel et al. 1991; Cooper et al. 1997, 2001; Benko & McFarlan 2003; Laursen & Svejig 2016), their real effect on the operation cannot yet be proven for issues that are relevant to generalizability of approach (Martinsuo 2013); hence their relation to portfolio effectiveness remains to be questioned (Petro & Gardiner 2015). It has been established for instance by scholars such as Blichfeldt and Eskerod (2008) that portfolio standards cannot be pushed to apply to the entire portfolio of projects of the organization due to the existence of "pet projects" (Loch 2000), or the lack of attention to other projects which should be in – but are not – in the portfolio (Blichfeldt & Eskerod 2008). Lack of coverage of these practices within the entire project portfolio creates issues of quality (Lechler & Thomas 2015), employees' and resources' management (Engwall & Jerbrant 2003) and tensions across all levels of the organization (Blichfeldt & Eskerod 2008). On the other hand, disadvantages of applying these practices can be found upon the rigid employment of the standards of use to all projects of the organization, these disadvantages shall be considered during any course of action. For instance, a rigid selection of projects for the strategic portfolio may contribute in killing innovation projects and creative ideas (Artto et al. 2008a, 2008b). Also, portfolio management practices assumes that the portfolio has an absolute control over resources, which is rarely the case (Nobeoka & Cusumano 1995; Nobeoka & Cusumano 1997; Principe & Tell 2001; Engwall & Jerbrant 2003; Perks 2007). This creates a paradox between the various degrees of application of these practices. This paradox poses a dilemma for portfolio managers and organizations. Loch (2000) was one of the early authors identifying this dilemma to generate his conclusion on the consistent use of these practices across organizations.

The paradox of this organizational dilemma could be resolved with careful consideration of the context within which the portfolio resides (Martinsuo 2013). An understanding of the influences of the context on project practices and their effectiveness shall precede. For instance, authors such as Aaltonen (2010) addressed variations in project portfolio selection, or what Aaltonen (2010) has identified as co-selection. Co-selection occurs in the course of "variation, selection and retention" evolutionary and co-evolutionary theory which resembles evolutionary aspects seen in the science of biology. Co-selection in this case, which is combined with trial and error, can generate model misfit within a specific context. Blomquist and Muller (2006) conclude in their research that portfolio practices are affected by the types of projects being managed under the portfolio. Christiansen and Varnes (2008) and Killen et al. (2008) observed managers' cognition and learning from the surrounding environment and context when selecting or managing portfolios. Also, in their study Blichfeldt and Eskerod (2008) addressed issues which could arise from the selective inclusion of projects in the portfolio. This all shows that planning has little to do with real portfolio management as claimed in the relevant standards; it is rather the situation, context and politics which control the portfolio (Martinsuo 2013).

2.7.3.2 Context

The above concludes that practices, although applied through standards in most of the cases (such as the PMI or the APM standards) – see Morris et al. (2006a) and Morris et al. (2006b) – may not be applied consistently due to the influence of context. Each portfolio context shall be understood and dealt with uniquely as it may have an effect on the applied practices. The lack of understanding of the various contexts within which portfolios reside can affect the effectiveness of application of those standards or practices (Martinsuo 2013). The context refers to the surroundings, the organization and/or the environment within which those practices are applied. For instance,

Biedenbach and Muller (2012) found a context in the organization's ability to absorb knowledge; they then linked portfolio management outcomes to the absorptive capacity of the organization. This capacity is a capability that defines a contextual ability of the organization (Zahra & George 2002; Cao et al. 2009). In this particular case, failure to understand the extent of how much (and what type) of knowledge the organization can absorb will have a direct effect on the knowledge that needs to be processed through portfolio practices – the extent of this capability is linked to the availability of relevant knowledge, people with relevant knowledge and processes that can administer similar type of knowledge (see also George & Zahra 2002). For instance, various degrees of absorption may require different types, or special versions, of Portfolio Management Information Systems (PMIS) to handle these variations (PMI 2013c). Blomquist and Muller (2006) on the other hand introduced complexity through organizational contextually and linked it to portfolio practices. Complexity of projects has been addressed as well by Geraldi et al. (2011). In their conclusion, Geraldi et al. (2011) postulated five dimensions of complexity – structural, uncertainty, dynamics, pace, and socio-political complexity. They claimed that "these five dimensions present individuals and organizations with choices about how they respond to each type of complexity in terms of business case, strategic choice, process choice, managerial capacity and competences" (Geraldi et al. 2011, p.966). Complexity of projects therefore shall be taken into account as one of the determinants of the context and the environment within which the portfolio is being applied to or implemented within.

Muller et al. (2008) explored various contextual factors covered by dynamicity of the surrounding environment, governance type and structure. Alongside context, other scholars identified risks and uncertainties as important aspects of PPM practices which can help handle various portfolio

settings (Olsson 2008; Petit & Hobbs 2010; Petit 2012). Although risk management was identified previously as an area of knowledge in PMI and other standards, uncertainty was not (Petit 2012).

The above argument corroborates that portfolio management practices are not as rigid as those of the project management – which makes a good case for nurturing ambidexterity traits in organizations. Although in project management some of the practices need to be tweaked to fit a certain project type, the project life cycle and some of the main features of project management practices remain unchanged and they seem to be internationally accepted. This does not yet seem to be the case for portfolio management. As a result of that, portfolio management can be used efficiently to respond to uncertainties of the context and the surrounding environment and the complexities generated by the various operations. This allows portfolio managers to use their intuition in applying practices, and hence portfolio management becomes a tool for "negotiation and bargaining" (Martinsuo 2013, p.799), and it permits the organization to restructure itself to respond to external dynamic influencers which adds to its dynamic capabilities (Killen et al. 2012).

2.7.3.3 Standards

This section covers discussions on the third edition of the PMI standard for PPM. The reason for choosing to conduct this study using the PMI version of the portfolio management standard and practices compared to other available standards is its generalizability and its detailed inclusion of inputs, tools and techniques, and outputs which allow seeing portfolio management through to implementation until its close-out and completion. This does not discount or reduce the importance of other standards or practices; therefore, they are referred to when and as needed in this thesis.

The portfolio management standard of the PMI consists of three process groups distributed over five knowledge areas in a fashion that is similar to that of the project management PMBOK

standard in all its versions (PMI 2013a). The *defining process group* is the first of all the groups and it starts with defining the portfolio, its plan, its roadmap and milestones, if any, along with any subsidiary plans. The *aligning process group* optimizes the portfolio through evaluation techniques, modifications, eliminations or inclusions of projects or resources in the portfolio. The *authorizing and controlling process group* deals with authorizing work under the portfolio and monitoring performance of the portfolio and its projects. These groups do not resemble the project life cycle or the process groups of project management as project management process groups end with closing-out the project under consideration. On the other hand, portfolio process groups are continuous and repetitive across the life cycle of all projects within the portfolio with all the portfolio operations until they all close-out.

Similar to the project management's inclusion of knowledge areas, portfolio management has five knowledge areas. These are the portfolio strategic management, the portfolio governance management, the portfolio performance management, the portfolio communication management, and the portfolio risk management. Each one of those knowledge areas is presented with a brief description in Table 2-10; each area has its unique inputs, tools and techniques, and outputs. These unique elements can be categorized and worked out in parallel during the operational life of the portfolio. Key inputs of these processes are summarized in Table 2-11, key outputs are summarized and presented in Table 2-12, and tools and techniques are categorized and presented in Table 2-13.

Table 2-10. A summary of portfolio management knowledge areas per PMI standards

Portfolio knowledge area	***Description***
Portfolio strategic management	This is where the knowledge of developing the strategic plan for the portfolio is stored. This could include the development of organizational milestones (i.e. portfolio roadmap), the portfolio charter and the assessment of projects' alignment with strategy. This knowledge area involves responding to environmental changes which could affect the organizational strategy.
Portfolio governance management	This is where portfolio oversight is provided. It provides the tools and techniques needed to optimize the portfolio and authorize it through investment analysis and prioritization techniques.
Portfolio performance management	This is where the portfolio performance is monitored through the continuous measurement of its value and the value of the projects within. This area has hands on critical assets of the organization such as finance, human resources and the likes and it controls the allocation of resources through its supply and demand processes.
Portfolio communication management	This knowledge area contains the tools and techniques which could facilitate the management of information within the portfolio; this could involve the management of information about portfolio risks, portfolio or business KPIs, resources and the likes – and example of that is the use of the Portfolio Management Information System PMIS.
Portfolio risk management	This knowledge area is where the tools used to manage all portfolio risks are provided. Risk management in this manner allows portfolio managers to assess all risks that are relevant to the portfolio of projects along with the operations or the business risks collectively.

Table 2-11. A summary of portfolio management key inputs per PMI standards

Portfolio input	***Description***
Portfolio process assets	These include plans, procedures and guidelines used to manage the portfolio. It could include historical information of the projects and the portfolio if available, templates used to manage the portfolio and the business, lessons-learned databases and the database of performance measurements.
Portfolio reports	These include reports of various natures such as: performance reports, feedback report, variance reports, capacity and capability of resources, risk analysis reports recommendations and decisions relating to the various natures.
Organizational process assets	These are similar to the portfolio process assets but they carry more relevance to the managing organization.
Enterprise environmental factors	These are the internal and external influencers which neither the organization nor the portfolio has any control over. These factors need to be considered during strategy formulation and be monitored and measured throughout the operational life of the portfolio.

Table 2-12. A summary of portfolio management key outputs per PMI standards

Portfolio outputs	***Description***
Portfolio strategic plan	This plan consists of the mission and the vision of the portfolio in relation to the organization. It may provide information or plans on fund allocations for the portfolio or its budgetary needs, the benefits of the portfolio which could be represented by business plans along with assumptions and constraints that need to be managed to see this plan through.
Portfolio charter	It is this document (if it explicitly exists) in the organization which spells out the roles and responsibilities of the portfolio manager or the group of managers responsible for the portfolio of projects.
Portfolio management plan	This plan is a direct translation of the strategic plan. It provides the approach for procuring or authorizing or chasing projects under the portfolio. The plan consists of a governance model, a communication and an information management model, a procurement model, and a prioritization and projects selection model.
Portfolio roadmap	This is a plan which stipulates milestones (if any) of the portfolio that needs to be seen through its management. This plan could see through the development of certain capabilities of the organization to seek new projects, or the buildup of the organization's entire capability and the upgrade of its resume.

Table 2-13. Categorization of portfolio management tools and techniques per PMI standards

Tools and techniques categorization	***Description***
*Tools and techniques used for **analyzing***	These include tools of: strategic alignment analysis, ***projects' prioritization analysis***, ***scenario analysis***, ***capability and capacity analysis*** (used for resources), interdependency analysis, cost/benefit analysis, stakeholder analysis, readiness analysis, ***portfolio organizational structure analysis***, graphical analytical methods, ***quantitative and qualitative analysis***, value scoring and measurement analysis, benefits realization analysis, ***communication analysis*** and gap analysis.
*Tools and techniques used for **selecting***	These include tools for: portfolio component inventory, ***portfolio component categorization***, weighting and ranking scoring techniques and ***authorization***.
*Tools and techniques used for **meetings***	This includes the tools and techniques relevant to ***review meetings***.
*Tools and techniques used for **informing***	These include tools for implementing: ***communication methods***, ***elicitation techniques***, PMIS and the integration of the portfolio management plans.

This section has so far provided a general overview on portfolio management practices as proposed by the Project Management Institute (PMI). The PMI proposes the use of these practices for the betterment of the organization in managing its portfolio(s) but it does not claim that abidance with its suggested rules provides the utmost solution for improving performance. As explained earlier, these practices shall be carefully considered and tweaked to fit the context within which the

portfolio is being managed. That said, these practices shall not be considered as static; rather, they shall be thought of as dynamic and flexible to provide the ability for the organization to change the extent of application of these practices to fit with the context. The tools and techniques proposed in the practice of portfolio management of PMI resemble the *mechanisms of ambidexterity* generated by the systematic review of the literature carried out so far. Therefore, it is proposed in this thesis that the careful consideration of those tools may generate ambidexterity – this proposition is tested in the coming chapters of this thesis.

Table 2-14. Proposed mapping of PPM practices along with mechanisms of ambidexterity

Mechanisms of ambidexterity	Relevant PPM tools and techniques	Explanation
Structural	Portfolio organizational structure analysis, projects prioritization analysis, portfolio component categorization	This is where the structure of the portfolio is determined and linked to the structure of the organization along with identifying roles and responsibilities. These tools may generate the need to separate exploratory activities from those that are exploitative to form a temporal, a domain or a structural separation. Prioritization of projects can be introduced to support the organizational structure; this can be accompanied with scenario analysis and categorization. A clear cut between organic and mechanistic structures can also be identified here.
Learning	Elicitation techniques, review meetings	This is where the portfolio manager learns the different requirements for the portfolio through brainstorming, facilitation, surveys, learning from, and collaborating with others such as work groups, internal or external experts, alliances, client and/or stakeholders.
Selection	Capacity and capability analysis, qualitative and quantitative analysis	These tools allow the organization to assess its resources or its processes and procedures, capability or capacity for allocation purposes. Quantitative and qualitative analyses here are not only linked to risk management, they also help identify the numbers and the capacity of resources.
Communication	Communication methods and communication analysis	The use of various communication and information transfer techniques can help generate ambidexterity when put through appropriate techniques such as elicitations and review meetings.

For simplicity, a few of these practices are marked in ***bold italics*** in Table 2-13 and their relevance to the mechanisms of ambidexterity is explained briefly in Table 2-14 in preparation for the

qualitative analysis carried out during field investigations and presented later in this thesis. Later these were verified and edited in Table 5-3 in Chapter 5. Table 2-13 and Table 2-14 and the later similar comparison tables, i.e. Table 5-3, represent a possible mapping between mechanisms of ambidexterity and PPM practices. Other arrangements is possible and scholars or practitioners can freely explore this area. The purpose behind this exercise was to prove the possible relationship between PPM practices and the mechanisms of ambidexterity which have already been established.

The Association of Project Management (APM) has also developed its own code of practice which they identify as their Body of Knowledge (APMBOK). The 6th edition of the APMBOK distinguishes the context from the practice and emphasizes understanding the governance and the environmental settings of the portfolio being the main constituents of context. The APMBOK divides the knowledge behind managing the portfolio into seven areas of management; these are the integrative management, the scope management, the schedule management, the financial and cost management, the risk management, the quality management, and the resource management. The APMBOK describes the role of portfolio management within each of these areas and gives the practitioner the freedom to apply the necessary practices to achieve the defined requirements of portfolio management under each area of management. That, in comparison with PMI practices, provides a more general approach to portfolio management and provides practitioners with more room to come up with their own practices taking into account the context behind each portfolio. That, compared with the PMI standard for portfolio management, PMBOK, has more coverage of portfolio practices across more areas of knowledge. This thesis does not favor any of those standards of practice; rather, it highlights each one's means of application and further applies the practices adopted in the PMI to define ambidexterity due to their unique and concise presentation in their standards.

2.7.4 Project portfolio management effectiveness

In light of the literature on practices, and in reference to Figure 2-21 which provides a simplification of Meskendahl's (2010) framework adopted here to define the relationship between practices and effectiveness, it is noted that a good portfolio structure led by the effective application of practices can lead to success for both the portfolio and the business (Meskendahl 2010; Petro & Gardiner 2015). A successful portfolio is led by the average success of its projects, their synergetic management in realizing the overall benefits from the holistic management of the portfolio, the strategic fit, and the portfolio balance. All these factors not only refer to the success of the portfolio; they also imply that the portfolio management in such a case is effective (Patanakul 2015). Patanakul (2015, p. 1093) has defined the PPM effectiveness in this context as:

> *… the organizational capability to 1) form a project portfolio such that the portfolio aligns with the organization's strategic direction, is adaptive to the internal and external changes, and contains projects with high perceived value or benefit, and 2) manage the portfolio to promote project visibility, transparency in decision making, and predictability of project delivery, in order to achieve project success, short and long-term value or benefits, and integrity, cohesion, and morale of the project community.*

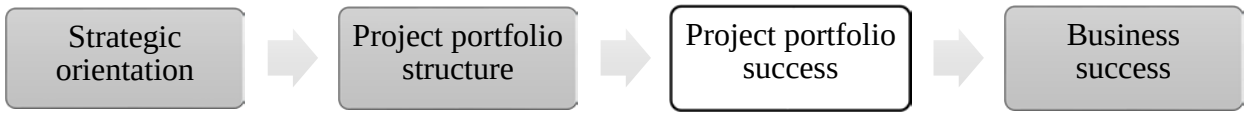

Figure 2-21. Portfolio management framework – project portfolio success and effectiveness

Many scholars studied and generated project and portfolio dimensions for measuring portfolio effectiveness and success (Shenhar 2001; Martinsuo & Lehtonen 2007; Meskendahl 2010; Jonas et al. 2012; Voss 2012; Patanakul 2015). Shenhar (2001) for instance explored the portfolio's future preparedness as its means to maintain its sustainability along with the sustainability and performance of the organization. The projects themselves which reside in the portfolio take into

account future preparedness in their measurements of success to support that of the portfolio. Serrador and Turner (2015) in this case divided project success into two main streams; a stream which measures projects' short-term gains and their benefits as supplied to the organization, and a stream which carries on the measurement of long-term benefits for the project, portfolio and the organization. Cooper et al. (2002) looked at the portfolio balance in relation to resources availability. Market share and commercial performance have been looked at by Shenhar et al. (2001). Average project success in terms of short-term budgetary compliance, quality, scope and schedule has been looked at by many scholars such as Levine (2005) and Serrador and Turner (2015). Customer and stakeholder satisfaction as relevant to portfolio success and effectiveness were covered by scholars such as Lechler and Dvir (2010) and Martinsuo and Lehtonen (2007). The portfolio use of synergies between projects adds to its effectiveness and is an area which was looked at by scholars such as Meskendahl (2010). The portfolio's strategic fit with the organization has an effect on the portfolio success and effectiveness as claimed by Unger et al. (2012). Designing the portfolio in a way that the projects within the portfolio balance items of risk (Killen et al. 2012), value (Cooper et al. 2002) and short- versus long-term benefits (Archer & Ghasemzadeh 1999) enhances their chances of becoming more effective and successful.

Project portfolio success and effectiveness has been assessed so far by various scholars using measures which are similar to the abovementioned suggested measures and attributes. To date, scholars have used these tools to compare PPM effectiveness and test it against various organizational situations or events for the purpose of establishing relationships (Martinsuo & Lehtonen 2007; Unger et al. 2012; Voss 2012; Beringer et al. 2013; Kissi et al. 2013; Voss & Kock 2013; Petro & Gardiner 2015; Rank et al. 2015). A summary of a few of these relationships under discussion is presented in Table 2-15 for information and for reference. In light of the

methodologies used by scholars whose work is presented in Table 2-15 and throughout this thesis, and in reference to the survey instrument(s) that they have used, this research attempts to test the relationship between PPM effectiveness and organizational ambidexterity in a similar fashion. Therefore, factors and attributes of success and effectiveness mentioned so far are summarized in Table 2-16 in preparation to be taken forward to measure their relationship with organizational ambidexterity. The establishment of this relationship concludes the answers on the research questions this thesis has presented so far.

Table 2-15. A summary of established relationships which involves PPM effectiveness

Established relationship(s)	***Supporting literature***
Behaviour of internal stakeholders and their impact on success	Beringer et al. (2013)
The impact of customer integration into PPM and its impact on success	Voss (2012)
The study of senior management involvement on project termination quality and its effect on strategic fit	Unger et al. (2012)
The relationship between transformational leadership and portfolio performance	Kissi et al. (2013)
The influence of a single project success and performance on the efficiency of the portfolio	Martinsuo and Lehtonen (2007)
The influence of the organization design on portfolio effectiveness and business success	Petro and Gardiner (2015)
A study of the relationship between management quality and future preparedness	Jonas et al. (2012); Rank et al. (2015)
Relationship between value as produced for or from the customer on portfolio success	Voss and Kock (2013)

Table 2-16. PPM effectiveness and success attributes

Attributes of PPM effectiveness and success	*Supporting literature*
Future preparedness	Petro and Gardiner (2015); Shenhar (2001)
Portfolio balance	Cooper et al. (2002) ; Petro and Gardiner (2015)
Market share and commercial performance	Shenhar et al. (2001)
Average project success	Petro and Gardiner (2015); Serrador and Turner (2015)
Customer and stakeholder satisfaction	Lechler and Dvir (2010); Martinsuo and Lehtonen (2007)
The use of synergies between projects	Jonas et al. (2012); Meskendahl (2010)
Strategic fit with the organization	Petro and Gardiner (2015); Unger et al. (2012)
Portfolio balances items of risk	Killen et al. (2012)
Portfolio balances items value	Cooper et al. (2002)
Portfolio balances short- versus long-term benefits	Archer and Ghasemzadeh (1999); Petro and Gardiner (2015)

Project portfolio management is an organization's and a PBO's dynamic capability (Davies & Brady 2016). This is a capability which can work towards building ambidexterity in the organization as proposed in this study. This section comes after establishing the foundational results produced by the review of the literature in general, and the systematic review of the literature on ambidexterity specifically to build a relation with project portfolio management functions and its practices. Portfolio management is strategic in nature and targets the highest levels in the organization. In this section, those functions and practices of portfolio management were found to tally with what is needed to build an ambidextrous organization. The research proposes the use of portfolio management practices as an umbrella to host mechanisms needed to achieve ambidexterity. Such an umbrella could also work towards emphasizing the importance and the benefits of learning, communication, structural design and selection as mechanisms in building an effective organization. This study also takes PPM practices along with results of the literature review into the field to prove the importance of this relationship and its effect on the overall performance and sustainability of the organization.

2.8 Summary

After introducing organizational ambidexterity and explaining it in sufficient detail, the focus of this chapter shifted to provide a systematic review on ambidexterity followed by a review on PBO and portfolio management, the structure of PBOs and their dynamic capacities, along with a review on PPM standards, practices and their effect on the managing organization. The overall intention behind carrying out these reviews was to lay the path for this thesis to establish relationships between portfolio practices and organizational ambidexterity. Ambidexterity has so far been identified as a great dynamic capability to have in organizations for its direct relevance to performance, sustainability and innovation. However, literature lacked both the comprehensive definition for this capability and the "mechanisms required … to implement and operate an ambidextrous strategy" (O'Reilly & Tushman 2011, p. 8). This thesis has therefore triggered the need to generate a comprehensive definition for organizational ambidexterity within the context of the project organization and the PBO to be used in this chapter as a point of departure taken forward in this study.

Turner et al. (2013) responded to O'Reilly and Tushman's (2011) notion of *mechanisms of ambidexterity* by unleashing the capacity of Intellectual Capital (IC) resources and the benefits they bring in achieving ambidexterity. This thesis, however, treads a different path – instead, it generated a more detailed analysis for ambidexterity by way of a systematic review of the literature. Combining this analysis with the theory of paradox presented in this chapter, the thesis provided an understanding of how ambidexterity generates and resolves tensions at the various levels of the organization. This chapter has also introduced a review and a comparative analysis between mechanisms of ambidexterity and PPM practices with the intention to use PPM as an umbrella for the latest definition and the proposed mechanisms of ambidexterity. The intention

here is to carry out a field investigation to test the said comparative analysis in real-world situations, and to provide further reliability for the initial research results presented in this chapter.

Chapter 3 Conceptual framework

3.1 Introduction

The purpose of this chapter is to present and explain the study's conceptual framework, which will facilitate the reader's comprehension of the subject in hand, and enable the reader to build a logical sequence of concepts or constructs explained or produced by this study. The purpose of this framework is to ease the thesis way into the methodology chapter along with the upcoming discussions and conclusions. The conceptual framework aims to facilitate the reader's comprehension for the reasons these methods were selected in the first place along with how they were applied in the field which generated the envisaged results. It is also imperative to understand that this framework hosts the research questions and the research problem, whether implicitly or explicitly (Maxwell 2012). This makes the conceptual framework a point of reference to find the reason behind a finding or a conclusion or the overarching theory of the research (Borgatti 2016). This chapter takes the reader through the journey of building the study conceptual framework. It starts by defining what a conceptual framework is and what it consists of; it then uses a known method for building conceptual frameworks borrowed from Jabareen (2009) to build this study's framework.

This conceptual framework is constructed specifically for this study and is not drawn from other literature or other studies. This particularly adds to the soundness and relevancy along with the reliability of the framework (Jabareen 2009; Maxwell 2012). The constituent components of a reliable conceptual framework could be borrowed from other reliable sources, though, (Maxwell 2012) which builds on the reliability of the research and the framework in hand. This does not imply, though, that building conceptual frameworks out of pieces taken from reliable sources

instantly improves their reliability. The researcher shall take utmost care to ascertain that the entire structure of the framework is cohesive.

This conceptual framework is a dynamic piece of work (Jabareen 2009). This means that the development of this framework was iterative in nature and can change during the course of the study. In the case of this research, it took the author more than two years of building and rebuilding the various components of this framework until it all came together with its final shape and constituent parts as presented in Figure 3-2 and Figure 3-4 .

3.2 Features of a conceptual framework

A conceptual framework is a collection of concepts laid out in an orderly manner with the intention to help identify and direct the research subject (Borgatti 2016). Miles and Huberman (1994, p. 18) defined a conceptual framework as a product of graphics or text to "explain, either graphically or in a narrative format, the main things to be studied – the key factors, concepts, or variables – and the presumed relationships among them". The conceptual framework holds the tentative theory which the author intends to investigate; it does that by laying out a model of conceptions or concepts to gather information on what is out in the field that requires investigation (Maxwell 2012).

A concept consists of components which form a part of this concept and define its existence (Deleuze & Guattari 1991). Deleuze and Guattari (1991, p.19) added that these "components, or what defines the consistency of the concept; its endo-consistency; are distinct, heterogeneous and, yet, not separable". A concept therefore, and for matters of reliability, may consist of several components (Forza 2002). It may as well consist of an irregular "contour" of components (Jabareen 2009). In this research, the following concepts formed part of the framework: *levels of the organization, dimensions of ambidexterity, generated paradox, organizational capabilities* and *mechanisms to resolve paradox.*

The conceptual framework holds references to ontology, epistemology and methodology (Jabareen 2009). Each one of those theoretical stances is held by each of the concepts or constructs which together form the conceptual framework. An ontological stance or assumption refers to the way knowledge is being laid, or to the facts 'out there' which require collection, or the existence of reality (Guba & Lincoln 1994). Levels of the organization, which are discussed as part of the conceptual framework, hold an ontological stance for the nature of their existence – i.e. they exist

in reality and hence they hold an ontological assumption. The epistemological stance refers to "how things really work" and "how they really are" (Guba & Lincoln 1994, p. 108). In the framework, the paradox or tension which is generated among and between dimensions holds an epistemology on its own. The methodological assumption refers to the means and processes used to activate the conceptual framework. In this case, the part of the conceptual framework which refers to *mechanisms* holds a methodological assumption and the framework may not be complete without it.

3.3 Steps of building the conceptual framework

This thesis draws upon earlier work by Jabareen (2009) to build the study's conceptual framework. Here, Jabareen (2009) proposes the use of the multidisciplinary literature as the process of theorization and to arrive at the study concepts. The grounded theory comes into play to help discover a theory from the systematic acquisition of data from the multidisciplinary literature (Glaser & Strauss 1967; Strauss 1987). It then applies induction techniques to it to generate the needed theory (Martin & Turner 1986). The grounded theory method is part of the qualitative stream of research approaches (Jabareen 2009). It carries process-wise induction in its methods (Orlikowski 1993), and it builds a "context-based, process-oriented description and explanation of the phenomenon, rather than an objective, static description expressed strictly in terms of causality" (Anderson et al. 2003, p.50).

This study has so far built a smooth transition to the use of grounded theory post the systematic review of the literature and the extensive collection of literature and text as carried out in the previous chapter. Jabareen (2009, p.53) identified that the "texts selected for conceptual framework analysis should effectively represent the relevant social, cultural, political and environmental phenomenon or social behaviour", which case is applicable to this study's selection of text and literature. A grounded theory application for building the framework therefore comes as a natural progression in this thesis at this stage of research.

Jabareen's (2009) grounded theory procedure for building and analyzing conceptual frameworks is presented in Figure 3-1. The initial phase of this method calls for mapping the selected data sources. In this phase a whole spectrum of literature is reviewed to establish validity (Morse & Mitcham 2002). Jabareen (2009) recommended carrying out high-level interviews to enhance the validity of the research and the framework. The second phase calls for extensive reading and

categorization of the selected material, which was carried out in this research using the systematic review of literature and the accompanying taxonomical analysis. The third phase involves naming concepts as concluded from the extensive reading and categorizing exercise, and the fourth phase includes deconstructing these concepts into their attributes. The fourth phase also involves assigning to each concept its ontological, epistemological and methodological assumptions for ease of integration into a holistic model in the fifth phase. A summary of each of the study concepts, their attributes and their theoretical stances is summarized in Table 3-1.

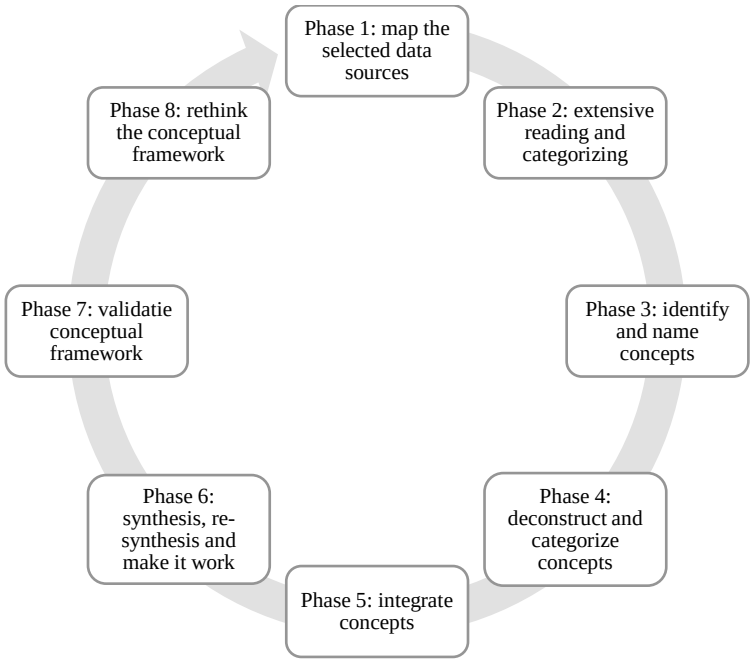

Figure 3-1. Process of building conceptual frameworks

The sixth phase involves synthesizing/building and resynthesizing/rebuilding the conceptual framework while accounting for the theoretical stance of each of these concepts. The seventh and the eighth phases involve presenting this framework to others such as scholars or practitioners, receiving comments, and reconstructing the conceptual framework, accordingly.

Table 3-1. Constituents of the study's conceptual framework

Concept/component	Attributes	Source of data
Organizational levels	Strategic Projects Operations Individual	Systematic review of the literature on organizational ambidexterity
Dimensions of ambidexterity	Knowledge Behaviour Technology Process	Systematic review of the literature on organizational ambidexterity
Generated paradox	Exploration Exploitation	Review of literature on ambidexterity and theory of paradox
Organizational capabilities	PPM practices Dynamic capabilities Project capabilities	Literature on project, program and portfolio management and literature on dynamic capabilities
Mechanisms to resolve paradox	Structural design Learning Selection Communication	Systematic review of the literature on organizational ambidexterity, interview sessions and qualitative analysis post field studies

3.4 The study conceptual framework

3.4.1 Background of the framework

The framework presented in Figure 3-4 was constructed in a simple, straightforward process-like manner which resembles a process-like horizontal framework proposed by Simsek (2009). However, prior to discussing the proposed conceptual framework, it is important to understand the environment which this framework will operate in, the probable inputs to the organization, and its envisaged outputs. This will be done through immersing the conceptual framework in an overall high level and a holistic model or framework which includes the environment and inputs to the organization – see Figure 3-2. The proposed holistic model allows the reader to use a bird's eye view to understand the constituents of the proposed conceptual framework, how it works, and how it is linked to the outside world.

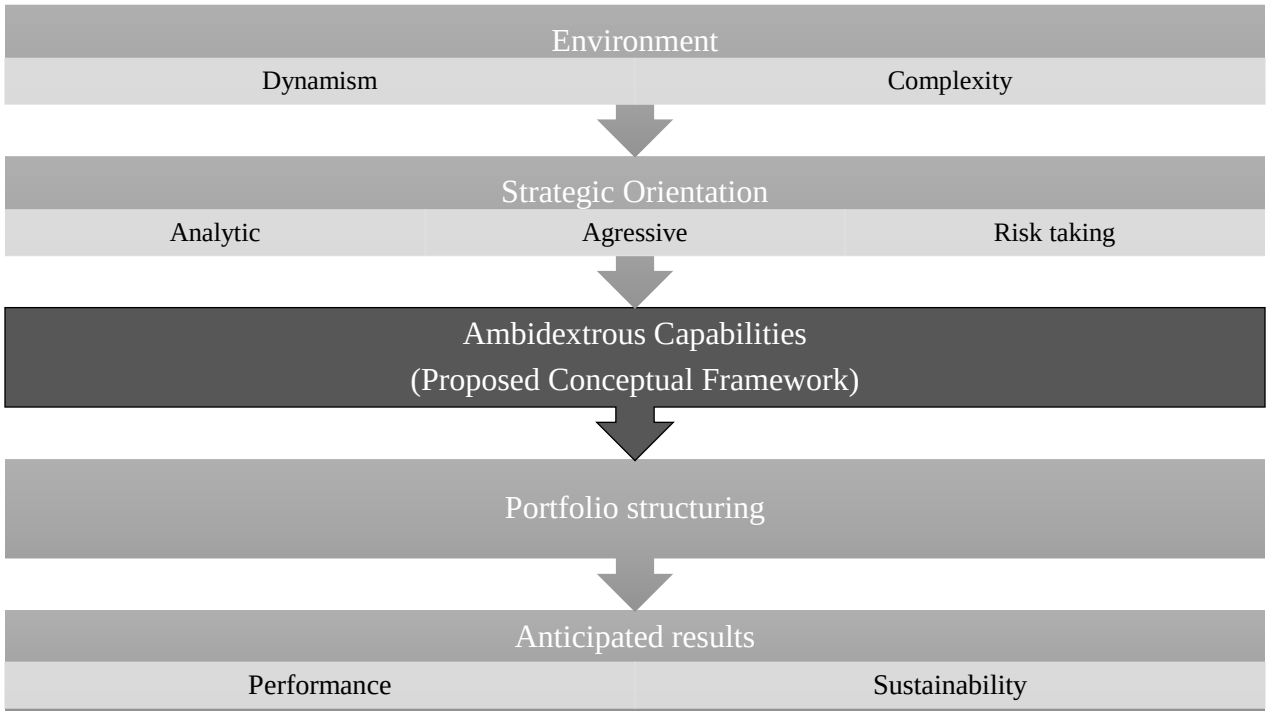

Figure 3-2. An overview on the conceptual framework embedded in a holistic framework

The holistic model presented in Figure 3-2 is initially influenced by the organization's surrounding environment. Although this influence appears to be taking effect at the very start, in fact it associates the organization and the conceptual framework throughout their entire lives. One of the characteristics of a surrounding business environment is its dynamism (Dess & Beard 1984) and its complexity (Miller & Friesen 1983; Dess & Beard 1984). A dynamic environment makes the organization susceptible to continuous market changes (Teece 2007), while complexity refers to the types of relationships within and the type of technology used (Eisenhardt & Bourgeois 1988). The surrounding environment has an influence on the strategic orientation of the organization. The latest could contribute with varying intensities through its strategic elements (Venkatraman 1989; Meskendahl 2010) – i.e. be more or less aggressive towards future market directions, take on a more analytic approach towards exogenous factors to help in decision making, or reconsider the organization's approach and its stance towards risk management.

The organization receives those external factors after converting them into new proposed strategic orientations to process them through their ambidextrous capabilities as laid out in this research. The ambidextrous capabilities of the organization represent the study's conceptual framework, details of which are presented in Figure 3-4. The conceptual framework of the study starts with the interactions among the various levels of the organization (see Figure 3-3 and Figure 3-4). Those external factors affect the organization at its different levels depending on their type. Each level within the organization along with their relevant dimensions of ambidexterity starts by generating paradoxes for later resolution – refer to the comprehensive definition of ambidexterity generated through the systematic review of the literature. The generated paradoxes are to be resolved through the organizational dynamics and project capabilities along with the mechanisms needed to achieve ambidexterity – also refer to the comprehensive definition of ambidexterity generated through the

systematic review of the literature. Those mechanisms in their turn lead to the formation of the portfolio structure, which leads to the anticipated results per Meskendahl's (2010) model presented in Figure 2-19 of Chapter 2.

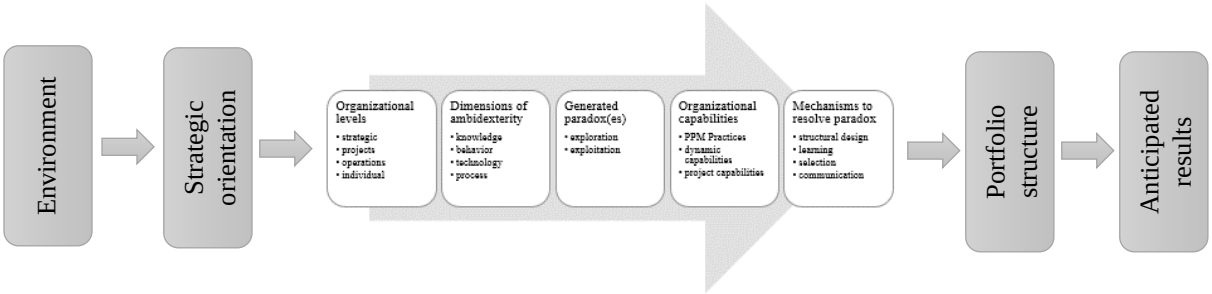

Figure 3-3. A holistic overview of the conceptual framework

3.4.2 Conceptual framework

The conceptual analysis undertaken here and laid down along the lines of Jabareen's (2009) grounded theory has generated five components which were included in the conceptual framework. Each of those components can be looked at as a concept for their inclusion of various subcomponents (Jabareen 2009). The conceptual framework presented in Figure 3-4 gathers all its components in a process-like manner and resembles the ambidextrous capabilities of the organization. In that, and in reference to the holistic model presented in Figure 3-3, those ambidextrous capabilities (the conceptual model) is subject to external influences from the dynamic environment from one end; it deciphers those and processes them within its internal "ambidextrous" processes to produce the best portfolio structure, which in its turn produces the anticipated results (Meskendahl 2010).

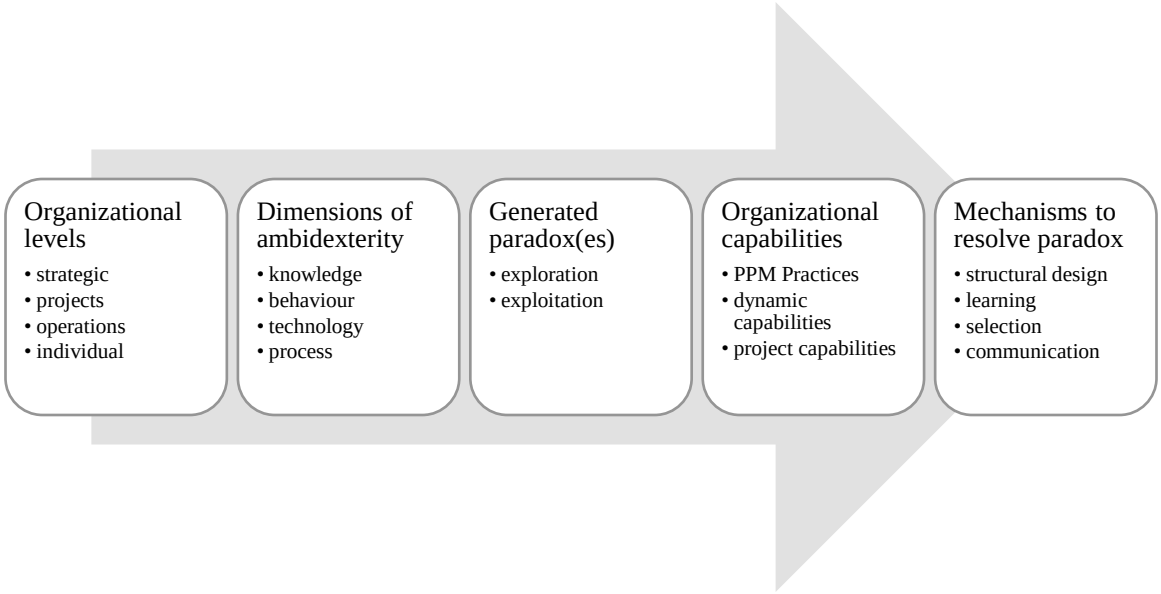

Figure 3-4. Conceptual framework

A definition for each of those concepts or components of the conceptual framework and their subcomponents along with their proposed theoretical stance (i.e. ontological, epistemological or methodological) is as follows:

Organizational levels: organizational levels represent the organization's hierarchal distribution and its stance on a project-based operation. The organizational levels concept is a product of the systematic review of the literature presented in Chapter 2 of this thesis where more than 700 articles with subjects on performance and ambidexterity were reviewed and analyzed. The review showed that ambidexterity can occur at various levels of the organization; those are the strategic level, the operations level, the projects level and the individual level. For ambidexterity to occur in an organization, it has been posited that it should take effect in all its levels. In this light, this research is premised on the assumption that ambidexterity cannot fully occur in an organization when its strategic management for instance is not ambidextrous – i.e. it takes on one type of strategy formulation such as deliberate or emergent without considering other types (Mintzberg 1994; Chandrasekaran et al. 2012), or when individuals do not exhibit a behaviour which is

conducive to ambidexterity (Gibson & Birkinshaw 2004) – i.e. do not exhibit a balance between hard elements such as discipline and commitment and soft element such as stretch and trust (Ghoshal & Bartlett 1994). Those organizational levels hold what is theoretically called an ontological stance as they represent the reality of the situation in an organization. This reality shall be accounted for when taking ambidextrous capabilities into account (Guba & Lincoln 1994).

Dimensions of ambidexterity: dimensions of ambidexterity are found in an organization at each of its levels where each dimension has the capability of creating a paradox. The resolution of these paradoxes represents the dynamic and ambidextrous capabilities of the organization. It transpired from the research carried out so far, and as generated from the systematic review of the literature presented in Chapter 2, that there are four dimensions of ambidexterity. These are (1) the knowledge dimension – this dimension differentiates between exploiting "old knowledge" and exploring "new possibilities" (March 1991); (2) the behaviour dimension – this dimension differentiates between social "hard elements" such as discipline, and "soft elements" such as trust (Gibson & Birkinshaw 2004); (3) the technological dimension covers aspects of technological innovation in projects (Rothaermel & Alexandre 2009; Voss & Voss 2013; Kortmann et al. 2014), and (4) the process dimension which can look at the tension created between radical improvements and process control (Vits & Gelders 2002; Andriopoulos & Lewis 2009; Pellegrinelli et al. 2015). The organization's strategic orientation, which is influenced by the external environment, would determine to what extent these dimensions have an influence or would be present. For instance, in a highly dynamic environment a start-up company that does not have a problem with its cash resources may want to be more exploratory with their knowledge and try new things, infuse new technologies in their projects, loosen the control a bit, and depend on monetary/extrinsic motivations for their employees rather than building a long-lasting trustworthy relation when they

are after some quick, short-term gains from their investments (Dong-Gil et al. 2005). Similar to the concept of levels, the dimensions concept holds an ontological stance in this theory.

Generated paradox(es): the generated paradoxes envisage results that have sustainable gains and long-term organizational success and performance. A successful paradox resembles a centrifugal force when, as one force tries to outwardly throw an object away from its curved path, the centrifugal force comes into play to pull this object back and balance the outward force to bring a consistent curvature movement to this object. The consistent movement of this object resembles sustainability generated in organizations when paradoxes are resolved. Smith and Lewis (2011, p. 382) defined a paradox with the set of "contradictory yet interrelated elements that exist simultaneously and persist over time". This research postulates that resolving paradoxes generated within each dimension at each level of the organization would result in better performance results and sustainability. Exploration and exploitation are the two contradictory and extreme poles presented at each of those dimensions which could generate the said paradox. The generated paradoxes refer to how things are happening in the organization and how they really work; hence this component holds an epistemological stance in this theory and the conceptual framework (Guba & Lincoln 1994).

Organizational capabilities: organizational capabilities are those capabilities which allow the organization to process existing knowledge and learn new ones to enable it to grow (Chandler 1990). These capabilities include those which belong to projects – termed project capabilities. These refer to project and operational management capabilities needed to run different tasks in the organization. The dynamic capabilities refer to those capabilities found at the strategic level of the organization which allow it to achieve its long-term goals while satisfying the shorter term ones through project capabilities (Davies & Brady 2016). Those capabilities (the project and the

dynamic ones) have been identified as "reciprocal, recursive and mutually reinforcing" by Davies and Brady (2016) due to their influence on both short- and long-term strategies. Project portfolio management practices have been added as a capability under this component of the conceptual framework due to their role in high-level planning and prioritization of investment which occur at a strategic level (Morris & Jamieson 2005; Morgan et al. 2007; Jonas 2010; Martinsuo 2013; Davies & Brady 2016). Organizational capabilities have a role in resolving paradoxes generated in those dimensions within organizational levels when put through the appropriate mechanisms. Due to their methodical role in this framework, these capabilities have been afforded a methodological stance in this theory (Guba & Lincoln 1994).

Mechanisms to resolve paradoxes: those mechanisms represent the organization's means of converting its dynamic and project capabilities into means to achieve ambidexterity. Those mechanisms are a product of the systematic review of the literature carried out in this thesis. They represent strategies of resolving paradoxes generated within dimensions in organizational levels. On further investigation of the literature on the project management and PBO direction, it has been found that these may find host in the practices of portfolio management and so attention was drawn to this concept through the second and third research questions. Those mechanisms of resolving paradox were generated through the systematic review of the literature and they have components of their own, those are the structural/organizational design, learning mechanisms, selection/allocation mechanisms, and communication mechanisms. Similar to the organizational capabilities concept, those mechanisms have a methodological role in executing the project and the dynamic capabilities of the organization; therefore this component of the conceptual framework was afforded a methodological stance in this theory (Guba & Lincoln 1994).

The five components of the conceptual framework identified above and presented in Figure 3-4 collectively constitute the theory behind this thesis. These components have interwoven relationships although they may be shown in a sequence-like manner. The first two components generated by the systematic review of the literature (levels and dimensions) are the framework's ontological basis and they sit at the beginning of an ambidexterity capability process. The epistemological foundation of this theory is represented by the paradox generated by each of those identified dimensions within each of the levels identified so far. In other words, the epistemological foundation of the conceptual framework is based on a generated and yet an unresolved paradox of exploration and exploitation found at each dimension. A methodological component of the conceptual framework comes into play to resolve the epistemological paradox using organizational capabilities through mechanisms of achieving ambidexterity as generated in the systematic review of the literature.

3.4.3 Research problem and questions and their relevance to the conceptual framework

The conceptual framework contains references to the research problem and the research questions whether implicitly or explicitly (Maxwell 2012). The problem presented in this research is the *ad hoc* approach to ambidexterity by organizations, an approach which embodies no structure or procedure. The research problem mainly addresses PBOs due to the rigid application of project management into the operation, whereby rigidity claims to reduce the organization flexibility and its ability to achieve ambidexterity (Hodgson & Cicmil 2007; Lenfle & Loch 2010; Candi et al. 2013). The conceptual framework in this case acts as the heart of the ambidextrous organization which stirs and generates its ambidextrous capabilities – refer to Figure 3-3.

The research questions presented in Chapter 1 can be found as implicitly interwoven with the conceptual framework components – see Figure 3-5. Building the conceptual framework while

explicitly showing the hypothetical location of each of those questions is not straightforward, and an explicit demarcation for each of those questions and the research problem is not exactly clear due to their interrelation with each other and with all phases and levels of an ambidexterity capability process. An indication of where each of the research questions draw on the model components for effect is presented in Figure 3-5.

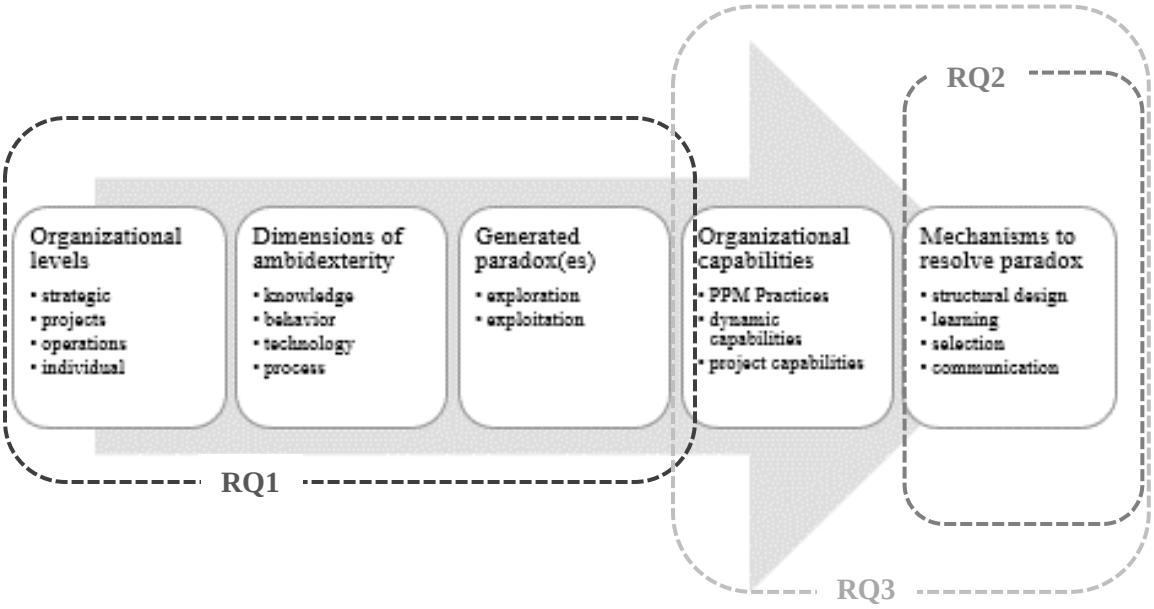

Figure 3-5. Conceptual framework, research problem and research questions

The research questions discussed in Chapter 1 are repeated here for ease of reference, and an explanation of the relationship between each of those questions and the conceptual framework follows:

> *RQ 1: What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?*
> *RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?*
> *RQ 3: How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?*

The first research question addresses the heart, or the core of what the conceptual framework is trying to represent. It holds an ontological assumption and tries to find an answer through epistemology. In this case, the first research question addresses the first three components which are relevant to ontology and epistemology of the framework and the study – namely, the levels, the dimensions and the paradoxes. The second research question addresses the methodology needed to resolve the epistemological position created through paradoxes; hence it is presented in Figure 3-5 covering the last component – namely, the mechanisms of ambidexterity. The third research question investigates the type of relationship between portfolio management practices and ambidexterity. It does so – as is explained later in Chapter 4 – with a combination between a qualitative study and a quantitative study (mixed method study). This question therefore covers two methodological contexts, one that is represented by organizational capabilities and the other represented by mechanisms.

The three questions presented in Figure 3-5 can be viewed as highly interwoven and they hold the conceptual framework altogether. A positive answer to these questions plays a significant role in proving the correctness and reliability of this framework, as well as the correctness and reliability of the proposed ambidexterity process in organizations and PBOs. More so, the point of intersection of the questions provides continuity in the theory and the conceptual framework, and that shall enhance the reliability of the study area and its outcomes.

3.5 Summary

This chapter has so far presented the conceptual framework which encapsulates the theory of this thesis. In developing the conceptual framework, a grounded methodology proposed by Jabareen (2009) was used. This grounded theory calls for identifying the various components or concepts of the conceptual framework, and determining their theoretical stance – ontological, epistemological and methodological – in order to form and construct the framework in a reliable manner.

The conceptual framework presented in this chapter resembles the ambidextrous capabilities of the organization and the process that the organization needs to implement to achieve ambidexterity. This capability (or the conceptual framework) sits at the core of the organization and it takes the first input from an oriented strategy or the variations as received from the external dynamic environment. It then converts them into a suitable portfolio structure which generates performance and sustainability for the organization. The conceptual framework of this study consisted of five components; the levels of the organization, the dimensions of ambidexterity, the generated paradox, the organizational capabilities and the mechanisms of ambidexterity. The conceptual framework started with an ontological foundation by identifying the reality of levels and dimensions; it then moved to an epistemological stance, which is represented by how paradox gets generated within dimensions and levels of the organization; and it then shifted its focus through a methodological assumption that resolves this paradox by using organizational capabilities and the proposed mechanisms.

The presented conceptual framework holds reference to the research problem and the research questions. The research questions were designed in an interwoven manner that holds the components of the framework altogether. A positive answer to the research questions along with

an optimistic resolution for the research problem in hand adds to the reliability of this framework and the outcomes of this study.

Chapter 4 Research Methodology

4.1 Introduction

The purpose of this chapter is to explain the rationale behind the research method selected. It starts by linking the research questions to suggested steps of theory building and testing (Wallace 1971; Handfield & Melnyk 1998; Stuart et al. 2002); it then provides a detailed approach to the selected methodologies and explains the ontological and epistemological stances this study assumes. The chapter begins with a scientific explanation of the method used for theory building adapted from Handfield and Melnyk (1998) and Stuart et al. (2002) to help determine what position this study holds in the overall advancement of similar research. The chapter then details the methodologies selected for this research supported by the reasoning for their choice. An ethical perspective, as explained later in this chapter, is applied to the selected methodology supports the moral conduct this research intends to uphold.

It is imperative to establish herein the differences between creating theory and viewing theory as science. A theory, when untested, remains an idea or a notion created by some researcher or scholarly body. Such a theory can easily be discredited by researchers or practitioners for its lack of proof and rigor. Science is a product of tested theories and it concerns itself with tested models and well observed phenomena (Handfield & Melnyk 1998). Overall, this chapter articulates the methodologies employed to convert theories into scientific knowledge.

Reynolds (1971, p.4) identified scientific knowledge as a method or a tool which facilitates: (1) organizing and categorizing (a typology), (2) predicting future events, (3) explaining past events, (4) understanding the causes of events; and, (5) controlling events. This study therefore adds to the scientific knowledge for the following reasons:

(1) its objectives promote organizing and categorizing the antecedents of ambidexterity and linking those to PPM practices;

(2) those objectives provide a way for predicting future events;

(3) it explains what has happened in earlier research;

(4) it sets a methodology for understanding ambidexterity through the lens of PPM; and

(5) it provides means for potential control of events in the future.

4.2 Theory-building process

This section provides an explanation on a generally accepted process of theory building created by Wallace (1971) and adopted by Handfield and Melnyk (1998). Wallace's (1971) process of theory building consists of five steps and is based on three logical pillars which cover *observation*, *induction* and *deduction*. As observed in Figure 4-1, which represents Wallace's process of theory building, the first of the steps for theory building starts off with *observation* – i.e. observing the status quo which induces the researcher to think of and create a theory. *Observation* is converted into *empirical generalization* via the use of measurements, sample summarization and parameters while *empirical generalization* is "an isolated proposition summarizing observed uniformities of relationships between two or more variables" (Merton 1957, p. 95). By forming concepts and propositions out of *empirical generalizations*, theories can be inducted. The logical deduction of *theories* converts them into *hypotheses* which can be tested for their conformity with newly created knowledge. *Hypotheses* in their turn can re-generate *observations* via the use of interpretation, instrumentation, scaling and sampling.

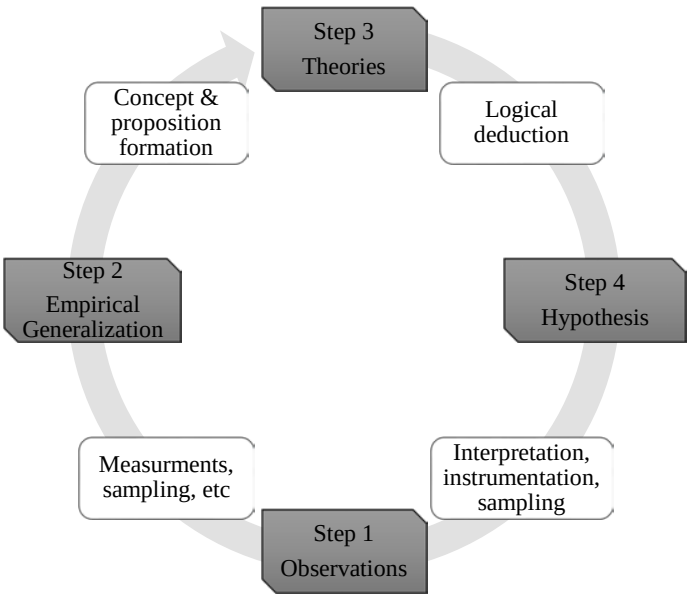

Figure 4-1. The scientific theory-building process (source Wallace 1971)

The above mentioned brief on Wallace's (1971) theory-building process does not have to follow a timely or process-like pattern. Those steps shown in Figure 4-1 do not have to be followed in an orderly manner. Scholars will have to carry out sufficient research on their studied (or to be studied) research subjects to determine what has been accomplished so far for them to determine which step their research would best fit in (Meredith 1993; Meredith 1998; Schmenner & Swink 1998; Wacker 1998). It is implied here that each step of Wallace's (1971) theory-building process would entail a different approach to research and method of testing. This chapter carries out this analysis and walks the reader through the means that led to selecting the methodologies this research has employed.

4.2.1 Observations and Empirical Generalization

Observation is the beginning of any theory-building exercise as it involves the initial awareness that a certain phenomenon exists and hence warrants investigation (Wacker 2004; Wacker 2004 Corley & Gioia 2011). When 'things' that might be relevant to a certain phenomenon are observed, Handfield and Melnyk (1998) advise on the use of *discovery* and *description* techniques to either expand on the knowledge underpinning them, or to draw a portrait that describes the relevant phenomenon that generated them in the first place. Description in this case would lead to either producing taxonomies – which deals with sorting data into categories – or typologies – which bring to the surface the most important aspects those observed phenomena contain (Colquitt & Zapata 2007). Handfield and Melnyk (1998) in this case recommend the use of an in-depth case study as the basis of the relevant research structure with interviews and observations used as data collection techniques.

Taking the organizational ambidexterity research as an example in this case; the overall concept and terminology of organizational ambidexterity all started with Duncan's (1976) observations of

dual structures in organizations. March (1991) in his turn carried these observations forward to study the phenomena attached to ambidexterity; he then observed the effect of allocating resources and organizational learning that occurs to help achieve a flexible, yet responsive structure. In his research, March (1991, p.85) concluded with an observation of his own –that "learning, analysis, imitation, regeneration, and technological change are major components of any effort to improve organizational performance and strengthen competitive advantage". The argument that March (1991) tried to conclude from this observation was that environmental changes could influence the trade-off exercise of interdepartmental resources allocation.

Empirical generalization on the other hand takes observatory data one step further and preps it for conversion into theory. While empirical generalization is taken to represent the summary of "observed uniformities" (Merton 1957, p. 95), theory building requires a more formalized type of relationship that goes beyond a mere summary towards relationship building. Empirical generalizations start off with discovering and describing observations – this could lead to creating taxonomies or typologies; after which, a pattern from these observations can be used for mapping the important factors emerging from these patterns.

For example, Teece's (2007) observations on "enterprises with strong dynamic capabilities" were empirically generalized to create taxonomies which were used by other scholars such as O'Reilly and Tushman (2008) to create theories. Teece (2007) concluded with three departmental taxonomies: (1) *sensing* which refers to the organizational capability of sensing threats or opportunities, (2) *seizing* which refers to the organizational capability represented by timely decision making in order to seize an opportunity, and (3) *reconfiguring* which refers to the organizational capability to reallocate resources to create a new structure in a timely manner in order to make the best of any identified threat or opportunity. A question that could be posed at

this point of research on Teece's (2007) concluded taxonomies is: "why?" The answer on this question could lead to building theories.

Similarly on empirical generalizations, in their study on exploitation and exploration tensions in organizations, Andriopoulos and Lewis (2009) selected five case studies based on an empirical generalization. Andriopoulos and Lewis (2009) adopted observations by Hardagon and Bechky (2006), and Hardagon and Fanelli (2002) on New Product Design (NPD) consultants being innovative to generalize on the possibility for them to be ambidextrous. In their generalization, Andriopoulos and Lewis (2009, p.698) claimed that NPD consultants are in fact "innovation-intensive settings, demanding that [these firms should] excel at both exploitation and exploration". So, a similar question to the one imposed by Teece's (2007) generalization of taxonomies, is "why?" Why do NPD consultants excel in innovation and have the tendency to become ambidextrous? The answers to this question and the preceding one can lead to building a theoretical perspective to the study.

4.2.2 Building Theories and Hypotheses

Proposing links and conceptualizing relationships between variables and items of empirical generalizations can lead to creating theories (Meredith 1993; Corley & Gioia 2011). In this case, empirical generalizations would act as the point of departure (Wallace 1971). Theories in this case would answer both *how* and *why* questions (Meredith 1998; Schmenner & Swink 1998). The 'how' part of the theory is addressed by the relationship which the theory tries to establish, and the 'why' part is addressed by the reasons these relationship were proposed in the first place (Wacker 1998). In establishing the theory and answering these questions, a reference may be made to observable and non-observable constructs (Meredith 1993; Schmenner & Swink 1998). In some instances, non-observable constructs that are explicit in empirical generalizations may be relegated "into an

implicit status in the theory" (Handfield & Melnyk 1998, p. 328) to help reprove the theory or rebuild it.

For example, in their seminal research on dynamic capabilities of organizations, O'Reilly and Tushman (2008) took on the taxonomies created by Teece (2007) to come up with theories which they identified as propositions. O'Reilly and Tushman (2008) mapped out five propositions as a bid to generalize a best fit for creating an environment conducive to ambidexterity. In their first proposition, they attempted to establish a relationship between strategic intent and ambidexterity. The second proposition links the organization's vision with ambidexterity. The third one links the leadership team consensus on strategy and extensive communication with ambidexterity. The fourth tries to establish a general link between the organizational architecture represented by the business model and ambidexterity. The fifth proposition links the senior leadership's ability to resolve conflict with ambidexterity. O'Reilly and Tushman's (2008) propositions remain untested; hence they cannot be generalized or turned into scientific knowledge.

Up to this point, an explanation of how to create theories has been given; what remains is testing the theory. An initial test for theories starts off by conducting an internal comparison to make sure that the theory is internally consistent (Handfield & Melnyk 1998). In this instance, part of the theory is compared with other parts of the research or the theory to confirm its internal consistency (Schmenner & Swink 1998; Wacker 1998). Likewise, an external consistency methodology can be applied to ascertain that the theory does not include bold theoretical jumps in the academic literature with insufficient justifications (Meredith 1993; Meredith 1998; Schmenner & Swink 1998; Wacker 1998). However, the true test for theory remains in deducting and testing hypotheses (Wallace 1971; Ketchen & Hult 2007). In reference to some of the example theories (or propositions) laid out above, if a need arises to test them, a careful selection must be applied to

those to convert them and put them into a mathematically or empirically testable format (Will et al. 2002; Colquitt & Zapata-Phelan 2007). In this, Handfied and Melnyk (1998, p. 331) advised researchers to "involve an explicit translation of concepts into measures". In this case, constructs – which cannot be observed directly – are created using a collection of observable measures such as variables for the purpose of creating/deducting the hypothesis from theory (Colquitt & Zapata-Phelan 2007).

For example, He and Wong (2004) theorized and then were able to establish (prove) a relationship between ambidexterity and performance. Their study laid out three hypotheses which addressed their theory. In their first hypothesis, He and Wong (2004, p. 484) claimed that "there is a positive interaction effect between explorative and exploitative innovation strategies on firm performance". They also claimed that "the relative imbalance between explorative and exploitative innovation strategies is negatively related to firm performance". In their last hypothesis they claimed that "ambidextrous firms exhibit smaller intragroup variation in performance, relative to the mean values of performance, than firms that specializes in explorative innovation strategies" (He & Wong 2004, p. 484). All these hypotheses were deduced from the theory of organizational ambidexterity and performance. They then tested the hypotheses via a quantitative method using a survey distributed to the CEOs of 1,872 firms in Singapore and 950 manufacturing firms in Penang. Two (non-observable) constructs were developed – *exploitative innovation strategy* and *explorative innovation strategy* – via collating observable variables and establishing a proper internal consistency among them. Using these constructs and the testing methodologies, He and Wong (2004) were able to prove their theory.

4.2.3 Logical deduction vs. induction

The left side of Wallace's (1971) model shown in Figure 4-1 represents theory induction. Theory in this case is induced from observations which take place upon stumbling on new knowledge (Barret et al. 2011). The right side of the model represents theory deduction. Theory in this case is deduced from established models, which could have been established through induction (Chen & Paulraj 2004; Corley & Gioia 2011). Each of these logics (induction and deduction) requires a certain approach and methodology for testing to carry out the research (Corley & Gioia 2011). It has been generally accepted that a deductive logic is linked to a post-positivist stance which generally implies a quantitative approach in testing theory (Wacker 1998; Ritchie et al. 2013). Similarly, it has been accepted that induction follows through from a qualitative approach (Meredith 1993; Meredith 1998; Schmenner & Swink 1998; Wacker 1998). Induction is usually used when insufficient knowledge is available to build a theory which is when subjectivism through a qualitative approach could become of use (Eisenhardt & Graebner 2007).

Taking the above discussion on research type and research type selection, Table 4-1 below summarizes this discussion and provides examples on the types of research questions that could trigger any of the research steps (or vice versa) along with an example of a research structure and methodology per each proposed research step and research question. The following section shows how this study has linked each of its research questions to those steps of research shown in Table 4-1 and Figure 4-1 to conclude with an appropriate research methodology.

Table 4-1. Theory-building (source Handfield & Melnyk 1998 and Stuart et al. 2002)

Research Step	Purpose	Research question	Research structure (methodology)
Observation	Discovery: uncover area s for research and theory development	What is going on? Is it interesting enough to research?	In-depth case study (unfocused) Longitudinal case study
Observation	Description: explore territory	What is there? What are the key issues? What is happening?	In-depth case study (unfocused) Longitudinal case study
Empirical Generalization	Mapping: identify and describe critical variables	What are the key variables? What are the key themes, patterns or categories?	Focused case studies In-depth field studies Multi-site case studies Best-in-class cases
Theories	Relationship building: identify linkages between variables, causal understanding	What are the patterns that link the variables? Can an order in the relationships be identified? Why do these relationships exist?	Focused case studies In-depth field studies Multi-site case studies Best-in-class cases
Hypotheses testing	Theory validation: test the developed theories, predict future outcomes	Are the theories robust? Is predictive capabilities validated? Are there unexpected behaviours?	Experiment Quasi-experiments Large-scale sample of population Refutation case study
Logical deduction	Theory extension/refinement: expand the map of the theory, better structure the theories in light of observed results	How widely applicable/generalizable are the developed theories? Where do the theories apply? What are the constraints?	Quasi-experiment Large-scale sample of population Contextual case studies

4.3 Research methodology

4.3.1 Methods of research

Saunders et al. (2007) defined research methodology as the "theory of how the research should be undertaken". There are two means of carrying out a research study; one is quantitative which relies much on deduction (Ritchie et al. 2013), and the other one is qualitative which is based on theory induction in most of the cases (Wacker 1998; Ritchie et al. 2013). Quantitative methods for conducting research use mostly objective means for data collection and analysis (Wacker 1998). An example of this approach includes data collection by way of distributing questionnaire and conducting descriptive and inferential statistics on the collected data. Qualitative methods on the other hand calls for subjectivism in laying out the basis of theory. This method uses instruments as interviews and case-study analysis (Eisenhardt 1989; Yin 2003; Eisenhardt & Graebner 2007; Ritchie et al. 2013).

Moreover, this research applies Multi-Methodological Approaches (MMA) by way of triangulating qualitative and quantitative research results to address complex areas of this study (Flynn et al. 1990; Jack & Raturi 2006; Choi et al. 2016). The rationale behind going with this direction is to enhance the reliability of the study outcomes and to arrive at convergence in the study conclusions.

The research approach proposed by Handfield and Melnyk (1998) and Stuart et al. (2002) and the map presented in Figure 4-1 were used to conclude what methods need to be applied to answer the research questions. The research questions suggested at the initial chapters are repeated here for ease of reference:

RQ 1: What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?

RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?

RQ 3: How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?

The first research question is linked to the core subject of this thesis. It explains organizational ambidexterity within the context of Project Based Organizations. This question is of an explanatory nature and requires an understanding of organizations' interactions with their surroundings. It also requires building up a definitive and a comprehensive definition for ambidexterity. This definition is used throughout this thesis as the foundation for creating the knowledge this research intends to achieve. Therefore, it was found to be most appropriate to study and analyze the literature on ambidexterity to understand the different approaches to it, and against this background, a systematic literature review was conducted. The intention of the review was to build a theoretical foundation for this research, build a conceptual framework, and facilitate answers to the remaining the research questions.

The second research question goes a level beyond the first research question and builds on top of it by investigating the mechanisms needed to achieve ambidexterity with. Although the answer to the first question generated an initial definition and identification for those mechanisms, the second question does so in much more depth using data collected from the field. This question was addressed by conducting interviews with various firms and drawing conclusions on those mechanisms from analyzing the collected data. In reference to Figure 4-1 and Table 4-1, this question falls between *empirical generalizations* and *theory building*, in which case, variables are inducted from the explanatory study along with the comprehensive definition of ambidexterity as generated from the output of the first research question.

The third research question investigates the relationship between portfolio management practices and ambidexterity. The answer to this question is provided in twofold. Firstly it uses the mechanisms of ambidexterity as a vehicle to answer the question; it uses part of the qualitative/interview data analysis for that. In this part, along with the assistance of the analyzed interview data collected during the interview process attached to the second research question, the third research question assesses the relationship between portfolio management practices and the mechanisms of ambidexterity. Ambidexterity may be viewed and understood differently in different organizations, so this could be the case with the application of PPM practices (Blichfeldt & Eskerod 2008; Raisch et al. 2009). Next, its second part takes the generated relationship between portfolio practices and ambidexterity into a quantitative analysis in order to add more generalizability to the research outcomes. This part carries more specificity compared to the first part of the answer and to the rest of the research questions. It therefore passes the point of *empirical generalizations* and starts with deducting the research theory – see Figure 4-2. The quantitative part was carried out with the use of a survey questionnaire distributed over a relatively representative and large sample (Will et al. 2002).

Table 4-2 below depicts the methodologies used to answer each of the research questions and summarizes all the above.

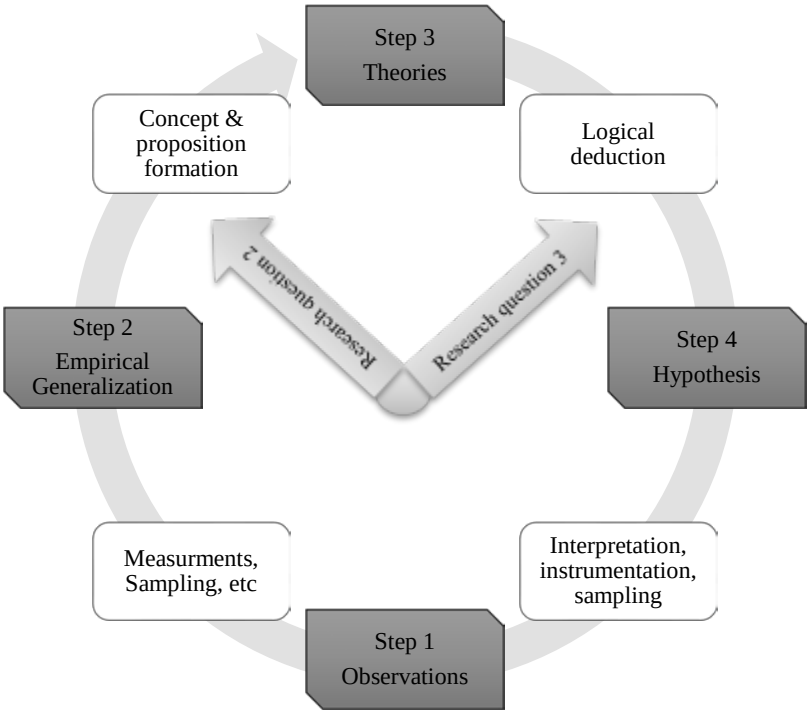

Figure 4-2. Development of the thesis methodology

Table 4-2. Approach to research questions

Research question	*Selected approach*	*Rationale behind selected approach*
RQ 1	Systematic review of the relevant literature	This question requires an explanatory analysis and a building of theory in order to set up the foundation of the research.
RQ 2	Qualitative study	This question requires an in-depth analysis of cases to determine organizational approach to ambidexterity.
RQ 3	Qualitative study Quantitative study	The *first part* requires an in-depth analysis and understanding of the link between portfolio management and ambidexterity. The *second part* requires to enhance reliability of the first part, increase its generalizability, and answer the question with more specificity.

Moving from research methodology to the methods proposed for carrying out the investigations, the coming sections specify relevant and specific qualitative and quantitative research approaches used to answer the research questions. More details on these methods are provided and the specifications of the research instrument are also explained.

4.3.2 Qualitative approach – multi-case study

A multi-case study method is used to answer the second research question and part of the third research question as discussed in the previous section. This type of research approach allows a detailed investigation into the various types, patterns and contexts of complex organizational and industrial systems (Sekaran 2000; Bryman & Bell 2003; Yin 2003). A case study research allows for a detailed analysis and understanding within each case (Eisenhardt 1989; Eisenhardt & Graebner 2007; Yin 2003), which is necessary in this thesis and at this stage of analysis to provide the ability to investigate probable types or relationships (McCutcheon & Meredith 1993, 1998; Stuart et al. 2002; Voss et al. 2002; Barratt et al. 2011; Ketokivi & Choi 2014). Twelve firms were selected for the qualitative study to form part of the multi-case study analysis which is the minimum indicative number as indicated in Sandberg (2000) required to achieve saturation. All the selected 12 firms operate in the Middle East and this makes the study more regional rather than focused in a single country. One Top Management Team (TMT) staff member per each of the 12 firms was interviewed (discussed later in Chapter 5).

The selection of a multiple case study design was favored over a single case study design as it provided the ability to produce more compelling results along with the ability to pursue more than one pattern in the study (Eisenhardt 1989; Handfield & Melnyk 1998; Yin 2003; Barratt et al. 2011; Ketokivi & Choi 2014). The case-study firms were selected taking into account various levels of ambidexterity with success and failure cases presented as much as possible to create a polarized selection (Pettigrew 1988). This selection criterion may in essence be controversial since the research outcomes were yet to be produced during the selection process, which makes determining the degree of ambidexterity for each case study firm prior to the interview process

unachievable. Therefore, in combination with this selection, an initial interview was conducted with each firm's representative to understand what they do and whether they fit into this study.

This research approach intends to break down those case study organizations into their constituent organizational structures, scope, contexts and any other characteristics which may be governed by the organization or the industry (Yin 2003; Ketokivi & Choi 2014). Along with that, the project portfolio management practiced by these organizations was investigated. It is envisaged that each matching couple of constituents or relationship with a practice or an approach across two or more cases would form a type, a theme or a relationship – a case of cross-case analysis (Eisenhardt 1989; Yin 2003; Kvale & Brinkmann 2009). The produced theme(s) was used to determine the appropriate contextual factors of ambidexterity or help validate a construct.

This research follows Eisenhardt's (1989) road map of explanatory case study research and analysis in building and confirming theory from case-study analysis, supported by the work of Barratt et al. (2011). The suggested road map starts with case selection, then data collection by way of conducting interviews, review of publically available documents or information, analysis, and finally the conclusion (Eisenhardt 1989). The interviews were structured following a carefully designed semi-structured questionnaire – see Appendix A. During the data collection and interview process, all publically available documents which reveal details on project management procedures, operations protocols, and organization charts for the case study organizations were inspected. Next, an interview with the founder, the managing director or the CEO of each of the case-study firms was conducted. It has been assumed that an interview conducted with this level of seniority can provide better information on those investigated organizations as this selected level should carry enough influence and knowledge of the organization and can drive the

behavioural context for its employees. One interview per selected organization was therefore conducted.

This research was carried out in Knowledge Intensive Firms (KIFs) where large amounts of knowledge are manipulated on a daily basis and technical functions constitute the core elements of these firms (Robertson & Swan 2003; Oehmichen et al. 2016). It also sought firms with few similarities in their operation, but not necessarily between their final deliverables/products or functions. These similarities helped in setting comparisons between cases and facilitated identifying replications with enough heterogeneity for the needed generalizability. All selected firms are based in the Middle East. Some may be headquartered in the US or Europe; however, it is safely assumed that they follow local rules and regulations and are affected by the local external environment of the Middle East. Table 5-1 of Chapter 5 provides an overview of those selected firms. Also, Chapter 5 provides more details on the qualitative data collection and analysis.

4.3.3 Quantitative approach

4.3.3.1 The field survey

This approach resonates with a post-positivist logic and represents quantitative means for collecting and analyzing data. Researchers use the survey approach to carry out one of the following: an *exploratory* survey research which mostly occurs at the early stages of researching a phenomenon to get an initial conceptualization of theory OR a *confirmatory* survey research which follows on from an established theories, frameworks or propositions and hypotheses, OR a *descriptive* survey research which aims at describing or generalizing a certain phenomenon into a particular population (Pinsonneault & Kraemer 1993; Filippini 1997; Malhotra & Grover 1998; Forza 2002). It is therefore the intention of this thesis to carry out a confirmatory type of survey research while assuming that the answers to the second research question and part of the third

question as discussed previously shall provide some clarity on the theory and constructs in hand. In such a case, Forza (2002, p.155) suggested to carry out a confirmatory survey approach which aims at "testing the adequacy of concepts developed in relation to the phenomenon of hypothesized linkages among the concepts, and of the validity boundary of the models".

A quantitative approach with a confirmatory type of survey should start off with a theoretical framework that could be used as a guideline to establish *units of analysis*, build a questionnaire, and collect and analyze data (Forza 2002). Defining a *unit of analysis* in the quantitative approach is critical and marks the very start of any such study. It should go hand in hand with defining the *level of reference* (Dansereau & Markham 1997) lest a case of "ecological fallacy" emerges out of the study (Babbie 1990). The *level of reference* in this case was the firm or the organization. The unit of analysis in this case sat at the operation's level (Flynn et al. 1990). Choosing individuals as units of analysis in this context, such as measuring their satisfaction or the likes, may not match with the selected level of reference, thus resulting in error or misconception during analysis (Babbie 1990).

Defining the units of analysis leads to the production of the study constructs and variables. Hanfield and Melynk (1998, p. 321) view constructs as "approximated units which by their very nature cannot be observed directly", while they view variables as units that can be observed and empirically operationalized, which can then be used to define or measure constructs. It is, however, important to note that reducing constructs to easily measured variables may lead to misrepresentation of the relevant constructs; this is where the role of reliability measures comes into play, with the use of reliability tests or the renowned Cronbach Alpha (Forza 2002).

Analyzing collected data quantitatively can be carried out in several ways. To start with, Forza (2002) suggests carrying out a preliminary descriptive analysis; this analysis provides the

frequencies which could lead to general statistical and empirical understanding of the basic elements of the research. Preliminary analysis could include testing: frequencies, central tendencies, means, measures of dispersion and measures of shape. Inferential statistical analysis on the other hand would normally follow through from a successful completion of preliminary descriptive analysis. Inferential analysis moves the research analysis from an empirical level to a theoretical domain and is a step towards generalizations (Forza 2002). Inferential statistics takes into account the sample size, the statistical power and the significance level the researcher wishes to reflect in their case. Table 4-3 provides examples of some of the inferential statistical test considered in this study.

Table 4-3. Research parametric tests and multivariate analysis methods (source Forza 2002)

Test	When used	Function
Pearson correlation	With interval and ratio data	Test hypothesis which infers significant positive (negative) relationships between two variables
Analysis of variance (ANOVA)	With interval and ratio data	To see whether there are any significant mean differences among more than two groups. To see where the difference lies.
Factor analysis	When the researcher wishes to reduce the number of variables to manage or to find out the underlying factors	To analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying dimensions (factors)
Multiple regression	With a single metric dependent variable presumed to be related to one or more metric	To predict the changes in the dependent variable in response to changes in the several independent variables
Multiple analysis of variance (MANOVA)	Useful when the researcher designs an experimental situation (manipulation of several non-metric treatment variables) to test hypotheses concerning the variance in group response on two or more metric dependent variables	To simultaneously explore the relationship between several categorical independent variables (usually referred to as treatments) and two or more dependent metric variables

Determining the sample size for quantitative studies is a complex matter. Size is critical to research outcomes due to its effect on the *level of significance*, the *statistical power* and the *size* of the

research (Forza 2002). This thesis therefore uses previous study conclusions and known methodologies used in the field of social sciences to determine what makes an appropriate sample size for this research (Verma & Goodale 1995; Forza 2002).

The *level of significance* is directly related to what is statistically called Type I error. Type I error represents the probability of research results to reject a hypothesis while it is true. The level of significance assumed in social sciences could be taken as either "0.001" or "0.05" depending on how nuanced what the researcher tries to prove is. In this research, and for the sake of determining sample size, the level of significance was taken as "0.05". The *statistical power* on the other hand is inversely related to the probability of making what is statistically called Type II error. Type II error represents the probability of approving (i.e. not rejecting) a hypothesis while its alternative hypothesis is true. Hence, a high value of a statistical power for a research reduces the probability of making a Type II error. The social sciences use the value of "0.8" to represent statistical power that can produce realistic research results (Verma & Goodale 1995; Forza 2002). The *size effect* of the research represents the difference in the means for two samples or the correlation values for two variables. A medium size effect therefore is assumed to produce acceptable results for this type of research.

A balance between the three above-mentioned factors is important as the researcher would not want to commit a Type I error on the account of a Type II error, or vice versa, while accounting for a wrong size effect. Researching a relatively large sample without taking the above effects into consideration commits a large pool of resources and tremendous effort just to measure a few trivial varying effects that can be removed by slightly adjusting the significance level (Forza 2002). At the same time, researching a fairly small sample may not produce enough statistical power that would deprive the research from being sufficiently reliable (Verma & Goodale 1995; Forza 2002).

Table 4-4 acts as an initial guidance for selecting the research sample size. Applying this table to the study in hand, taking into account a fairly medium-size effect with both acceptable values of significance and statistical power of 0.001 and 0.8, respectively, this produces an initial sample size of 62. This quantitative research, however, collected responses from 160 participants and that exceeds the minimum required sample size indicated here.

Table 4-4. Effect size and statistical power and sample size (source Forza 2002)

	Stat. power = 0.6		**Stat. power = 0.8**	
	sig. = 0.05	**sig. = 0.001**	**sig. = 0.05**	**sig. = 0.001**
Large effect (e.g., strong association)	12	18	17	24
Medium effect (e.g., medium association)	30	45	44	62
Small effect (e.g., small association)	179	274	271	385

4.3.3.2 The quantitative method

The quantitative research started with a model as explained in Chapter 5. This model gathers elements from project portfolio management and organizational ambidexterity. The quantitative research model was built on Gibson and Birkinshaw's (2004) conceptualization of organizational ambidexterity as a mediator to organizational performance. In this, PPM effectiveness and its effective application in organizations was operationalized to represent PPM practices to influence organizational ambidexterity and build on it. These relationships are depicted in Figure 5-3 of Chapter 5. A survey questionnaire was created to study the above model and was distributed to various organizations as explained later in Chapter 5. The constituents/constructs of the questionnaire can be found in Appendix D while the questionnaire is presented in Appendix E.

The population of this research covered mainly those of the Project Based Organizations (PBOs). Data for the quantitative survey were collected from 160 survey participants. Those responses

were collected from several sources such as organizations which operate in project-based and dynamic environments, the Project Management Institute (PMI) official website www.pmi.org, Masters' and MBA students, and professional websites such as Linkedin. All survey participants were approached through an introductory letter or an email introducing the research and specifying the type of audience needed to fill out the survey. A filter was also added to the survey to filter out data which do not comply with the specified requirements.

Moreover, three hypotheses were created in the quantitative part as protrusions from the third research question. These hypotheses are presented in Chapter 5 section 5.3.4.2. Constructs and variables were operationalized and set to test these hypotheses as explained in further details in the relevant section in Chapter 5. Control measures were set through industry and size variables.

4.3.4 Sample selection

The previous sections provided means for selecting the sample sizes for the qualitative and the quantitative streams. The qualitative study followed Sandberg's (2000) recommendations and selected 12 firms to conducts interviews with, and the quantitative study collected 160 responses as discussed in Chapter 5 (Verma & Goodale 1995; Forza 2002). This section concerns setting out the selection criteria to be used to add firms to the pool of qualitative and quantitative study surveys. Taking on from the theme of this research, the selected organizations for the case-study firms were selected as project-based in nature. An investigation was carried out on the selected organizations prior to approaching them to ensure that the set of criteria was met. A qualification statement was added at the start of the survey or made clear during interview sessions to filter out those organizations which do not meet these particular criteria.

The research endeavored to select organizations with various levels of ambidexterity and performance using a polarized form of case-study selection which could allow a correlation and regression to take effect (Pettigrew 1988; Field 2009). The environment which those selected organizations operate within was selected to be both complex and dynamic in order to trigger the need for ambidexterity (Miller & Friesen 1983; Dess & Beard 1984; Teece 2007). Such an environment can be found in the following industries: engineering, IT, banking or pharmaceutical/medical and Knowledge Intensive Firms (KIFs) (Robertson & Swan 2003; Oehmichen et al. 2016). It was also preferable for those organizations to have a decent number of employees to allow a hierarchy to be observed (Andriopoulos & Lewis 2009). However, various sizes of organizations were added to the selection criteria in order to test the sensitivity of those relationships under investigation with the size of each of the tested organizations. Table 4-5 below provides a brief summary for the study selection criteria.

Table 4-5. Sample selection criteria

Category	Selection Criteria	Reference/requirements
Sector	Private or public	Mercer (1991); Boyne (2002); Van der Wal et al. (2008)
Performance/ambidexterity	Polar type	Pettigrew (1988)
Processes	Project or portfolio management	PMI; Meskendahl (2010); Author
Environment	Complex and/or dynamic	Mercer (1991); Boyne (2002); Van der Wal et al. (2008); Simsek (2009)
Industry & size	Engineering, IT, Medical, KIF, others of all sizes	Author; Robertson and Swan (2003); Oehmichen et al. (2016)

4.4 Theoretical perspective

4.4.1 Purpose

This section describes the ontological stance and the epistemological context which the research has adopted in order to come up with the conclusions of this study (Ritchie et al. 2013). It then discusses the adopted theoretical perspective(s) as described through the relevant organization theories listed in Hatch and Cunliffe (2013) – also see Walker et al. (2005).

4.4.2 Theoretical stance

An ontological stance describes the research position in relevance to social reality and lays out a comprehension of what is 'out there' in the world that the research is trying to find (Ritchie et al. 2013). The research epistemological context deals with methods of know-how, and means of how such information shall be comprehended, and the outside world could be constructed (Ritchie et al. 2013). Research ontology concerns itself with the relationship that exists between the social reality and the conception of this reality in the human mind (Marsh & Furlong 2002). Two general ontological positions can be found in constructing research: *idealism,* which assumes that reality is linked to the human mind and their conception of it – in other words, humans' understanding of reality is an ideal description and construction of this reality without this conception reality do not exist (Gerring 2001). *Realism* on the other hand assumes that the external reality of the world exists independently of the human conception of it (Blaikie 2007) – in other words, humans' understanding of the outside word has no contribution in building its reality and it can only be observed without having the ability to alter it (Danermark et al. 2001). In this research, it is assumed that the industrial context within which the organizations operate gives rise to events while social actors have no control over. These events are not linked to how employees or any such social actors comprehend them. In other words; social actors do not build this reality; they

merely observe what is going on and strive to put it to best use. This research asserts that PPM consists of a set of processes which have been set in place over the years and were a product of trial and error during their application within various organizational and industrial contexts (Martinsuo 2013). Similarly, organizational ambidexterity can be viewed as a state which may have its own specifications that need to be applied to convert an organization into an ambidextrous one (March 1991). While this research tries to apply PPM to achieve this state for the organization, portfolio management processes and practices can therefore be viewed from an idealistic stance as ideally social actors can alter these processes to their benefit. However, the combination of ambidexterity as a state along with those established portfolio management processes and practices places social actors in a viewer's position which allows them to observe what is best for ambidexterity out of these practices. A cautious realism therefore – rather than an idealistic stance – as described by Blaikie (2007) and Ritchie et al. (2013) has been taken as the ontological stance for this research. Such a stance approaches the above reality rather cautiously by assuming that such reality can be measured approximately rather than accurately (Danermark et al. 2001). This research adopts this stance due to a probable connection with idealism in defining portfolio management practices (Ritchie et al. 2013).

Epistemology concerns itself with how the above conceptions of reality can be measured or comprehended (Ritchie et al. 2013). An inductive approach concerns itself with inducting theory from observations or generalizations (Gerring 2001), which is the approach used to answer the second research question with the aid of multi-site case-study analysis. The inductive approach represented by the multi-case analysis gauges the social actors' comprehension of their surroundings and tries to build a common theme or a pattern from the output of this analysis (Gerring 2001). The inductive approach in this case votes positivism, which, as described by

Ritchie et al. (2013), suggests that "all knowledge about the word [is] originate[d] in our experiences and is derived through [our] senses". This is the knowledge that the case-study analysis seeks to collect. A deductive approach on the other hand is another epistemological logic which concerns itself with a top-down approach (Golafshani 2003). It starts off with the knowledge or experience in mind and ends up by testing the theory which is the product of observing this knowledge or experience. Post-positivism is the approach which accompanies deduction and is the logic assumed in partly answering the third research question. Application of positivism logic on its own has been viewed as fluid and subject to the experiences of the social actors (Ritchie et al. 2013). A post-positivism approach comes into play to close-out the loop on this research and provide an objective measure to some of the conclusions this research is trying to reach.

In light of the above explanation of the various research approaches and their link to the purpose of this research, it can be observed that this research takes on a realistic ontological stance. Such a stance assumes that the organization and the overall industry give rise to events which are experienced by the social actors of the organization and its network. The research takes a cautiously realistic stance as a declaration of an approximated measure of events and to leave some room for idealism upon defining the process side of management (Danermark et al. 2001). This research therefore applies two consecutive types of logic in obtaining the knowledge needed for the study. The research starts with a positivist inductive logic which assumes a qualitative research approach and uses a multi-case study analysis. It then shifts to post-positivism with the aid of deduction and with the use of a quantitative multi-site survey data collection and analysis.

4.4.3 Theoretical perspective

This thesis aims to build an understanding of how ambidexterity can be achieved in Project Based Organizations (PBOs). Based on this, the thesis uses Hatch and Cunliffe's (2013) definition of and

approach to organizational theoretical perspectives to support and reveal these relationships. All such perspectives are applied in the discipline of project and PPM.

Hatch and Cunliffe (2013) discussed three organizational theoretical perspectives in their study – the modern, the symbolic and the postmodern perspectives. Each perspective represents its own means for viewing and testing reality, and each has its own approach to theory building. After careful consideration of all these perspectives and their relation to the research in hand, it was decided to use a perspective that represents a careful merger between the modern and the postmodern perspectives. An explanation of each of the perspectives is presented in the rest of this section in a way that leads to the conclusion of this merger.

The *modern perspective* views organizations as objects and promotes objectivism in testing and analyzing them (Whetten 1989). A modern perspective assumes that the environment in which the organization is embedded gives rise to events which cannot be controlled by social actors. Social actors – i.e. employees of the organization or its stakeholders – have no control on these events; hence their best action is to try to get the most out of these events by exploiting them for the betterment of the organization. This denotes a contingency approach to understanding and describing the act of organizing – the contingency approach is a subset to the modernist perspective (Woodward 1965; Lawrence & Lorsch 1967). The modernist perspective focuses on explaining events and the causes and consequences that these events could bring about in the organization. This perspective agrees with a quantitative approach to testing theory; it views correlations between elements and the inspection of causal relationships as prerequisites for adopting this perspective. This perspective agrees with an objective ontology and makes no allowance for subjectivity or feelings which could interfere in the analysis or the explanation of events. It could also adopt positivist and post-positivist epistemological assumptions in discovering theory.

The *postmodern perspective* combines the explanatory means of objectivism with subjectivity. The epistemological assumption behind the postmodern perspective is that of a postmodernism. A postmodernistic approach takes on the modernistic bias towards objectivity and infuses within it the need for subjectivity (Hatch & Cunliffe 2013). This approach views that reality cannot be measured with a pure objective stance since some understanding of what cognitive reasoning social actors have can affect the construction of theory (Parker 1992; Boje 1995). Postmodernists invite the use of language and discourse into the understanding of organization theory. This approach renders reality as "constantly shifting" and knowledge as "provisional" (Hatch & Cunliffe 2013).

The *symbolic perspective* promotes subjectivity in understanding and in analysis (Hatch & Cunliffe 2013). It gets its name from symbols which constitute emblems that depict what the internal workings of the organization and the social actors' minds could be. It supports cultural understandings along with the cultural and social relevance to organizational matters. In contrast to the modernist perspective, the symbolic perspective views social actors as part of the organization. These actors would have an effect on the way systems and structures are being constructed. This perspective agrees with a subjective ontology and has no allowance for objectivity. It emphasizes for instance that "culture would be unobservable if not for our capacity to experience [it] and communicate [it]" (Hatch & Cunliffe 2013, p. 11).

Based on the presented definitions for each of the perspectives, the author has decided to adopt a unique theoretical perspective to define the underpinning theory. This perspective represents a careful merger of the modern perspective and the postmodern organizational perspective proposed by Hatch and Cunliffe (2013). This merger suggests the application of a mixed-method research design in defining and proving theory (Modell 2005; Denzin 2012). A qualitative method that adopts the subjective traits of the postmodern perspective is used to develop the theory through

the use of multi-case study design and analysis, and a quantitative method that takes on the objective traits of the modern perspective is considered to test some of the specificities generated by this theory as discussed previously.

A comparison between the above two selected perspectives – the modern perspective and the postmodern perspective is presented and described in Table 4-6 below. This comparison takes into account the ontological and epistemological contexts of these perspectives and explains how organizations are viewed under each of those perspectives. Table 4-6 is sourced from Hatch & Cunliffe (2013, p. 15).

Table 4-6. The modern and the postmodern perspectives (source Hatch & Cunliffe 2013, p. 15)

Modern perspective	**Postmodern perspective**
Ontology	*Ontology*
Objectivism – belief in an external reality whose existence is independent of knowledge of it; the world exists as an independent object waiting to be discovered.	Postmodernism – belief that nothing exists separate from renderings of it in speech, writing, or other forms of expression; the world is made to appear in language, discourse and artwork without referents because there is nothing to which to refer.
Epistemology	*Epistemology*
Positivism – belief that the truth is discovered through valid conceptualization and reliable measurement, which allows the testing of knowledge against the objective word; knowledge accumulates, allowing humans to progress and evolve.	Postmodernism – belief that because there is no independent reality, there can be no truth about it, truth is an empty concept; there are no facts, only renderings and interpretations, therefore every claim to knowledge is only a power play.
Organizations	*Organizations*
Objectively real entities operating in a real world; when well-designed and managed they are systems of decision and action driven by norms of rationality, efficiency, and effectiveness directed toward stated objectives.	Sites for enacting power relations, giving rise to oppression, irrationality and falsehoods but also humor and playful irony; as they are texts or dramas, we can rewrite organizations so as to emancipate ourselves from human folly and degradation.

4.5 Ethical considerations

Ethical issues in conducting research refer to "the moral principles, norms or standards of behaviours that guide moral choices about [the researcher's] relationship with others" (Saunders et al. 2007). Taking this definition of ethical matter in research as the point of departure while setting out the moral conduct this research seeks to deliver; the intention is to assess the effect this research could bring about to the research subjects from harm to implement preventive measures accordingly. In carrying out such measures, Kervin (1992) suggests carrying out an assessment of the gathered information prior to its collection and the effect that it can have on the research subjects if leaked, an assessment of how harmful the findings of this research could be to others (such as stakeholders or shareholders) who are related directly or indirectly to the tested organizations, and an assessment of the methodology employed to conduct the research. Therefore, and as a preventive measure, the anonymity of all research subjects and the researched organizations were kept to the researcher only and will not be published or be made publically available (Grinyer 2009; Tilley & Woodthopre 2011). Moreover, verbatim quotations from interviews are minimized and to the extent possible not explicitly included in this thesis as Van Den Hoonaard (2003, p. 149) tells us that "the onus is on the researcher to acknowledge that the likelihood of tearing the veil of anonymity is a real possibility. To that end, the researcher must incorporate all known devices to maintain anonymity in the research and publication".

Chapter 5 Field Investigations

5.1 Introduction

This chapter primarily focuses on addressing the second and the third research questions, and it is also used to prove the continuity of the research results emerging from the findings from answering the first research question. This chapter takes on the theory produced earlier to test it and enhance it in the field so that it is transformed into real and applicable scientific knowledge. This theory is translated into three research questions, starting with an enquiry seeking a more comprehensive definition for ambidexterity, moving on to an enquiry to investigate the mechanisms which can help see ambidexterity through in organizations, and finally an examination of the compatibility of these mechanisms with PPM practices to see if those practices can act as a vehicle that can carry those mechanisms through. This chapter starts with a qualitative study and site investigation as explained earlier in the methodology chapter. The qualitative study was conducted on 12 firms commissioned to test the mechanisms of ambidexterity extending the findings from the systematic review of the literature. The qualitative study also covered the assessment of portfolio management practices to test their relationship with the mechanisms of ambidexterity. After this, and in order to add further generalizability to the research outcomes, the quantitative study was commissioned introducing a larger pool of professionals. The quantitative study was not just commissioned to confirm or generalize the results produced by the qualitative results, or used as a way to triangulate the data or the study outcomes as explained in the relevant section here. The quantitative data collected were used to expand the pool of research to test various other types of relationships which could not be tested otherwise, such as testing the mediation effect of ambidexterity and seeing the effect of the organization's size or its industry and the research outcomes.

5.2 Qualitative research

5.2.1 Purpose

The purpose of this section is to provide more clarity by conducting a qualitative field investigation on the mechanisms needed to achieve ambidexterity in organizations, and test the possible relationship between those mechanisms and the PPM practices. This research responds to the second research question and part of the third research question by providing a comparative case-study analysis for 12 case-study firms. The research tests these firms' means of operation in their day-to-day normal business; it examines the challenges that these firms face in their operations and the challenges imposed by the external environment. It then scrutinizes their means of resolving these challenges to allow them to achieve better performance results and ambidexterity.

5.2.2 Methods

This research entails a comparative case-study analysis alongside a within-case study analysis following the recommendations of Eisenhardt (1988) and Yin (2008). These cases have been treated herein as multiple experiments and have been used to verify the initial findings on mechanisms of ambidexterity as laid out in the systematic literature review and presented in the conceptual framework of this thesis. The initial results from the systematic literature review have been used in this field investigation in two forms; first, these have provided a direction to the design of the field investigation questionnaire, and second, they helped in determining the initial categories or codes used in the qualitative analysis for the collected data (Eisenhardt 2008).

Results of this investigation can be considered as more focused and more generalizable compared to the use of a single-case study as findings are now deeply grounded in empirical evidence drawn from multiple cases (Yin 1994; Eisenhardt & Graebner 2007). In applying the prescribed methods of comparative case-study analysis, the research endeavored to select theoretically and

operationally relevant cases/firms. The research endeavored to target ambidextrous organizations, although theoretically this may not be possible until those selected firms have been scrutinized and investigated. This has resulted in the selection of a few organizations which may not seem as ambidextrous as their peers, which led to the creation of a polarized type of selection per the recommendations laid out in the methodology chapter of this thesis (Pettigrew 1988).

5.2.3 Research context

This research was carried out in Knowledge Intensive Firms (KIFs) where large amounts of knowledge are manipulated on a daily basis and technical functions constitute the core elements of these firms (Robertson & Swan 2003; Oehmichen et al. 2016). The study was carried out in this context for several reasons. Firstly, KIFs have generally proven to be well suited to the study of challenges posed by external environments or internal settings coupled with innovative tactics set against these challenges (e.g., see Alvesson 1995 and Robertson & Swan 2003). Knowledge Intensive Firms (KIFs) are by their nature innovation-intensive (Robertson & Swan 2003). When these firms are placed in a dynamic environment with other similar firms, competition between them creates a catalyst that lead to the generation of more ideas and actions of exploration and exploitation – hence ambidexterity becomes a necessity for success (Hardagon & Fanelli 2002). Knowledge Intensive Firms (KIFs) such as consultancies and the likes develop projects and business models through learning and through trials as will be seen from the analysis of the qualitative data (Danneels 2002; Edmonson 2008; Aubry & Lievre 2010). Communication is an important facet that is needed to lubricate internal and external relationships for those firms (Lubatkin et al. 2006). Placing and allocating the right people and selecting the right skills and knowledge sets carry similar weight in allowing these firms to perform (He & Wong 2004; Cao et al. 2009; Kortmann et al. 2014), and having the right organizational structure with the correct

placement of the various roles and responsibilities is as important (Chandrasekaran et al. 2012; Jansen et al. 2012). With all these settings along with the outcome of the systematic review of the literature in mind, it is safely assumed that these organizations should identify future opportunities to leverage their current competencies and build on new ones, and use certain methods to achieve ambidexterity.

Secondly, those firms were selected and theoretically sampled to fit the research focus and the intended means for carrying out case-study analysis (Eisenhardt 1989). Those selected firms are, to the best of the researcher's knowledge, models of ambidexterity, while some may not be, as explained previously. This disparity in selection creates a polarized approach to allocating cases. This method of selection could help in cross-case comparison and idea generation as explained in the methodology chapter (see also Pettigrew 1988 and Eisenhardt 1989). The semi-structured questionnaire used in qualitative data collection was designed to understand the extent of ambidexterity each interviewed organization possesses. As noted by Sheremata (2000), ambidexterity is important to the success and the development of organizations. Tushman and O'Reilly (1996) postulated that ambidexterity allows for profitability and growth. While it was not possible to test profitability due to confidentiality issues, or get a true measure of growth and development, the discussion with the interviewees implied the extent of attention each of those organizations gave towards these attributes.

Lastly, this research has sought firms with few similarities in their operation, but not necessarily between their final deliverables/products or functions. These similarities helped in setting comparisons between cases and facilitated identifying replications with enough heterogeneity for the needed generalizability. All selected firms are based in the Middle East. Some may be headquartered in the US or Europe; however, it is safely assumed that they follow local rules and

regulations and are affected by the local external environment of the Middle East. Table 5-1 provides an overview of those selected firms.

Table 5-1. Overview of case firms

Firm	Type of services	Country of operation	Year founded	Number of employees	Annual revenue	Interviewees
1	Engineering consultant	**UAE**, Qatar, Bahrain, Kuwait	~1960	200	$25.0	Director of Operations
2	Engineering consultant	**Egypt**, UAE, Qatar, KSA	~1960	Grew to 1000 then shrunk	~$50.0	General Manager
3	Logistics – big-scale projects	**Jordan**	2003	UI and Subs	UI	Treasury Manager
4	Management consultant	**UAE**	2005	Grew from 15 to 40	$9.0	Business Development Manager (BDM)
5	Manufacturer	**UAE**, Qatar, KSA	2000	UI	UI	Managing Director
6	Humanitarian projects	**Egypt**, UAE, KSA	2006	300	$600.0	Local Manager UAE
7	Recycling and manufacturing	**KSA**	1988	Grew to 1500	$650.0	Operations Manager
8	Specialized DBO contractor	**UAE**, Libya	2000	Grew to 56 and Subs	~$100.0	Project Director
9	Contractor	**Jordan**	1981	400 shrunk to 200	$150.0	Head of Projects Control
10	Web developers	**Jordan**, KSA, Qatar & UAE	2007	20 grew to 70	$0.5-$1.0	Business Development Manager (BDM)
11	Project management consultant	**Qatar**	2014	600	UI	Technical Manager
12	Energy consultant	**UAE**, Jordan, KSA	1991	57 to 17 to 35	~$12.0	Chief Executive Officer (CEO)

UI: Unidentified/confidential | Subs: Heavily dependent on subcontractors and outsourcing | Revenue in million USD/yr. | BDM: Business Development Manager | MD: Managing Director | CEO: Chief Executive Officer | Bold font: Regional headquarters

5.2.4 Data collection

The data collection exercise for the qualitative part of this research extended for a period of three months, started in November 2016 and closed-out in January 2017. Several sources were used for collecting data; however the focus was mostly on face-to-face or telephone interviews with the selected informants. Some of the archival data, publically available processes, or models and organizational structures were examined but were not deemed suitable for use in the research (Forster 1994).

A total of 12 semi-structured interviews were conducted with the Top Management Team (TMT) of the case-study firms. Those informants were selected from the top levels of the organization to guarantee their involvement in the assumed mechanisms of ambidexterity applied in those firms. Titles such as Chief Executive Officer (CEO), Managing Director (MD), and Business Development Manager (BDM) were interviewed. To further ensure that the informants were at the right level in the organization, or whether the selected organization was the best fit for the purpose of this research, a pre-discussion took place with each of the informants, their superiors or reportees, or any of the firms' other employees (Currall et al. 2015). The initial discussion performed a filtration process and acted as a pilot for each of the case studies. Each of those interviews lasted for about 75-120 minutes. Data analysis was carried out during the course of interviews and a point of saturation was sensed midway through conducting those interviews. The number of interviews and their titles are presented in Table 5-1. Those interviews were transcribed and then summarized. The questionnaire and the summary of each interview are placed in Appendix A and Appendix B, respectively – this summary was checked and agreed by the informants.

The questions which were designed for this study and presented in Appendix A were inspired by several similar studies that covered areas on portfolio management and/or ambidexterity. The questionnaire in Appendix A consists of 10 core questions; each question is itemized and described in Table 5-2. Table 5-2 describes how each of those questions is used in collecting and analyzing the data. Table 5-2 also provides the reference to the literature or the research that those questions or items were either taken from or inspired by.

The interview protocol was designed with mechanisms of ambidexterity in mind and their relevance to PPM practices (Kvale & Brinkmann 2009). The interview and the discussions with

each informant did not contain the word "ambidexterity" to remove any probable or obvious guidance to anticipated results. The interviewees were asked general questions of how things are carried out in their organizations, the challenges and means to resolve those challenges and their organization's key differentiating elements used to achieve long-term growth and sustainability. The interviews started with general questions about the company and its history per the recommendations of Spardley (1979) and interviewees were left to ponder freely about those answers. The interviews systematically evolved to achieve the purpose of the interview with the guidance of the semi-structured questionnaire.

Table 5-2. Describing the core content of the qualitative questionnaire

Question No.	Question/item description	References
Q1	Size of the organization and whether the organization is in a growing or a shrinking mode – this question tries to understand the extent of ambidexterity for each case-study organization.	O'Reilly and Tushman (2008); Birkinshaw et al. (2016)
Q2	The operation type of the organization – this question looks at the complexity of the organization and sees whether this has an effect on its ambidexterity.	Gupta et al. (2006); Andriopoulos and Lewis (2009)
Q3	A description of how respondents perceive the market - this question measures the relevance between the organization's own ambidexterity and compares it with the dynamicity of the market and environment.	Teece et al. (1997, 2016)
Q4	This core question extracts and understands the means and mechanisms each organization addresses its challenges with.	O'Reilly and Tushman (2008)
Q5	This questions measures the differentiating elements organizations apply to fine tune their means and mechanisms to overcome challenges.	O'Reilly and Tushman (2008); Birkinshaw et al. 2016
Q6	This question addresses PPM practices in organizations – the question aims to see the relevance between organizational ambidexterity and its applied practices.	PMI (2008); APM (2012); Patanakul (2015)
Q7	This question looks at the types of the projects in the organization whether those are of the exploratory or the exploitative types and then tries to understand the relevance of the type with the environment.	Pellegrinelli et al. (2015); Davies and Brady (2016)
Q8	This question also tackles PPM practices with more emphasis on the outcomes of question 7.	Levine (2005); PMI (2008); APM (2012)
Q9	This is an exploitative type of a question since it asks about the specific challenges faced in the delivery of projects. Similar to questions 4 and 5, this question tries to extract the different types of challenges combined with probable means or mechanisms for their resolution.	Andriopoulos and Lewis (2009); Chandrasekaran et al. (2012);Eriksson (2013)
Q10	Similar to questions 4, 5 and 9, this question digs into more challenges and tries to find the means of resolving those challenges, but this time on the individual level.	Gibson and Birkinshaw (2004)

5.2.5 Data analysis

Raw data were collected and then converted into specific mechanisms which can be used to achieve organizational ambidexterity as discussed in the rest of this chapter. To start with, the semi-structured questionnaire initiated questions which tested the degree of ambidexterity for each of the case-study organizations to understand which of those carry true mechanisms for ambidexterity and which of those do not. The questions also investigated and analyzed the challenges each of those case-study organizations face during their day-to-day operations to identify and align them with dimensions of ambidexterity as generated in the systematic review of the literature – this initial stage of analysis was deemed as necessary to ascertain that the outcome of the study is cohesive and its aims are aligned with the outcomes of the field survey. The assessment of mechanisms needed to resolve these challenges per case followed through the rest of the qualitative analysis which was the focus of this field survey.

This chapter uses a four-stage process to convert the raw data into the said mechanisms. This four-stage process is adopted by Andriopoulos and Lewis (2009) in their qualitative study on organizational ambidexterity, and it drew from recommendations by Glaser and Strauss (1967) and Miles and Huberman (1994). This process calls for a systematic analysis for the raw data along with iterative comparisons to help generate agreements between the generated categories. The existing literature and the systematic literature review along with the conceptual framework aided in identifying and developing cohesive constructs.

Stage 1. Identify patterns and broad categories in each of the case studies. This stage started by examining each of the interview scripts and retyping each of those into a brief version as presented in Appendix B. In each of those patterns, high-level categories for resolutions (mechanisms of ambidexterity) were identified and linked to the challenges faced by each of the interviewed

organizations along with their business/operating model. Those challenges along with each business/operating model were analyzed to see if they align with paradoxical situations faced by each of those organizations. It was not the intention of the qualitative field survey to dig deep into paradoxical situations of what this thesis has identified as *dimensions of ambidexterity*; rather the intention was to answer the research question regarding mechanisms of ambidexterity and their relation to PPM practices. Identifying those paradoxical situations and dimensions in each case study was necessary though in order to infuse cohesiveness and reliability into the outcome of the study. It was important to ascertain that those challenges along with the business and operating models were a product of a paradox for if they were not then it could be argued that the mechanisms generated by this field survey and analysis do not belong to the theory under study.

Using the NVivo software coding, a node identified as *business/operating model* and *challenges* were subcategorized into 24 sub-codes. Those parent nodes received no less than 50 references combined, while the nodes which were created for mechanisms to act as resolutions to those challenges received no less than 53 references. During the analysis of the *challenges and business/operating model* references, contradictory situations and/or statements were looked at and conditions which could create a paradox were scrutinized to satisfy the cohesiveness and the reliability of this study. To further enhance the reliability of the codes and sub-codes generated for *challenges, business/operating model* and *mechanisms* and to ensure their relevance to paradoxical situations, a second round of interviews carrying more specific questions was conducted targeting a few of the swinging cases only. [Another way to increase the reliability of this study, which could be considered in future similar studies, is the appointment of other coders to analyze the results of the interviews in parallel to each other. Results could then be compared, and an inter-coder

coefficient could be used to measure the degree of agreement between the different coders' results (Cohen 1960).]

Stage 2. Link relevant concepts within each case. The second stage looked for links between the first-order concepts – those are the initial categories generated to group ideas and relevant texts within each of the transcripts in the raw data (see Figure 5-1 and Figure 5-2). The first-order concepts were grouped to form second-order themes which were then aggregated to form the parent node or code in the NVivo software platform. It is important to note that this inductive process and analysis was carried out in a way which allowed those concepts to be generated by the raw data rather than being purely guided by the study theory (Strauss & Corbin 1990). A simple guide to the themes of the studies (but not to the first-order concepts) was added towards the end of the process to enable seeing through alignment between the conceptual framework and the outcome of the study. This final step constituted a confirmatory step to verify the initial outcome of the systematic review of the literature, and yet it yielded an important outcome due to its contribution to the study generated comprehensive definition of ambidexterity.

Stage 3. Conducting cross-case analysis. Using case-study analysis and cross-case comparison analysis techniques recommended by Eisenhardt (1989), similarities between first-order concepts and second-order themes were identified to help gather all references under the relevant codes.

Stage 4. Building/confirming the theoretical framework. This final stage provided confirmation to the conceptual framework presented in Chapter 3. To agree on a parsimonious set of constructs as identified by the raw data, the most robust findings were used for this purpose as presented in Figure 5-1 and Figure 5-2.

5.2.6 Findings

5.2.6.1 General findings

The analysis started by gauging the degree of ambidexterity in each of the interviewed case organizations, after which the text of each of the interviews was scrutinized to identify situations of paradox which require resolution. Once identified, these situations of paradox were broadly categorized into two groups; one was identified as the business/operating model depicting the case-study firms' efforts to deliver projects and grow, and the other was identified as the challenges and obstacles to growth and/or sustainability.

Those challenges in some cases could act as opportunities as can be seen in the analysis carried out in the rest of this chapter. The forces between the business/operating model and challenges are in constant tension. These forces resemble exploration and exploitation tensional forces in ambidextrous organizations. The business/operating model category resembles exploitation in its attempt to use internal knowledge or capabilities to deliver projects and company vision (March 1991; Vahlne & Jonsson 2016), while challenges call for exploring the external environment and sensing the future to prevent obstacles and to facilitate delivery and growth (March 1991; Teece 2007).

These forces require resolution to see ambidexterity through in all organizational levels as indicated in the generated levels of ambidexterity identified in the systematic literature review literature. The following subsection details the constituents of those broad categories and links them back to dimensions of ambidexterity as generated by the earlier literature review. The cross-case analysis carried out in this study is presented in table C1 of Appendix C. Also refer to Figure 5-1 below which depicts the analysis carried out in table C1 of Appendix C in a graphical format.

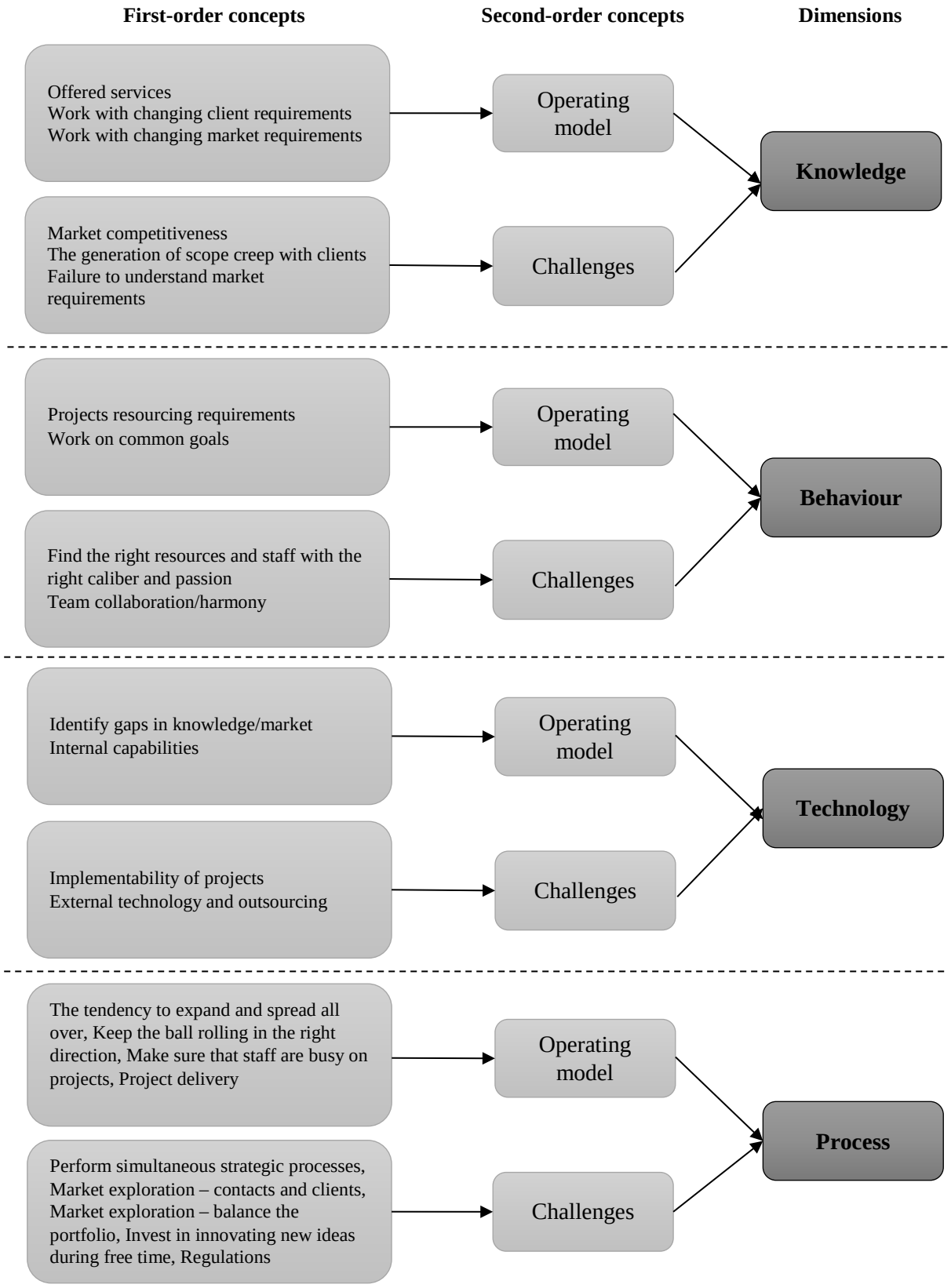

Figure 5-1. Cross-case analysis for dimensions of ambidexterity

Post the initial analysis which was carried out on dimensions as stated above, this chapter conducts an analysis on mechanisms of ambidexterity using an approach similar to the above. The thesis has chosen to identify tensional forces and regenerative dimensions of ambidexterity from those case-study firms prior to the identification of mechanisms to show continuity of the results, and to further emphasize the cohesiveness of the study's aims and objectives. The generated mechanisms' cross-case analysis can be found in table C2 of Appendix C. Towards the end of the qualitative analysis, the study takes on PPM practices and links these back to the outcome of ambidexterity analysis using a comparative analysis between the two.

5.2.6.2 Dimensions of ambidexterity

5.2.6.2.1 The knowledge dimension

Operating/business model. The first-order concepts for those interviewed Knowledge Intensive Firms (KIFs) suggest three main subcategories, those are: *Growing knowledge through offered services*, *understanding changing client requirements*, and *working along with changing market requirements*. Each of the first-order concepts tallies with and builds on the results of the systematic review and analysis of the literature – see Table 2-4 of Chapter 2. The qualitative analysis suggests that these concepts are primarily exploitative – it can be argued that some exploratory functions can be found in this broad category as well. The offered services concept in this case refers to exploiting the knowledge within each firm and defining what each firm does. Working with changing client requirements defines a tension and calls for alignment with client needs and with the internal capabilities and knowledge of each of the delivery organizations. Working with changing client and market requirements refers to understanding the laws and regulations of the country to allow for better exploitation of internal capabilities.

Challenges. Challenges in this case have been associated with exploration. Those challenges work alongside the first-order concepts identified in the business/operating model and they create tension that requires resolution. Working on tensions in the knowledge dimension generates ambidexterity. However, working on any of the identified sides (operating model or challenges) without paying attention to the other may not create an environment that is conducive to ambidexterity (O'Reilly & Tushman 2008).

Most informants have agreed that market competitiveness constitutes one of the challenges which require careful attention and that can work against any of the business/operating models identified initially – in particular, the offered services. In this case, Matthews et al. (2015) offer codification of existing knowledge and codification of expertise to generate new ideas that can enhance one's competitiveness. Honing an understanding of the market and its requirements is an important asset needed to build ambidexterity and counter the effect of any similar challenges (Voss & Voss 2013; Wei et al. 2014). Also, paying attention to client portfolios and extracting all sorts of knowledge from it enhances competitiveness and arms KIFs with prior knowledge of the market and its requirements compared to others who compete in the same market or area (Im & Rai 2008; Bednarek et al. 2016).

It is to be noted that through the cross-case analysis presented in table C1 of Appendix C, a reference to the level of organization in which ambidexterity occurs has been identified as a proposition. Discussion on levels and their relation to dimensions and mechanisms is not covered here as it has been covered in previous chapters. However, these levels have been made apparent through the identified tables to infuse reliability and cohesiveness to the study inputs and outputs.

5.2.6.2.2 The behaviour dimension

Operating/business model. The first-order concepts under this dimension refers to projects' and business resourcing requirements. This concept also comes with a hidden requirement that addresses the behaviour associated with these resources along with their attitude and their caliber. Gibson and Birkinshaw (2004) for instance voted for intrinsically motivated employees and those who are willing to stretch themselves and work out of their comfort zone to provide to the organization, those who are disciplined, and willing to support their colleagues for the sake of the group, and those who are trustworthy. Another set of the first-order concepts in this case refers to working on common goals. This set refers to loyalty of the employees to the organization, and their stretch and discipline as referred to in Gibson and Birkinshaw (2004). The informant of Firm 12 refers to his employees and explains how they worked out of their own time to resolve issues which arose from the 2009 financial crisis. He added:

> My staff came up with brilliant ideas, such as part time work and the likes. By them being so loyal to me and to the company and working out of their comfort zone we managed to survive.

Challenges. Challenges in this case is the actual process of finding and testing the caliber and attitude of these resources, and then assigning them to the right activity which goes along with their personality and/or character (Kaplan 2008; Walsh 2008; Chandrasekaran et al. 2012; Auh & Menguc 2005). Employees who were involved in the early days of establishing or founding the organization may exhibit different behaviour or attitudes compared to new joiners (Beckman 2006). A team that is formed and which constitutes of such a mix, or a mix of employees with different tenures or levels or grades can be problematic. Team collaboration and the harmony of

such a mixed team are very important. The informant of Firm 11 refers to this challenge in their interview and comments that there is too much politics inside his organization with much of tension between employees.

Another challenge, as referred to by Firm 1 informant is when individuals are selective of the type of work they want to do – see table C1 of Appendix C for more details. Ambidextrous individuals have the ability to resolve such situations and avoid any unnecessary tension which is not conducive to ambidexterity. Those individuals have the ability to operate in two different modes of actions and then operate in the best mode which produces overall benefits to the group (Aubry & Lievre 2010).

5.2.6.2.3 The technological dimension

Operating/business model. The first-order concepts under this dimension refer to identification of gaps in knowledge, technology and the market combined for the sake of growth and sustainability. Firm 12 informant for instance presented a new technological breakthrough in energy savings and the firm claims that it was the "first to see it [and hence] invented and invested in a Blue Ocean technology". The informant of Firm 7 identified a new technological breakthrough in aluminum and its production and sensed "a huge demand" for aluminum, by which they started their application in mass production infusing efficiency in their operation and creating a fully ambidextrous organization at the operational level as they claim (Kortman et al. 2014). Internal capabilities of a firm refers to the direction they pursue gaps in technology; this could be through inventing new models for operation such as PPP or DBO (refer to interview conducted with Firm 8 in Appendix B or table C1 of Appendix C), seeking innovation (Andriopoulos & Lewis 2009), or investing capabilities in R&D and technology (Chandrasekaran et al. 2012).

Challenges. It is always good to identify gaps in technology, or build on R&D initiatives and capabilities and so on; however, when it comes to real projects implementation, problems of various types arise and hinder the production or the process. Firm 12 claims that identifying a new gap in technology and in energy savings was good and conducive for investment, but no business model was established previously that could be referred to. Firm 5 looks at followers of their business and/or competitors who work in the same niche or market, and investigates how they can differentiate themselves from those. External technology outsourcing could be one of the solutions but that needs to be treated with care in relation to Intellectual Property (IP) and similar issues (Rothaermel & Alexandre 2009).

5.2.6.2.4 The processual dimension

Operating/business model. The first-order concepts under this dimension refer to the processes needed to grow, sustain and perform – i.e. tendency to expand, keep the ball rolling, keep it rolling in the right direction, make sure staff are busy, and project delivery (see table C1 of Appendix C). Firm 12 for instance endeavored to expand but found it was "spreading itself too thin" due to the lack of proper planning and strategic thinking behind the expansion. Firm 7 runs a massive operation and they want to assure they are not caught at a halt situation at any point in time as this would be costly to their operation. Firm 5 has issues with their DSO (Days Sales Outstanding, which is an indicator for cash flow versus revenues – see Stewart 1995), and they seek better design of their portfolio(s) to achieve a better handle on their operational level. Firm 4 has issues with keeping staff busy to work on projects and they started investing in innovation cycles to generate good ideas for investments during idle times.

Challenges. Operating a business towards growth, performance and sustainability is not easy and is always faced with issues. For instance, Firm 12 failed to perform simultaneous strategic

processes, and lacked strategic flexibility (Kortmann et al. 2014). Their CEO found himself caught in many instances "overlooking" other directions of the business during his expansion efforts. In feeding the operation with new work and to "keep the ball rolling", the challenge of market exploration can be looked at through the eyes of the clients and the various business contacts as identified by Firm 7 informant – see Bednarek et al. (2016). Sensing such opportunities during market exploratory activities requires a set of processes and a sound routine structure to see through success (O'Reilly & Tushman 2008). Adopting a process of innovation to resolve issues and challenges of market expansion, filling idle time and resolving issues on projects could be a challenge, but the organization can reap the fruits of success if invested correctly (Zahra & Das 1993).

5.2.6.3 Mechanisms of ambidexterity

The cross-case analysis carried out on dimensions of ambidexterity contributes to the reliability of the systematic review of the literature results. It is, however, important to note that the systematic review and the field investigation results complement each other. An analysis conducted on the mechanisms of ambidexterity using a similar approach to the dimensions analysis follows through in this section – see table C2 of Appendix C for the cross-case analysis which was carried out on mechanisms of ambidexterity; also see Figure 5-2 for the graphical representation of the conducted analysis. The coming analysis proves that mechanisms and dimensions are tied and are also linked to each other at the various organizational levels. In the remainder of this section more details on the analysis of mechanisms are provided, followed by an analysis of their relation to portfolio management practices as extracted from the cross-case study analysis.

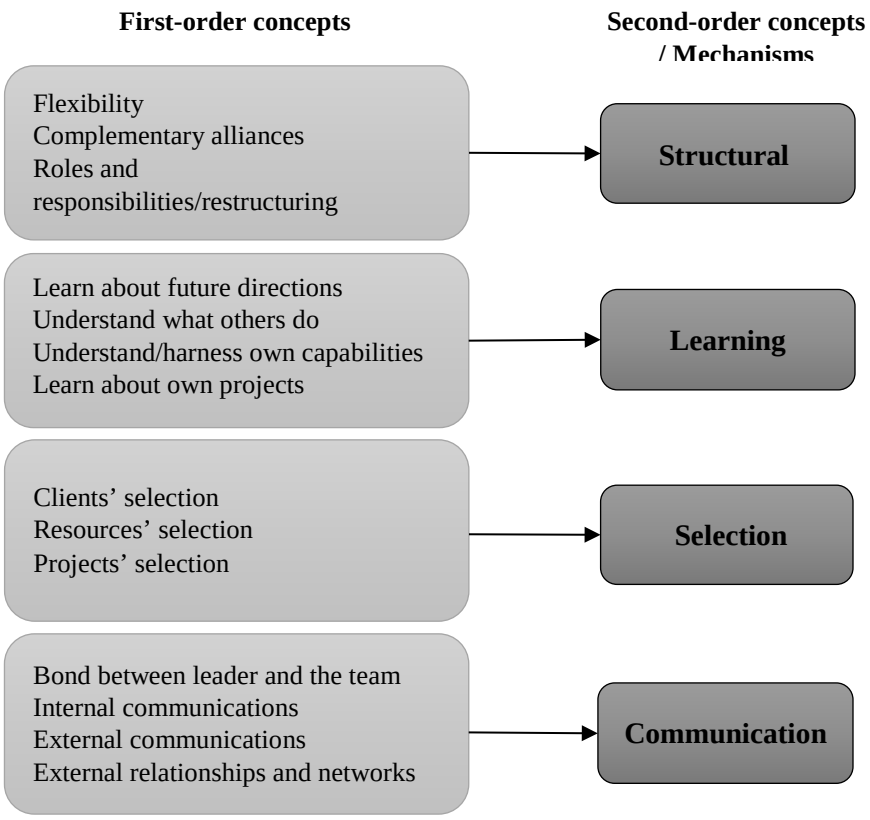

Figure 5-2. Cross-case analysis for mechanisms of ambidexterity

5.2.6.3.1 Structural design of the organization

The first-order concepts here refer to *flexibility*, *alliancing*, and *roles and responsibilities.* Flexibility of the resources and their ability to work on various tasks and wear different hats in the organization has proven to be one of the important constituents of ambidexterity. Human resources need to be willing to do so and need to be willing to go the extra mile for the betterment of the organization (Andriopoulos & Lewis 2009). The flexibility of resources can help resolve many of the previously presented challenges and ease the tensional forces within the organization to inject ambidexterity. Jansen et al. (2012) for instance emphasized the importance of resource dependence across the various organizational sub-units and compared this to their munificence. Flexibility in this case can counter the effect of munificence and the lack of resourcing. Firm 10 informant

demonstrated his flexibility in performing a dual role in both business development exploratory type of a role and "media coordination".

We see this as an exploitative role. Firm 12 informant adds that his…

> employees wore salesman hats [during the financial crisis]… and they were all determined to bring in more work to increase their time booking.

This suggests no structural separation between exploration and exploitation (Chandrasekaran et al. 2012); rather a temporal separation was apparent in this case (Kaplan & Henderson 2005; Lavie et al 2010). Flexibility can streamline work between centralization and decentralization (Jansen et al. 2005) and it can facilitate striking a balance between exploitation and exploration (Cao et al. 2009), and/or the use of organic or mechanistic structures in the organization (Turner et al. 2015).

Another means of achieving ambidexterity through the structural design of the organization is bringing in alliances and partnerships which can facilitate the resolution of some of the difficult challenges as indicated by Firm 12 informant (Koza & Lwein 1998; Rothaermi & Deeds 2004; Lavie & Rosenkopf 2006; Wassmer et al. 2016). In that vein, Firm 12 informant stated that…

> some of the acquisitions of my company added a corporate touch and structure to our operation and that provided us the exposure and allowed us to expand even further.

Roles and responsibilities within the organization carry an important say in the process of ambidexterity, not only that which is relevant to flexibility as indicated earlier in this text, but also

through constant "restructuring" as indicated in several case studies. Most of the informants indicated that restructuring of roles and responsibilities took place on several occasions to enhance unproductive situations, while they claimed that as a set of structures was focused internally, another would come in to externalize the strategic focus of the organization (Bradach 1997).

5.2.6.3.2 Learning mechanisms

The first-order concepts here refer to *learning about future directions, understanding the competition, understanding own capabilities* and *learning about own projects.*

Learning mechanisms facilitate ambidexterity and help build a complementary understanding between one's own business model and others' business models. Learning about one's company's own offerings and understanding their operating model helps gauge the possibility of infusing creative variations or solutions and benchmarking it with future market directions (Mathews et al. 2015). Firm 10 informant for instance "learn[ed] the hard way". He learned how to build on and enhance his own business model, and benchmarked this against other business models. It was not until then that their business could see through better performance results. Firm 12 informant voted for "untraditional" thinking that requires true commitment and understanding of the current operation and the market. Creativity in these situations is essential as referred to by Firm 12 informant:

> We are creative; we always create new things, new processes, new frameworks and new services.

Understanding one's own business capabilities affords better chances of spreading those capabilities to other team members who handle exploratory and/or exploitative functions. Moving

things around, constant changing of roles and responsibilities, and the continual improvement in capabilities gives everyone a chance to learn new things about the organization, and makes the operation more cohesive (Kortmann et al. 2014). Firm 10 for instance moved some operations and resources around to achieve operational efficiency; by doing so, they managed to disperse all their knowledgeable resources across the various company functions and operations. Firm 12 never stopped creating and recreating services, functions and models with the contribution of their own staff. Firms 6 and 9 never ceased trying out new business models. Constant changing and the continual improvement on own capabilities improve the absorptive capacity of the organization along with its ambidexterity (Jansen et al. 2006; Broersma et al. 2016).

The emergent execution of projects calls for learning and exploring during projects' implementation and delivery (Edmonson 2008). The emergent delivery of projects is both costly and risky. This cost can be considered as an investment towards building new capabilities (Edmonson 2008; Aubry & Lievre 2010). The potential risk of this option shall be addressed very carefully lest it affects firm reputation (Voss & Voss 2013). Firm 3 informant, for instance, confirmed that the emergent delivery of one of their largest projects cost them more than it should have, but the capabilities which they built out of this project were priceless and they were the reason behind their "superiority" in delivery and the market:

> In 2003 we started our first operation/project and we lost lots of money during implementation, and we learned a lot from it; we learned things which we are currently implementing in new projects, which learnings were part or the reason behind our reliability and performance superiority nowadays.

Firm 10 was able to learn and build new capabilities that allowed them to challenge clients on real drivers behind their own projects or their proposed methodologies of implementation. This added a strategic spin to Firm 10's service offerings that elevated them to a referee's position in their clients' eyes:

> We sometimes go back to the client and advise them on what needs to be done or a feasibility of something.

5.2.6.3.3 Selection mechanisms

The first-order concepts in this category refer to *clients' selection, resources' selection* and *projects' selection.*

Bednarek et al. (2016) refer to the careful selection of a client portfolio, the selection of this portfolio can be beneficial in terms of the strategic distribution of work and through building networks, contacts and the extra work and knowledge that can be obtained through this portfolio. Firm 10 informant commented on this:

> Clients in the GCC are willing to pay the premium of our services, hence we locate those clients and work with them.

Bednarek et al. (2016) emphasized on the knowledge that can be captured from delivering projects for different clients. This knowledge can be diffused within the organization and this can create new knowledge, new contacts and new clients. This also goes about enhancing the company resume and its reputation if the delivery was right and extraordinary. Thus, according to Firm 10 informant,

> Once we succeeded in delivering the project our name was added to the vendors' list of that client and we started receiving more enquires, basically because they liked us.

Firm 7 informant talks about the information and the contacts they get through the diversity of their client portfolio:

> We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects. Out of all these connections we receive various types of information.

Resources selection is one of the important factors not only for achieving ambidexterity, also for the design of an effective organization (Cameron 1983; McKenna 2006). Almost all the interviewed firms agreed with hiring the best and retaining the best. Thus, according to Firm 1 informant:

> We try to hire top-notch people and we try to invest in our people as well.

Firm 4 informant commented on staff retention:

> Everyone liked the work environment, no one left/resigned – probably very few only, and everyone was loyal to the company.

Selection becomes even more critical when it involves the selection of a leadership team as emphasized by Firm 12 informant:

> The selection of the management was another mistake which I made; I did not select an old existing leadership team to run my business.

Incentivizing the team to work and to accomplish their assignments on either exploratory or exploitative tasks is as important (Cao et al. 2009; Chandrasekaran et al. 2012). This could come through flexibility of the team to work on various tasks associated with a relevant rewarding system:

> We follow a transparent system of targets and sales, in that I mean that all salespeople and see what others have achieved as their target and then start competing with each other… Informant Firm 5

Thus, Firm 5 informant added that team development, appreciation and rotation to different roles in the organization added to the team's value and enhanced their sense of belonging:

> I am the business development director for the company. I used to be a programmer, then a project manager and finally got promoted to this position. The company notices talented people and they deal with them with care and grow their talents, which puts them into good positions at the end of the day.

Project selection and the selection and allocation of project teams in a way that facilitates ambidexterity is an important performance improvement factor (Andriopoulos & Lewis 2009;

Eriksson 2013). The selection of the right types of projects and setting the right balance between the different types, with due consideration to the right balance between exploratory and exploitative goals, can bring in sustainability and help the organization achieve its long-term goals (Pellegrinelli et al. 2015). Firm 8 informant agrees that:

> We sometimes need to chase other types of projects to keep the ball rolling.

Firm 5 informant adds:

> Our business is divided mainly into two streams, we have the projects operation and we have the retail business, for now our focus is more on projects not the retail since the retail business requires lots of infrastructure and preparation and other types of marketing campaigns which we don't have at the moment. We wish we can be doing better in retail since it has better DSO and collection system compared to those of projects.

5.2.6.3.4 Communication mechanisms

The first-order concepts in this category refer to *the bond between the leader and the team, internal communication, external communication* and *external relationships and networks.*

The behaviour of the Top Management Team (TMT), their connection with the employees and their close communication with them is an important facet of an ambidextrous organization (Lubatkin et al. 2005; Chandrasekaran et al. 2012). Gibson and Birkinshaw (2004) emphasized the positive and motivating type of a relationship between the top management and the employees and its effect on employees' encouragement and motivation to act "ambidextrously". The relationship between the Top Management Team (TMT) and the other management teams of the organization,

and its effect on ambidexterity was evident through most of the interviews. Thus, according to the CEO of Firm 12:

> Instead of reducing staff like what others did, I gathered all my employees and requested them to contribute in ideas to resolve the challenges generated by this crisis.

Interestingly, this perspective is corroborated by Firm 2 informant, who suggests that:

> The bond between this team and the leader was very strong. Bond between peers was not as strong and this may have led to the demise of the company later on.

Ambidexterity can also be seen through internal and external communications, amongst the team members and between employees and external contacts of the organization such as subcontractors, authorities, and other projects' stakeholders (Eriksson 2013). The social network amongst the team members (Turner et al. 2015), the team(s) interdependence that emerges through units' boundaries in a multi-unit context (Jansen et al. 2012), and the flow of information amongst the team(s) and the management and between the team members themselves (Jansen et al. 2005; Mom et al. 2007) all constitute the building blocks for organizational ambidexterity. On internal communication, Firm 4 informant agrees with the above as follows:

> When we have less work, the employees take it on themselves to brainstorm several ideas to put them into work.

Again, interestingly, this view is also advanced by Firm 12 informant on the external communication part:

> I had to meet lots of people and I had to allocate that consultant whom I wanted to transfer the knowledge from.

Firm 2 informant agrees by suggesting that:

> This has led to building another type of a relationship which facilitated approval in the work place and enhanced trust between the authorities and our organization.

There is no real difference between the *external communication* and *external relationships* concepts mentioned above apart from the "network" component, the effect or which is associated with the type of those relationships. Network and networking with the external environment leads to the creation of ties (Powel et al. 1996). Those ties could be beneficial to the organization in some form or another (Parkhe 1991). The diversity of those ties creates an even better environment that is conducive to ambidexterity (Simsek 2009). Firm 5 informant agrees with this:

> The only way we can do so is through building good networks and relationships amongst consultants and keeping ourselves up to date in regards to changes in the market and the technology.

Firm 7 informant adds:

> We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects.

Firm 8 informant sees the importance of networks and networking and the diversity of ties through projects' awards as follows:

> We work on trust and word of mouth most of the time – project Alpha was awarded to us upon the good relation between our manager and the owner for example supported by our known reputation in the market and our credibility. Relationship is important of course as well as the networks which we built and are building through our contracts, contacts, contractors and consultants.

5.2.6.4 Portfolio management and its relation to ambidexterity

Project portfolio management has been defined previously in this thesis as the management of the organization's projects' portfolios in a way that increases the strategic efficiency of the organization and improves on the overall benefits realized from the collective management of those projects (Levine 2005). Portfolio management acts as the link between operations management and projects management (Brook & Pagnanelli 2014). This link facilitates the relationship between operations and projects management, and both need to have a collective understanding of each other's functions in order to run a smooth operation (Meskendahl 2010).

Project portfolio management (PPM) is seen to complement the dynamic capabilities of the organization; hence it can be seen as being flexible (Davies & Brady 2016) compared to project management (Hodgson & Cicmil 2007; Candi et al. 2013). Project portfolio management (PPM) with its flexibility, along with its oversight over the project portfolios, has a unique position in

infusing ambidexterity into the management of the organization and its operations, as claimed in this thesis.

Borrowing from the PPM tools and processes of various project management methodologies and standards such as the PMI, APM and the CIOB, those tools and techniques that are used by various organizations to implement PPM practices can be compared with the mechanisms of ambidexterity discussed and demonstrated for use in this chapter. It has been cautiously assumed that conducting a comparative analysis between mechanisms of ambidexterity as detailed and analyzed in this chapter, and the PPM practices, can sufficiently demonstrate the adequacy of using PPM practices as a vehicle to achieve ambidexterity. Table 5-3 below provides a comparative analysis between the first- and the second-order concepts of mechanisms of ambidexterity along with a selection PPM practices.

The purpose of presenting this comparative analysis is to verify the possible links between portfolio management practices, as represented by tools and techniques, and mechanisms of ambidexterity as discussed and validated earlier in this chapter. It has been assumed that organizations that are intending to improve their PPM practices for the sake of achieving ambidexterity – performance and sustainability – would consider all PPM practices, not only those ones presented in Table 5-3 below.

Table 5-3. Comparison between mechanisms of ambidexterity & PMI PPM practices

Mechanisms of ambidexterity *Second-order concepts*	**Mechanisms of ambidexterity** *First-order concepts*	**PPM tools and techniques** *Selection made from PMI*
Structural	Flexibility Complementary alliances Roles and responsibilities	Portfolio organizational structure analysis Projects prioritization analysis Portfolio component categorization
Learning	Learn about future directions Understand what others do Understand own capabilities Learn about own projects	Elicitation techniques Review meetings Capacity and capability analysis

Selection	Clients' selection Resources' selection Projects' selection	Capacity and capability analysis Qualitative and quantitative analysis Projects' prioritization analysis Portfolio component categorization
Communication	Bond between the leader and the team Internal communications External communications External relationships and networks	Communication methods Communication analysis Stakeholder analysis Elicitation techniques

Firstly. The structural mechanisms used for achieving ambidexterity have been divided in this qualitative analysis into three first-order concepts/components, those are: *Flexibility*, *complimentary alliances* and *roles and responsibilities*. The PPM tools represented in Table 5-3 above direct the entire PPM practice that can be applied throughout the organization. The portfolio structural analysis refers to the assignment of roles and responsibilities of the portfolio this goes with the needed structural, size and complexity analysis of the organization and the size of the projects in hand. These resemble the structural mechanisms of achieving ambidexterity. Resources are looked at here and analyzed along with the rest of the portfolio components in order to build a comprehensive structuring plan that allows for their feasibility of use and ease of application. Moreover, these tools and techniques define the structure of the portfolio and link this to the structure of the organization; this structure then defines the needed roles and responsibilities to run the organization and its portfolios. These tools may generate the need to separate exploratory activities from those that are exploitative to form a temporal separation, a domain separation or a structural separation. Prioritization of projects can be introduced to support the organizational structure; this can be accompanied with scenario analysis and categorization. A clear demarcation between organic and mechanistic structures can also be identified here.

Secondly. Learning mechanisms used for achieving ambidexterity have been divided in this qualitative analysis into four first-order concepts/components, those are: *Learn about future*

directions, understand what others do, understand own capabilities and *learn about own projects.* Elicitation techniques here refer to planning, setting up metrics, understanding the direction of the business, measuring the performance, and re-strategizing when and as needed (PMI 2008). These are all accompanied with the review meetings, steering committee meetings and performance review meetings required to set the target and move towards the strategized direction. Capability and capacity analysis refers to the analysis of own resources, their schedules, funding requirements and any other relevant resources or capabilities needed to deliver the portfolio (PMI 2008). This is where the PPM manager learns the different requirements for the portfolio through brainstorming, facilitation, surveys, learning from, and collaborating with others such as work groups, internal or external experts, alliances, client and/or stakeholders. It is assumed that the PPM manager has absolute control over all the resources within the organization; this however may not be the case, particularly in less mature organizations (Nobeoka & Cusumano 1995; Principe & Tell 2001; Engwall & Jerbrant 2003; Perks 2007). This may have an effect on the efforts expended in building and achieving ambidexterity.

Thirdly. Selection mechanisms used for achieving ambidexterity have been divided in this qualitative analysis into three first-order concepts/components, those are: *Clients' selection, resources' selection* and *projects' selection.* Portfolio management tools and techniques selected under this component for comparison with mechanisms refer to *capacity and capability analysis, projects prioritization analysis* and *portfolio component categorization* as discussed earlier. Although most of these tools and techniques have been referred to under other mechanisms, they still can work under these mechanisms as well. It is to be noted that it was never the intention here to set a clear-cut demarcation between components, mechanisms and/or tools and techniques. The *qualitative and quantitative analyses* in this case tap into the capability and capacity assessment

specifically for resources with the intention to improve on their schedules for the betterment of the entire portfolio and the organization.

Finally. Communication mechanisms used for achieving ambidexterity have been divided in this qualitative analysis into four first-order concepts/components, those are: *Bond between the leader and the team, internal communications, external communications* and *external relationships and networks.* The PPM tools and techniques compare with many components under this category. Stakeholder analysis, for instance, defines those stakeholders which need to be satisfied or just appeased, the methods of communication and analysis with stakeholders and others, and the elicitation techniques as discussed above. The use of various communication and information transfer techniques can help generate ambidexterity when exposed to those appropriate techniques as mentioned above.

Compared with PMI and its Standard for Portfolio Management (PMI 2008), the APMBOK (APM 2012) divides the knowledge behind managing the portfolio into seven areas of management which are: the Integrative Management (IM), the Scope Management (SM), the Schedule Management (ScM), the Financial and Cost Management (FCM), the Risk Management (RM), the Quality Management (QM) and the Resource Management (ResM). Each of those areas can be compared and mapped against the mechanisms of ambidexterity (structural, learning, selection and communication) represented by their first-order concepts as presented in Table 5-4 above. PPM practices within each of the management areas as presented in Table 5-4 are applied as part of the portfolio management where the operation requires.

Table 5-4. Comparison between mechanisms of amb. & APM PPM areas

Mechanisms of ambidexterity *First and second order concepts*		**PPM areas of management** *Selection made from APM*
Structural	Flexibility Complementary alliances Roles & responsibilities	Control – IM Organization – IM Change management – SM Budgeting and cost control – FCM Funding – FCM Investment appeal – FCM
Learning	Learn about future directions Understand what others do Understand own capabilities Learn about own projects	Business case – IM Configuration management – SM Requirements management – SM Solutions development – SM Resource scheduling – ScM Risk techniques – RM Assurance – QM Reviews – QM
Selection	Clients' selection Resources' selection Projects' selection	Benefits management – SM Solutions development – SM Resource scheduling – ScM Time scheduling – ScM Budgeting and cost control – FCM Funding – FCM Investment appeal – FCM Contract – ResM Mobilization – ResM Procurement – ResM Provider selection and management – ResM
Communication	Bond between the leader and the team Internal communications External communications External relationships and networks	Information management – IM Planning – IM Stakeholder management – IM Changes control – SM Change management - SM Risk context – RM Risk techniques – RM Assurance – QM Reviews – QM

The above discussion represented a high-level comparative analysis between portfolio management practices and mechanisms of ambidexterity. The intention of this high-level analysis was to provide evidence that PPM can act as a vehicle to facilitate achieving ambidexterity in organizations. As expected, the above list and comparison is not comprehensive; more analysis is required to understand how those mechanisms can work along with the accompanying PPM practices to achieve ambidexterity. For now, it is recommended to look at practices and mechanisms as complementary factors needed to build ambidexterity. Although there are a number of similarities between PPM practices and mechanisms of ambidexterity, care shall be taken to

address the gaps between both in order to arrive at a more comprehensive list that can be generalized for use across organizations as a possible separate practice.

5.2.7 Summary of the qualitative study

This section of Chapter 5 primarily focused on addressing the second research question; the aim of this question was to investigate the means and mechanisms needed to achieve ambidexterity in organizations. This question also promoted PPM through its presentation in the third research question. The qualitative investigations employed the comprehensive definition of ambidexterity, as generated by way of the systematic review of the literature carried out in Chapter 2, to achieve its results. The qualitative site investigations were carried out through 12 interviews which were conducted with 12 informants of 12 various case-study firms (Sandberg 2000). The interviewed firms were selected to represent various degrees of ambidexterity in their operations (see Pettigrew 1988 for recommendations on polarized form of case study selection). The qualitative analysis was carried out using a cross-case analysis along with a within-case study analysis (Eisenhardt 1989). The aim of the analysis was to investigate those mechanisms of ambidexterity. Nevertheless, the analysis was carried out simultaneously on both dimensions and mechanisms of ambidexterity as defined in the systematic review of the literature in order to increase the reliability of the study outcomes, and to further infuse trust into the generated comprehensive definition of ambidexterity, thus deeming the study outcome as cohesive and reliable. The analysis which was carried out on dimensions of ambidexterity confirmed the outcomes of the systematic review of the literature and provided further details on these constructs (see first- and second-order concepts for dimensions and mechanisms in the relevant analysis, Figure 5-1 and Figure 5-2, and table C1 and table C2 of Appendix C). Resuming with the analysis, the study continued with the analysis of mechanisms of ambidexterity and tested their relationship with PPM practices.

5.3 Quantitative research

5.3.1 Purpose

The purpose of this section of Chapter 5 is to add more reliability to the overall research outcomes and link the qualitative study results, which was carried out on 12 case-study firms, by triangulating the findings of the qualitative study to empirical quantitative data. Establishing such a relationship would not only provide reliability to the research outcomes by way of triangulation (Creswell & Clark 2007; Tashakkori & Teddlie 2010); it also allows the research to generalize its outcomes to a larger audience (Forza 2002). The qualitative study analysis generated a thematic view geared towards understanding the mechanisms of ambidexterity for organizations by which their application should move the organization towards an ambidextrous status. After this, the qualitative research investigated the relatedness between those established mechanisms and PPM practices. This section takes this relationship forward to further justify the relationship between those practices, represented by the effectiveness of their application and the effectiveness of PPM, and organizational ambidexterity as means for achieving overall business performance and efficiency. This section represents ambidexterity as a mediator for success and performance as presented in Figure 5-3.

5.3.2 Quantitative research model

The quantitative research model gathers elements from project portfolio management and organizational ambidexterity as covered in the literature review chapter and the subsequent qualitative analysis carried out in the previous section. The quantitative research model was built on Gibson and Birkinshaw's (2004) conceptualization of organizational ambidexterity as a mediator to organizational performance. As presented in the previous section, PPM practices exhibited a major influence on building ambidexterity in organizations and therefore this was

presented as such in the model. In this section, PPM effectiveness and its effective application in organizations was operationalized to represent PPM practices to influence organizational ambidexterity and build on it. These relationships are depicted in Figure 5-3.

The body of this section covers an argument that supports the research model through an emphasis on constructs' operationalization. The model constituents are broken down into their elements/variables with an explanation of how and why operationalization was taken as such. A survey questionnaire was created to study the above model and was distributed to various organizations as explained in the subsequent sections.

The constituents/constructs of the questionnaire can be found in Appendix D while the questionnaire is presented in Appendix E. A total of 160 responses were collected.

Figure 5-3. Research model

5.3.3 Sampling and data collection

The population of this research covered mainly those of the Project Based Organizations (PBOs). There is a possibility that some of the quantitative survey questionnaire responses came from non-PBO-type organizations. Those have been filtered out in accordance to the initial filtration process performed using a few of the control questions embedded in the questionnaire.

This part of the thesis forms the post-positivist component of the modernistic approach. The modern perspective views organizations as objects and promotes objectivism in testing and

analyzing them (Whetten 1989). A modern perspective assumes that the environment in which the organization is embedded gives rise to events which cannot be controlled by social actors. This conceptualization of theory denotes a contingency approach to understanding and describing the act of organizing (Woodward 1965; Lawrence & Lorsch 1967). This perspective concurs with a quantitative approach to testing theory, in that it views correlations between elements and the inspection of causal relationships as prerequisites for adopting this perspective. It also agrees with an objective ontology and makes no allowance for subjectivity.

Data for the quantitative survey were collected from 160 survey participants. Those responses were collected from several sources such as organizations which operate in project-based and dynamic environments, the Project Management Institute (PMI) official website www.pmi.org, Masters' and MBA students, and professional websites such as Linkedin. All survey participants were approached through an introductory letter or an email introducing the research and specifying the type of audience needed to fill out the survey. A filter was also added to the survey to filter out data which do not comply with the specified requirements.

The quantitative study and survey followed ethical procedures and it was not possible to know the identity of any of the respondents from any of the groups. A disclaimer was also added at the beginning of the survey confirming the confidentiality of the responses and the privacy of all respondents and their organizations.

It is to be noted at this stage of the study that the estimated number of surveyed organizations exceeded the minimum required sample size recommended by Forza (2002) as calculated in Section 4.3.3 of Chapter 4. Hence, it was safely assumed that this study can progress to the data analysis stage.

5.3.4 Constructs, operationalization and hypotheses

5.3.4.1 Constructs and operationalization

The major constructs presented in the research model of Figure 5-3 are broken down into their constituents as explained below and as shown in Figure 5-4.

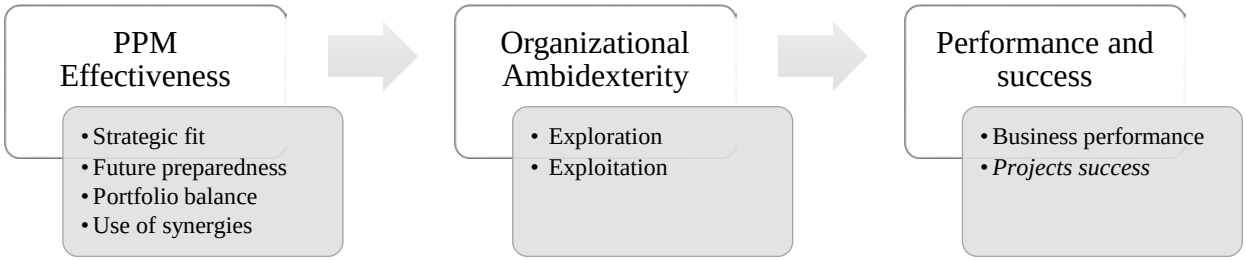

Figure 5-4. Research model constituents and variables

Project portfolio management effectiveness refers to the effective application of PPM practices in a way that helps it achieve its objectives (Patanakul 2015). PPM effectiveness is taken herein to represent the effective use of practices which lead to the effectiveness of the portfolio practices application and its management. The definition of PPM effectiveness is borrowed from Patanakul (2015, p.1093) for use in this study, as follows:

> *The organizational capability to 1) form a project portfolio such that the portfolio aligns with the organization's strategic direction, is adaptive to the internal and external changes, and contains projects with high perceived value or benefit, and 2) manage the portfolio to promote project visibility, transparency in decision making, and predictability of project delivery, in order to achieve project success, short and long-term value or benefits, and integrity, cohesion, and morale of the project community.*

It is noticed in this definition that the strategy of the organization forms the heart of its portfolio management. Also, it shows that the strategic fit of projects with the overall direction of the organization sets the path towards achieving its desired business outcomes. Strategic fit in this case

"is accomplished when individual projects, and thus the portfolio, are aligned to a company's business strategy" (Unger et al. 2012, p. 677). It is not an easy task to achieve a strategic fit in organizations and it generates complexity across its various levels, particularly at the executive level. For instance, establishing this effectiveness and the strategic fit is the goal of top executives and the management; nevertheless, resources allocation through traditional project management that occurs at the lower levels of the organization may impose difficulties in achieving this goal (Cooper & Edgett 2003). For example, the successful design of a strategic fit that does not take into account future preparedness and the use of the available resources could lead to the failure of the portfolio. Secondly, designing for strategic fit shall take into account the overall success of the entire organization and its business units along with the projects and portfolios in hand (Roussel et al. 1991; Herfert & Arbige 2008). For example, aligning project management with the business success and its strategy is an essential component to achieve a strategic fit for organizations (Artto & Wikstrom 2005; Srivannaboon & Milosevic 2006).

Future preparedness reflects the preparedness of the portfolio and the organization to utilize its infrastructure for its future needs (Shenhar et al. 2001; Levine 2005). It is the ability of the organization to analyze the current situation and evaluate long-term needs through establishing opportunities by way of delivering projects. Examples could be through building own internal capabilities in order to prepare oneself to bid for future projects seen as an outcome of an imminent global or market need or requirement. This is similar to what Firm 7 informant from the qualitative part of this thesis referred to in their market expeditions:

> We knew that aluminum is going to be the next new thing and that there will be a huge demand for aluminum.

An alternative is to create a new market and prepare oneself for it, which is similar to what Firm 12 informant has established:

> I have identified a serious gap in energy efficiency in the market.

Balancing the portfolio means the ability to identify the right mix of projects which can bring the least amount of risk to the portfolio (or the organization) – refer to Firm 5 informant for instance trying to add in a various mix of opportunities between his retail business and project management business to reduce the risk of cash flow:

> We wish we can be doing better in retail since it has better DSO and collection system compared to those of projects.

This approach gets the maximum value behind delivering the mix of projects within the portfolio considering the size and the type of each of those projects in comparison to the availability of resources and the capacity of the organization, its strategic direction and its short-term and long-term plans (Archer & Ghasemzadeh 1999; Cooper et al. 2002; Killen et al. 2008).

The synergy created between projects can assist in identifying opportunities for collaboration between those projects. Not only does synergy prepare the organization for the future, but managing those projects collaboratively adds value to those projects which value cannot be achieved when those project are delivered individually (Meskendahl 2010).

Exploratory and exploitative activities and organizational ambidexterity have been covered in significant detail to this point. The previous section which covered a qualitative study and analysis provided a confirmation on the definition of organizational ambidexterity which was generated via the systemic literature review conducted earlier. This definition was used to test the scale used in the quantitative study survey questionnaire to ascertain that the results of this thesis are cohesive.

> *Ambidexterity is the ability of the organization to employ structural, learning, selection and communication techniques to resolve paradoxical challenges within intellectual, behavioural, technological and processual dimensions in the various levels of the organization - these levels (strategic, projects, operations and individual) can be separate or interwoven - to overcome situations of external dynamicity and competitive environments, considering internal limiting factors such as size, resources availability and absorptive capacity of the organization.*

This thesis has assumed that the overall performance and success of the organization involves the success and performance of the business itself along with the average success of its projects (Petro & Gardiner 2015). Business performance dictates that a company secures an appropriate share of the market in comparison to competition, the fulfillment of sales objectives, its revenue growth and profitability (Shenhar et al. 2001). Average projects success reflects the achievement of overall projects' success criteria, such as budget, schedule and quality, and that goes along with obtaining customer satisfaction for the average pool of projects the business is handling (Levine 2005; Martinsuo & Lehtonen 2007; Lechler & Dvir 2010).

5.3.4.2 Hypotheses

Based on the build-up of constructs, the quantitative research model, and the suggested operationalization presented in the previous section, the following hypotheses were proposed to support the quantitative research model; these are aligned with the overall aims and objectives of this thesis:

Hypothesis H1. The higher the level of ambidexterity in an organization or business unit, the higher the level of performance.

Hypothesis H2. The more that an organization or its business units exhibit an effective application of its project portfolio management practices (measured through its PPM effectiveness), the higher the level of ambidexterity.

Hypothesis H3. Ambidexterity mediates the relationship between PPM practices and the organization's performance.

5.3.5 Measures and operationalization

As far as both the dependent and the independent variables are concerned, this study used well-validated scales – refer to Appendix D. The *ambidexterity* scale in particular was adopted from Lubatkin et al. (2006) and was compared to the results produced by this study so far to ascertain that this scale has captured most of the identified dimensions. Although not all dimensions were captured in the scale, it has been assumed that this validated and well-tested scale (and also most relevant to this study) would sufficiently satisfy the research purpose. Another study could be commissioned to re-operationalize a better scale for ambidexterity using the definitions and outcomes of this research.

The dependent variable used to measure *business performance* was borrowed from Meskendahl (2010) and Petro and Gardiner (2015). This scale used four measures operationalized to measure various aspects of success of the business and the organization, such as measuring the perception of respondents as to the level of success of their organization compared to its competitors in aspects relevant to overall success, market share, revenue growth and profitability. The *average projects success* of the organization was added to this construct as measured by Jonas et al. (2012) and tested by Petro and Gardiner (2015). This scale used four measures which targeted the traditional project success criteria; these being the schedule, the budget, the quality, and customers' satisfaction.

The independent variable, *PPM effectiveness*, suggested to measure the effective application of PPM practices, used several variables to get it operationalized. These variables were borrowed from Patanakul (2015) in general, and from Jonas et al. (2012) and Petro and Gardiner (2015) in particular. This main independent variable consisted of *future preparedness* (Meskendahl 2010; Petro & Gardiner 2015) which used three measures to assess it, *strategic fit* (Jonas et al. 2012; Petro & Gardiner 2015) which used three measure to evaluate it, *project portfolio balance* (Jonas et al. 2012; Petro & Gardiner 2015) which used five measures to understand it, and the use of *synergies/collaboration* between business units (Jonas et al. 2012) which used three measures to operationalize it.

Concerning the dependent variable, *organizational ambidexterity*, there were several scales available and various means used to operationalize it in the academic research. For instance, He and Wong (2004) designed a measure based on product design and innovation. Benner and Tushman (2003) conceptualized this construct using measures of technological innovation and product design. Chandrasekaran et al. (2012) designed a scale which targets R&D and high-tech businesses. Gibson and Birkinshaw (2004) conceptualized a measure which has hands-on behavioural and contextual aspects of the organization and its ambidexterity. Kortmann et al. (2014) were more interested in manufacturing. Many other scholars designed different scales to measure ambidexterity in one way or another and in a way that fits within their research requirements – see Jonas et al. (2005); Lubatkin et al. (2006); Mom et al. (2007); Cao et al. (2009); Rothaermel and Alexandre (2009); Voss and Voss (2013); Kortmann et al. (2014); Wei et al. (2014) and Agostini et al. (2016).

In light of the above, this thesis adopted a combined scale for ambidexterity which was operationalized by Lubatkin et al. (2006) and tested by Agostini et al. (2016). Lubatkin et al. (2006)

adapted He and Wong's (2004) scale of measuring *organizational ambidexterity* and enhanced it with the use of a panel of researchers. The final measure of Lubatkin et al. (2006) consisted of 12 measures divided between exploration and exploitation. These measures were the closest amongst many others to the definition of ambidexterity generated by this study and it has been assumed that it would better serve the intention behind this research.

Control variables were added to the study questionnaire to understand the various relationships which could occur in the various study contexts. The size of the organization was selected as one of the control variables since this may have a direct effect on the organization's innovativeness and its ambidexterity (Fritsch & Lukas 2001; Lavie et al. 2010). The industry was selected as another variable as it may have an effect on the type of relationship that may influence the internal processes in the organization (Junni et al. 2013).

All items referring to the constructs and variables in this research were measured using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Prior to deciding on the 5-point Likert scale, an investigation on the best number of points for this scale – either 5 or 7 points - was carried out (Nunnally 1978; Sauro 2010). The short answer [was] that 7-point scales are a little better than 5-points – but not by much (Sauro 2010). Hence, a 5-point Likert scale was used to simplify the analysis, and to further simplify the data-gathering process as it was well perceived that lowering the number of points in the scale could encourage more respondents to contribute in the quantitative research.

5.3.6 Descriptive analysis

The quantitative survey was responded by 160 participants most of which came from more than 12 different industries. The sizes of the respondents' organizations varied as can be seen from the tables below. The levels of those respondents who contributed to the survey came mostly from

senior to top management levels of their organizations, denoting an understanding of their operations as well as an understanding of the operations of their competitors and counterparts in the market. It is assumed herein that the contribution of such levels of seniority among the respondents would reduce inaccuracies and errors in the collected data.

The following tables provide a high-level descriptive analysis for the collected data. More details and descriptive analysis for the entire set of collected data can be found in Appendix F.

Table 5-5 below presents the industries from where the respondents have contributed to the questionnaire. This table shows the Construction, Engineering, Consultancy and Manufacturing industries contributed most to the data with nearly 60% share. It is perceived that most of these organizations share a similar essence which mostly revolves around engineering.

Table 5-5. Industry frequency

Industry	Count	Percentage
Construction	41	25.6%
Engineering	26	16.2%
Consultancy	15	9.4%
Manufacturing	16	10.0%
Management Consulting	9	5.6%
IT	9	5.6%
Medical	9	5.6%
Education	7	4.4%
Banking	6	3.8%
Logistics	5	3.1%
GIS	2	1.3%
Others (government, telecom, oil, etc)	15	9.4%
TOTAL	**160**	**100%**

Table 5-6 below presents the sizes of the organizations which contributed to the survey. It shows that more than 30% of the contribution came from Small to Medium sized Enterprises (SMEs), while slightly more than 25% came from medium to large-sized organizations, and above 40% came from large corporations. The data in this case can be seen as sufficiently distributed amongst these three categories. This distribution would allow the thesis to draw sufficient conclusions on

the various sizes and their effect on ambidexterity and the research model. This is seen later in the regression analysis part of this chapter.

Table 5-6. Frequencies of organizations' size

Size of the organization	Count	Percentage
Below 20 employees	12	7.6%
21-75 employees	38	23.6%
75-150 employees	23	14.4%
150-300 employees	20	12.5%
Above 300 employees	67	41.9%
TOTAL	**160**	**100.0%**

Table 5-7 provides information on the levels of the respondents who answered the survey placed against the size of their corresponding organization. This shows that more than 65% of the respondents (107 respondents) came from senior to top management levels of their organizations and this implies to the level of accuracy of the collected data.

Table 5-7. Cross reference between employees' level in the org and the org size

Respondents' level in their organizations	*Size measured in number of employees of the organization*					Total
	Below 20	20-75	75-150	150-300	Above 300	
Entry level	0	2	0	1	1	**4**
Mid-level	5	9	6	7	22	**49**
Senior level	4	17	12	10	30	**73**
Top management	3	10	5	2	14	**34**
TOTAL	**12**	**38**	**23**	**20**	**67**	**160**

Table 5-8 below provides information on the industries' contribution to the survey placed against the relevant sizes of the contributing organizations. The table confirms a uniform distribution of the collected data across various organizational sizes and industries in some way or another with the exception of the construction industry in one particular case only. The table below adds confidence to the research in that the data are not fully skewed towards a particular industry or size.

Table 5-8. Cross reference between the industry and organization size

Industry	*Size measured in number of employees of the organization*					Total
	Below 20	**20-75**	**75-150**	**150-300**	**Above 300**	
Construction	2	10	6	5	18	**41**
Engineering	4	8	1	4	9	**26**
Consultancy	2	8	1	1	3	**15**
Manufacturing	0	2	4	1	9	**16**
M. Consulting	0	3	1	1	4	**9**
IT	0	0	3	5	1	**9**
Medical	1	1	1	0	6	**9**
Education	1	0	1	0	5	**7**
Banking	0	0	3	0	3	**6**
Logistics	0	1	1	1	2	**5**
GIS	0	1	0	1	0	**2**
Others	2	4	1	1	7	**15**
TOTAL	**12**	**38**	**23**	**20**	**67**	**160**

5.3.7 Confirmatory factor analysis

A factor analysis was carried out on the selected variables to establish the constructs which make up the research model; those constructs are the *PPM effectiveness* which represents the effective application of those project portfolio practices in the organization (Meskendahl 2010; Jonas et al. 2012; Patanakul 2015; Petro & Gardiner 2015), *ambidexterity* which is represented by the summation of exploratory and exploitative activities (Lubatkin et al. 2006; Agostini et al. 2016), and the *business performance and average projects success* (Meskendahl 2010; Jonas et al. 2012; Petro & Gardiner 2015).

The Confirmatory Factor Analysis (CFA) test was conducted using the factor reduction function in the IBM SPSS Statistics quantitative data analysis software. A Varimax rotation was used for this purpose with a minimum of 25 iterations to test the loading of the factors per each of the constructs.

In summary, the four variables used to describe PPM effectiveness (future preparedness, strategic fit, portfolio balance and synergies) loaded successfully on four different factors as shown in Table 5-9. A few items had to be dropped due to their lack of representation and loading in the selected factors as shown in the table below.

Table 5-9. Factor analysis for PPM effectiveness

Items	Factors			
	1	2	3	4
Future preparedness 1	0.706			
Future preparedness 2	0.806			
Future preparedness 3	0.522			
Strategic fit 1		0.775		
Strategic fit 2		0.746		
Strategic fit 3		0.596		
Portfolio balance1			*0.376*	
Portfolio balance2			*0.163*	
Portfolio balance3			0.614	
Portfolio balance4			0.778	
Portfolio balance5			0.792	
Synergies 1				0.627
Synergies 2				0.786
Synergies 3				0.879

The two variables used to describe ambidexterity (exploration and exploitation) loaded successfully with their 12 items on two different factors as expected and as shown in Table 5-10. A few items of the factors relevant to ambidexterity had to be dropped due to their lack of representation and loading in the selected factors, as shown in the relevant table. The two variables used to describe business performance and success also loaded successfully on two different factors as expected and as shown in Table 5-11. All items for this construct loaded successfully without the need to drop any of its items.

The factor *business performance and success* is subdivided into one component that tackles the performance of the business itself and another component which deals with the average success of

projects. This study tests the relationship of ambidexterity with both and then tests mediation with the business performance separately due to its greater involvement with ambidexterity.

All factors were then tested for reliability and internal consistency using all the items which loaded successfully into their relevant factors using the Cronbach Alpha (Nunnally 1987). The test shows that all the factors were reliable, and almost all of the items constituted high internal consistency of 0.7 and above. The details of this test are shown in Table 5-12.

Table 5-10. Factor analysis for ambidexterity

Items	Factors	
	1	**2**
Exploration 1	0.849	
Exploration 2	0.817	
Exploration 3	0.846	
Exploration 4	0.768	
Exploration 5	0.593	
Exploration 6	*0.499*	
Exploitation 1		*0.444*
Exploitation 2		0.858
Exploitation 3		*0.445*
Exploitation 4		*0.436*
Exploitation 5		0.622
Exploitation 6		0.582

Table 5-11. Factor analysis for business performance and success

Items	Factors	
	1	**2**
Business performance 1	0.737	
Business performance 2	0.821	
Business performance 3	0.854	
Business performance 4	0.758	
Projects success 1		0.748
Projects success 2		0.647
Projects success 3		0.780
Projects success 4		0.834

Although the items of the business performance and success loaded successfully on two separate factors, this global factor – which is the combination of the two constituent factors *business performance* and *average projects success* – exhibited low reliability that is less than 0.7. The two components of this global factor were looked at separately with more emphasis on the *business performance* factor, particularly during regression and mediation test, due to its higher relevance to the thesis aims and objectives.

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test was carried out to ascertain the appropriateness of using CFA and to further confirm the reliability of those measures selected for field investigations (Kaiser 1970). KMO represents the ratio between variables' squared correlation and their squared partial correlation. A KMO value that is closer to 0 represents a diversion between those variables and hence CFA may not be appropriate for testing. Good KMO results are those with a value that is higher than 0.7 (Hutcheson & Sofroniou 1999). KMO was measured using SPSS and presented in Table 5-12 along with the reliability results.

Table 5-12. Reliability test and KMO results for all factors

Factor	Number of items	Items reduced to	Cronbach alpha	KMO
Business performance	4	NA	0.829	0.750
Average projects' success	4	NA	0.779	0.747
Future preparedness	3	NA	0.754	0.677
Strategic fit	3	NA	0.757	0.693
Portfolio balance	5	3	0.715	0.712
Use of synergies	3	NA	0.757	0.657
Exploration	6	5	0.885	0.864
Exploitation	6	3	0.850	0.852
Global factor: Business performance & success	*2*	*NA*	*0.620**	*0.500**
Global factor: PPM effectiveness	4	NA	0.791	0.860
Global factor: Ambidexterity	2	NA	0.861	0.912

* Due to lack of reliability combined with a low KMO measure, constituent items were looked at separately in the further analysis.

5.3.8 Correlation analysis

A correlation analysis for the factors which constituted the research model was carried out using the bivariate Pearson correlation test – see Table 5-13. In order to choose this particular approach for conducting the correlation test and analysis, a check for data normality had to be carried out which was conducted using two methods. Firstly, normality was checked visually by inspecting the graphs and figures generated through the descriptive analysis as presented in Appendix F. A normal bell curve was detected for almost all the variables, which was slightly skewed to the right-hand side – this skewness indicated most of the participants' optimism in responding to the field questionnaire. Secondly, the Kolmogorov-Smirnov statistical non-parametric test was carried out to confirm the visual findings for normality. A 2-tailed correlation test was therefore performed to capture all possibilities of correlation.

The correlation analysis shows that all the study factors and variables are positively and significantly correlated and this can provide sufficient proof for the first two quantitative research hypotheses. The model for instance supported H1 with the moderately strong and highly significant correlation of r = + 0.501 at sig = 0.01 which reflects the relationship between ambidexterity and business performance, and the moderately strong and highly significant correlation of r = + 0.593 at sig = 0.01 which reflects the relationship between ambidexterity and the average project's success. Ambidexterity was found highly correlated with the combined/clustered global factor *business performance* and *average projects success* at r = + 0.641 and sig = 0.01 as well. Moreover, taking exploration and exploitation factors separately, those two factors were found to be correlated with the factors of business performance and projects' success both separately and clustered.

PPM effectiveness was found to be strongly and highly correlated with ambidexterity at r = + 0.778 with sig = 0.01 providing sufficient proof for H2. Similarly, the model showed that PPM effectiveness is highly and strongly correlated with business performance at r = + 0.539, average projects' success at r = + 0.687, and the cluster of business performance and average projects' success at r = + 0.710.

Table 5-13. Correlation analysis

	1	2	3	4	5	6	7	8	9	10	11
1. Business performance	1.000										
2. Average project's success	0.450**										
3. Future preparedness	0.498**	0.575**									
4. Strategic fit	0.333**	0.530**	0.635**								
5. Portfolio balance	0.444**	0.577**	0.476**	0.490**							
6. Use of synergies	0.391**	0.468**	0.497**	0.454**	0.350**						
7. Exploration	0.494**	0.535**	0.691**	0.516**	0.512**	0.549**					
8. Exploitation	0.447**	0.580**	0.619**	0.561**	0.510**	0.555**	0.763**				
9. Business performance. & success	***0.863***	***0.840***	0.625**	0.497**	0.593**	0.498**	**0.603****	**0.599****			
10. PPM effectiveness	**0.539****	**0.687****	***0.847***	***0.821***	0.728**	0.737**	**0.736****	**0.724****	**0.710****		
11. Ambidexterity	**0.501****	**0.593****	0.699**	0.571**	0.545**	0.586**	***0.947***	***0.930***	**0.641****	***0.778***	1.000

Bivariate correlation analysis using the Pearson correlation method
** Correlation is significant at the 0.01 level (2-tailed)
Bold font refers to relationships directly related to the quantitative research model
Bold italic font represents a check for collinearity – i.e. a correlation that exceeds 0.8 may trigger a case of collinearity (similar items) as per Field (2009)

Since more and more factors were significantly and highly correlated in the correlation model, a check for collinearity was necessary prior to moving on to regression analysis. Generally, if two items or more had a correlation value that exceeded 0.8, collinearity between those items could exist (Field 2009). Collinearity refers to the close dependence, and the exhibition of "non-independence", of the predictor variables (Dormann et al. 2013). This may occur, for example, upon measuring two very similar variables – for instance, one could be the "age" of a respondent and another could be their "year of birth". Collinearity in this case can inflate regression values providing wrong analysis results (Dormann et al. 2013).

The correlation model shows that exploration, exploitation and ambidexterity are highly correlated. This, however, has been assumed not to be of concern since all are constituents of the same construct or global factor – "ambidexterity". The same applies for the other constructs "PPM effectiveness" and "performance and success". A closer look however was necessary at the relationship between the two constructs, "PPM effectiveness" and "ambidexterity", since their correlation was close enough to 0.8.

Collinearity between those factors was checked using the Variance Inflation Factor (VIF) measure. VIF indicates whether a variable or a predictor has a strong linear relationship with the other variables(s) or predictor(s) (Field 2009). Myers (1990) suggests that a value of VIF that exceeded 10.0 may be problematic while the guide for IBM SPSS Statistics software version 22 suggests that any value that exceeded 2.0 shall be of a concern. Based on this, several scenarios for the two constructs (the global factors, ambidexterity and PPM effectiveness) and their constituent variables were performed and VIF was always measured at a value that is less than 10.0, which indicates that collinearity or multi-collinearity was not an issue (Dormann et al. 2013).

5.3.9 Regression analysis and test for mediation

The previous section presented a correlation analysis between all the model variables. This section takes the analysis one step further and tests the quantitative research hypotheses using the Ordinary Least Square (OLS) regression method. OLS regression tends to be used to predict relationships' behaviour and how they could act in future events (Field 2009). Regression was carried out here in categories of size in order to predict how each organizational size would perform, particularly when it comes to measuring the mediation effect of ambidexterity (H3).

In summary, the regression results supported H1 and H2 for all organizational sizes. However, H3 which tests the mediation effect of ambidexterity was only supported in Small or Medium Enterprises SMEs (20 to 75 employees in size) while the effect of this mediation dwindled and disappeared as the organization grew bigger in size, in which case more emphasis on portfolio management was noticeable.

Based on the above brief summary of regression results, the following analysis focuses only on testing the three hypotheses using regression for SMEs only. The regression models which present the regression analysis for each organizational size are presented in Appendix G in a similar format to Table 5-14 for reference.

Hypothesis H1 predicts that ambidexterity (which is the cluster formed by adding exploration and exploitation) will be positively related to performance. As presented in Table 5-14, the coefficient β (which is the slope of the regressed line) for ambidexterity in model 1 was positive and highly significant ($\beta = 0.525$ at sig < 0.001), therefore supporting H1. Hypothesis H2 predicts that PPM effectiveness would be positively related to ambidexterity as presented in model 2, as supported by the highly significant positive β coefficient ($\beta = 0.674$ at sig < 0.001).

Table 5-14. Results of regression analysis for SMEs only

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.525**			0.445*
	PPM effectiveness		0.674**	0.480*	0.545
R^2		0.276	0.454	0.231	0.284
Adjusted R^2		0.254	0.438	0.208	0.239
ANOVA F		12.559**	28.283**	10.186*	6.347*
VIF		1.000	1.000	1.000	1.774 for all

* Significance < 0.05 level
** Significance < 0.001 level

Hypothesis H3 predicts that ambidexterity shall mediate the relationship between PPM effectiveness and performance. In order to analyze for mediation, three steps are followed (Kenny & La Voie 1985; Baron & Kenny 1986; Mackinnon & Dwyer 1993; Kenny et al. 1998). Initially it is important to establish that the independent variable (in this case PPM effectiveness) influences the mediator (in this case ambidexterity). This was established and supported in model 2 where β = 0.674 at sig < 0.001. Secondly, it is essential to demonstrate that the independent variable (PPM effectiveness) influences the dependent variable (performance). This was established in model 3 at β = 0.480 and sig < 0.05 as shown in Table 5-14. In the last step, one must demonstrate that the mediator (ambidexterity) influences the dependent variable (performance) with the independent variable (PPM effectiveness) controlled. If in this last step the effect of PPM effectiveness on performance was no longer significant when the mediator 'ambidexterity' is in the model, full mediation can be indicated depending on how significant the model was.

In light of the above, and as shown in model 4 (in Table 5-14), a multiple regression analysis was performed using the two variables as independent variables – PPM effectiveness and ambidexterity. The β coefficient for ambidexterity was found to be positive and significant at β =

0.445 and sig < 0.05. Furthermore, and while using ambidexterity in the same multiple regression model, the coefficient β for PPM effectiveness lost its significance to ambidexterity and this indicates that mediation of ambidexterity was taking effect in SMEs.

The VIF for all variables in the four models was measured and found to be less than 2.0, which indicates that collinearity or multi-collinearity did not exist in these models, and hence the models' results can be accepted (Myers 1990; Field 2009).

Based on the above results of regression and multiple regression analysis, it can be concluded that the three hypotheses presented at the beginning of the quantitative study can be accepted, and most importantly, it was found that ambidexterity acted as a mediator for performance with the use of PPM effectiveness as an independent variable in SMEs only. This conclusion provides sufficient proof that PPM practices as represented by their effectiveness can enhance ambidexterity which in its turn can mediate for business units' performance. This conclusion agrees with the aims and objectives of this study when applied to SMEs; it indicates that as organizations grow, ambidexterity ceases to mediate the relation between portfolio management and performance. In fact, ambidexterity becomes one of the factors which affects performance but at lesser significance compared to PPM – see Appendix G for more details on significance and in particular models 1 and 3 for each organizational size. Larger organizations have the capacity for creating various units for exploration and exploitation with their resources' munificence (Cao et al. 2009; Jansen et al. 2012). They shall increase their focus in this case on getting their processes and practices right.

A similar analysis for regression and multiple regression was carried out to test average projects success as the dependent variable, but mediation for ambidexterity was not detected. However,

positive and significant relationships were established among all the variables as also indicated in the correlation model presented in Table 5-13.

5.3.10 Post hoc analysis – the effect of size and industry

To gain more insight into the quantitative analysis, a post hoc analysis was carried out with the organization size and its industry in mind. The intention of this analysis was to measure the effect of size and industry on the extent of ambidexterity of organizations to see if clustering is an option.

To start with, the collected data for the variables 'exploration' and 'exploitation' along with the calculated data for the construct 'ambidexterity' were grouped under two major categories, one for size and another for industry. Each of these categories consisted of groups or subcategories beneath them. For example, the size category had five sizes beneath it as originally defined in the scale presented in Appendix D. The same applied to the industry groups (see Table 5-15). The intention behind this arrangement was to see if clustering of groups can be created with each cluster carrying a particular ambidexterity score. To achieve this, means were calculated for ambidexterity, exploration and exploitation under each of the groups/clusters (Loftus & Masson 1994).

An initial view of the outcome of the analysis on ambidexterity scores is presented in Table 5-15. Table 5-15 shows that there are few differences between those groups or clusters. For instance, the data show that SMEs acted more ambidextrously compared with their larger size counterparts. Moreover, industries which belonged to the service sector generated slightly higher, albeit barely noticeable values of ambidexterity. The differences in the average of ambidexterity scores per each of the defined group(s) were not large enough to prove that a significant statistical difference existed. The standard deviation also proves that the ranges of ambidexterity scores between those

defined groups could intersect and hence a boundary between each of the groups may not really exist.

Table 5-15. Means for ambidexterity against size and industry

Industry	*Size measured in number of employees of the organization*					**Average Amb.**	*Std Deviation*
	Below 20	**20-75**	**75-150**	**150-300**	**Above 300**		
Construction						**42.3**	*7.5*
Engineering						**41.4**	*11.3*
Consultancy						**45.3**	*6.6*
Manufacturing						**43.3**	*6.5*
M. Consulting						**43.3**	*6.4*
IT						**43.7**	*6.1*
Medical						**42.3**	*7.4*
Education						**44.2**	*8.1*
Banking						**38.5**	*14*
Logistics						**48.4**	*5.3*
GIS						**49.5**	*4.9*
Others						**44.8**	*6.4*
Average Ambidexterity	**41.7**	**45.3**	**41.6**	**45.1**	**42.6**		
Standard Deviation	*9.2*	*6.7*	*8.6*	*5.5*	*9.4*		

An independent t-test was conducted to see if clustering ambidexterity based on size or industry was an option. The independent t-test detects if there was significance in the differences between groups' means (Field 2009). The results of the independent t-test have proven that almost all scores within each of the groups of size and industry carried very little to almost no significance at all. The lack of establishing significance has failed to disprove the homogeneity of the assumed clusters. Hence, it can be safely concluded that clustering of ambidexterity based on size and industry was no option and that there is really little effect when it comes to comparing ambidexterity scores on the basis of size and industry.

The above finding of the lack of clustering confirms that ambidexterity is independent of any static exogenous factors such as size and industry. This confirms that, in order to achieve ambidexterity, careful consideration should be given to discovering and resolving paradoxes in the various dimensions of ambidexterity as defined in this thesis along with the other factors and mechanisms which can help do that. The ability to achieve this can help enhance the ambidexterity score for organizations and this has nothing to do with the organization size or its industry.

5.3.11 Summary of the quantitative study

The quantitative study carried out in this thesis confirms the qualitative study results presented earlier in this chapter. These results provided more generalizability for the overall research outcomes and enhanced the validity of the research findings.

The quantitative study was commissioned to establish a connection between Project Portfolio Management (PPM) practices and ambidexterity, and to further test the effect of both on performance. Although this relationship has already been established using the qualitative field analysis by way of the 12 interviews previously conducted, the quantitative analysis provided objectivity to the qualitative results through the use of a questionnaire distributed to a much larger pool of professionals. In the quantitative study, PPM practices were represented and operationalized by the effective conduction of PPM. PPM effectiveness was therefore operationalized as a standalone construct measured against a combination of tested and known scales (Meskendahl 2010; Jonas et al. 2012; Patanakul 2015; Petro & Gardiner 2015). The final scale which was used to measure PPM effectiveness was checked against the outcome of the qualitative study to confirm alignment with its findings. Ambidexterity was also operationalized as a construct which was measured using a collection of established scales (Lubatkin et al. 2006; Agostini et al. 2016). The final scale used to measure ambidexterity was also checked against the

results of the qualitative analysis to confirm alignment with its findings. Performance was measured following a verification process similar to that used for the other study constructs.

The quantitative research was conducted in a project management industry where mainly Project Based Organizations (PBOs) were involved. A total of 160 responses were collected throughout this study; most came through from the engineering industry – i.e. above 60%, while other industries such as education, banking, logistics and management consulting contributed in sufficient numbers as well.

The results of the quantitative analysis have proven that a relationship between PPM practices – as depicted and operationalized by PPM effectiveness – existed and that was positive and significant. Also, the analysis results have shown that PPM effectiveness was correlated positively and significantly with performance. Most importantly, ambidexterity was found to mediate the relationship between PPM effectiveness and performance in SMEs. That is; this research has proved that *project portfolio management can achieve performance through ambidexterity* in SMEs only. This was established via several multiple and singular regression analyses to prove that ambidexterity carried more significance in enhancing performance compared to PPM effectiveness, while PPM effectiveness remained salient with its relationship with ambidexterity. This final conclusion agrees directly and indirectly with a proliferation of research on SMEs (Covin & Covin 1990; Lubatkin et al. 2006; Cao et al. 2009; Turner et al. 2009; Gong et al. 2013; Patel et al. 2013; Voss & Voss 2013; Broersma et al. 2016).

A post hoc analysis was carried out in an attempt to create clusters of organizational sizes and/or industries, or a combination of both, with the possibility of each cluster to exhibit a certain degree of ambidexterity. However, and upon conducting an independent t-test to confirm the possibility

of data clustering, no real statistical difference was detected between those assumed clusters. The lack of clustering and the confirmation of homogeneity in variances agree indirectly with the initial research findings. This entails that the achievement of ambidexterity requires the realization of certain paradoxes in certain dimensions through the application of certain mechanisms, and that has nothing to do with size or industry.

5.3.12 Triangulation

Triangulation methods have been used throughout the field investigations of this thesis to enhance the validity of their relevant findings (Denzin 1978; Bryman 1992; Curral et al. 2015). A combination of the triangulation's "within" method and the "in-between" method were used in this study to corroborate the qualitative study results against those of the quantitative study. The earlier method refers to confirming the internal validity of the measures used in the research while the latter deals with their external validity (Jick 1979; Modell 2005). The purpose behind triangulating the research findings was to arrive at a convergence of the study conclusions.

The outcomes of this study were triangulated with the use of the qualitative case-study analysis, combined with the prior literature review and the systematic analysis of the literature. This was followed by the broad use of a survey questionnaire that targeted professionals in certain industries and certain organizational types (i.e. PBOs). The main contribution of the case-study analysis was to confirm the initial findings of the systematic review of the literature which generated a comprehensive definition for ambidexterity – this involved confirmation of the dimensions and mechanisms of ambidexterity which entailed a "within" method of triangulation to achieve internal validity of those measures. The case-study analysis then targeted one of the objectives of this thesis, which is the establishment of a relationship between mechanisms of ambidexterity and PPM practices.

A quantitative analysis applied through a survey instrument followed lead to corroborate the findings of the case-study outcomes in regards to the established relationship between ambidexterity and project portfolio management. To start with, the construct PPM effectiveness was validated and operationalized to measure the effective application of PPM practices as discussed in the quantitative study part (Modell 2005). After which, internal validity was established by linking ambidexterity with portfolio management, this was followed by externally validating the constructs by linking them with performance (see Modell 2005 for the requirements of internal, external and construct validity in triangulation).

In conclusion, it can be seen that triangulation was generally applied throughout this thesis as implied by its methods of application in the study's various parts. This adds confirmation to the measures used in this study, it adds further confidence to the generated comprehensive definition of ambidexterity, and, it adds more reliability to the overall thesis findings.

5.4 Overall chapter summary

This chapter has so far presented the qualitative and quantitative field investigations carried out in its various parts to prove the theory behind this research. The chapter started with presenting the approach taken to conduct the qualitative site investigation, which was conducted by interviewing 12 case-study firms, most of these firms believed to be ambidextrous while few exhibited the opposite of ambidexterity selected as such to create a polarized form of case study selection (Pettigrew 1988). The qualitative study and analysis were operationalized to firstly converge into the comprehensive definition of ambidexterity which was generated during the systematic review of the literature, and this has been successfully proven. It was important to produce this proof at the start in order to show the continuity of the findings of this thesis. Secondly, the qualitative study investigated the mechanisms that can be applied in organizations to assist them in achieving ambidexterity; those were successfully generated and they also converged with the outcome of the systematic review of the literature. Thirdly, the qualitative study investigated the means and processes of portfolio management practices and their relationship with the mechanisms of ambidexterity, not only to prove that there was a direct link between both, but also to show how both processes/practices and mechanisms can complement each other. This was carried out by mapping both PPM practices and the mechanisms of ambidexterity and filling out the gaps between them.

A quantitative field investigation followed the qualitative study to increase the reliability of the results, enhance their generalizability, and test the mediation effect of ambidexterity with portfolio management. The quantitative field study investigation collected 160 responses using a survey questionnaire designed to identify the constructs which were most relevant to portfolio management practices, ambidexterity and performance operationalized. The data from the 160

responses were analyzed and the findings of the initial qualitative study were corroborated. Second and most importantly, ambidexterity was tested for mediation – i.e. to see if it mediates the relationship between portfolio management and performance. The results of mediation were positive for SMEs only. Larger organizations required rather more emphasis on PPM practices to enhance performance without disregarding the importance that ambidexterity plays.

Chapter 6 Discussion

6.1 Introduction

This study investigates the factors which can improve performance in PBOs and see through their growth and sustainability in dynamic environments. It starts by examining the internal functions of those organizations – exploration and exploitation – which form what has been identified in this study and in previous research as organizational ambidexterity. Organizational ambidexterity has been defined previously as *the ability of the organization to explore the market and the surrounding environment while having the ability to exploit its own knowledge base, resources, processes and technologie*s. This study also examines the relationship between this organizational capability and performance. The study then recognizes PPM practices as a vehicle which can host ambidexterity within the organization, and recommends their use to achieve ambidexterity in PBOs.

This research was commissioned to resolve a problem faced by PBOs which operate in highly dynamic environments. These organizations use project management practices to run their operations. These practices are known to being sufficiently inflexible to run an ambidextrous operation (Hodgson & Cicmil 2007; Lenfle & Loch 2010; Candi et al. 2013). This inflexibility can impede the organization's desire to grow and perform, and this can lead to difficulties in achieving ambidexterity in PBOs. These organizations therefore try to embed this desirable ambidextrous status by applying various techniques, which may not be structured to start with and could be infused with an *ad hoc* application of various approaches. The application of unstructured approaches to ambidexterity may not lead to the desired and consistent outcome those organizations would like to see. It is, therefore, the *ad hoc* approach which organizations use to achieve an ambidextrous state, particularly in the case of PBOs, or the imbalance between

exploitation and exploration, which may lead to the lack of real performance exhibited by these organizations.

This study aims to address and resolve this research problem. First it generates a detailed structure and approach to organizational ambidexterity, by which it generates a comprehensive definition for this capability. This definition is formulated to be as suitably general and sufficiently detailed to realize its applicability in various environmental and organizational contexts. Portfolio management practices are investigated to assess their compatibility with this generated definition as a proposed approach to ambidexterity.

This study therefore, and in the realm of the different practices and/or the claimed dynamic capabilities and performance of organizations along with business sustainability concerns, proposes the use of PPM as a standard practice to establish new mechanisms for ambidexterity in PBOs. In order to establish this objective, organizational ambidexterity is analyzed in this thesis in sufficient details by way of a systematic literature review to understand all its requirements, definitions and applications.

In summary, this study examines organizational ambidexterity through the lens of PPM practices. It seeks to establish a relationship between ambidexterity and PBOs which operate in dynamic environments, and in the process, seeks to evaluate the nature of relationships within the context of organizational events when dealing with internal and external factors within the project-based environment.

6.2 Transforming research problem into questions and objectives

In order to answer the research problem, the study was structured to produce three research questions that follow the logical sequence of the earlier presented research map (shown in Table 1-1) in the introduction section of the thesis.

The first research question starts with an enquiry to redefine and restructure ambidexterity. This question was addressed through an extensive and a systematic review of the literature. This review was followed by a qualitative field investigation and analysis to refine its outcomes and provide reliability to the generated answer.

RQ 1: What is organizational ambidexterity and how can it be defined within the context of Project Based Organizations (PBOs)?

The answer to the first research question generated a comprehensive definition for the organizational dynamic capability *ambidexterity*. This detailed and comprehensive definition facilitated the application of ambidexterity to various organizational contexts and types and facilitated understanding ambidexterity in various environmental applications, such as the project-based environment and PBOs, which is the focal point of this research.

The second research question builds on the recommendations produced by the first research question. As a continuation from the first research question, the second research question investigates the mechanisms needed to achieve ambidexterity, as defined in the first question. This question was initially answered by conducting a systematic literature review followed by qualitative field verifications.

RQ 2: What is the range of mechanisms needed to support ambidexterity in Project Based Organizations (PBOs)?

The answer to the second research question generated mechanisms that can fill the gap of ambidexterity and that can be applied throughout organizations in general and PBOs in particular.

Those mechanisms were initially produced at a high level based on the literature review, then they were detailed enough to understand how ambidexterity can be approached. This lower layer which represents a detailed approach to mechanisms was generated and confirmed with a qualitative study research which took place in the field.

The third research question investigates PPM practices to see if they can be used as a vehicle that can carry ambidexterity within the organization. This question carries on from the conclusions and recommendations on the mechanisms of ambidexterity of the second research question and links them with PPM practices. This question is addressed by means of conducting a qualitative study combined with a review of PPM practices literature and standards, and triangulated by conducting a quantitative study.

RQ3: How can project portfolio management (PPM) as a process support ambidexterity in Project Based Organizations (PBOs)?

Three hypotheses were advanced to support addressing this research question. These hypotheses start with a check on the relationship between (1) ambidexterity and performance, then (2) PPM and performance, and finally, (3) they set the stage to test the mediation effect of ambidexterity with performance:

Hypothesis H1: The higher the level of ambidexterity in an organization or business unit, the higher the level of performance;

The field study confirmed this first hypothesis through the application of a quantitative field study. An increased level of ambidexterity in organizations has certainly proved its relationship with performance. The outcome of this hypothesis corroborates with the outcomes of many scholars who studied ambidexterity in a similar context (Gibson & Birkinshaw 2004; He & Wong 2004; Venkatraman et al. 2007; Agostini et al. 2016). In addition to this relationship and to the previous related research, this study added one more relation to its initial outcome, and that is the positive

relation between ambidexterity and the performance and success of projects within PBOs, which is a logical progression of this hypothesis.

Hypothesis H2: The more that an organization or its business units exhibits an effective application of its project portfolio management practices (measured through its PPM effectiveness), the higher the level of ambidexterity;

This hypothesis was proven to be true and corroborates with the outcome of many other similar research studies (Petro & Gardiner 2015; Serrador & Turner 2015). The reason for its inclusion in this research was to support the answer to the third research question and the third hypothesis through a mediation analysis achieved via regression analysis – see section 5.3.9 for more details.

Hypothesis H3: Ambidexterity mediates the relationship between PPM practices and the organization's performance.

This hypothesis hosts the main objective of the research; its intention was to see how PPM practices could help organizations achieve ambidexterity and what the overall effect on performance was if that was true. Initially, a relationship between ambidexterity and PPM practices was established through a comparative analysis carried out during the qualitative field study. This relationship was then advanced to be tested in the field through regression to see the direct effect of this combination on performance. A mediation effect of ambidexterity was found. This means that the study gave more importance to ambidexterity to achieve better performance and that ambidexterity shall be achieved through the application of PPM practices. However, this relationship was only found to be true in SMEs, while other organizational types and sizes had processes, as represented in PPM practices, at the forefront for seeing performance through.

6.3 Overview of the research outcomes

The aim of this research is to build an understanding of how ambidexterity can be achieved in Project Based Organizations (PBOs), in doing so it generated a comprehensive definition for ambidexterity to act as a foundation for this research. The intention behind the construction of this foundation was to facilitate understanding of this capability and prepare it for its application to some specific forms of organizing, one of which was the focus of this study, PBOs. The study then investigated the means and mechanisms needed to achieve ambidexterity in organizations. This aim promoted the application of PPM practices being viewed to facilitate dynamic capabilities within organizations (Davies & Brady 2016). The comprehensive definition was generated through a systematic review of the literature. This was then followed by a combination of qualitative and quantitative field studies to generate a proper approach to see this capability through in organizations and in PBOs.

The qualitative investigations employed the comprehensive definition of ambidexterity to achieve its results. The qualitative site investigations were carried out through 12 interviews which were conducted with 12 informants from 12 case study firms. The interviewed firms were selected to represent various degrees of ambidexterity in their operations. The qualitative analysis was carried out using a cross-case analysis along with a within-case study analysis to investigate mechanisms of ambidexterity. Nevertheless, the analysis was carried out simultaneously on both dimensions and mechanisms of ambidexterity as defined in the systematic review of the literature in order to increase the reliability of the study outcomes, and to further infuse trust in the generated comprehensive definition of ambidexterity, thus confirming the study outcome as cohesive and reliable. The analysis which was carried out on dimensions of ambidexterity confirmed the outcomes of the systematic review of the literature and provided further details on these constructs.

Resuming the analysis, the study continued with investigating the mechanisms of ambidexterity and tested their relationship with PPM practices.

The quantitative study carried out in this thesis confirmed the qualitative study results. These results provided more generalizability for the overall research outcomes and enhanced the validity of the research findings. The quantitative study was commissioned to establish a connection between PPM practices and ambidexterity, and to further test the effect of both on performance. Although this relationship has already been established using the qualitative field analysis by way of the 12 interviews conducted earlier in this thesis, the quantitative analysis provided objectivity to the qualitative results through the use of questionnaire distributed to a much larger pool of professionals.

The quantitative research was conducted in a project management industry where mainly PBOs were involved. A total of 160 responses were collected throughout this study; most responses came from the engineering industry. The results of the quantitative analysis proved that a positive and significant relationship existed between PPM practices, as represented by PPM effectiveness. Also, the analysis results have shown that PPM effectiveness was correlated positively and significantly with performance. Most importantly, ambidexterity was found to mediate the relationship between PPM effectiveness and performance in SMEs. That is, this research has proved that PPM can achieve performance through ambidexterity in SMEs only. This was established though carrying out several multiple and singular regression analyses to prove that ambidexterity carried more significance in enhancing performance compared to PPM effectiveness, while PPM effectiveness remained salient with its relationship with ambidexterity.

A *post hoc* analysis was carried out in attempt to create clusters of organizational sizes and/or industries, or a combination of both, with the possibility of each cluster to exhibit a certain degree of ambidexterity. However, no real statistical difference was detected between those assumed clusters. The lack of clustering and the confirmation of homogeneity in variances indirectly support the initial research findings. This means that the achievement of ambidexterity requires the realization of certain paradoxes in certain dimensions through the application of certain mechanisms, and that has nothing to do with size or industry.

The following sections discuss the research outcomes and show how the research outcomes contributed in restructuring and redefining ambidexterity, and how this new structure facilitates its application to PBOs. Those sections then discuss how this new structure and approach to ambidexterity contributes in a paradigm shift in this particular area of knowledge and how that has contributed with a theoretical framework that can be built upon in future studies.

6.4 Limitations and future studies

Leveraging on the review and analysis of the literature, combined with the cross-case analysis carried out in the qualitative study and the inferential statistical analysis undertaken during the quantitative study, this has all enabled the development and the establishment of a theoretical framework which explicates the exploitation/exploration tensions along with the situations of paradox which could occur within and outside the boundaries of PBOs. The establishment of this framework led to generating the substance of a shift in paradigm in this area of knowledge. More specifically, this study identifies what new actions should be taken to spin the wheel of ambidexterity in PBOs, posed as mechanisms and dimensions of ambidexterity integrated within the levels of the organization, illustrated within the boundaries of the above-mentioned theoretical/conceptual framework (see Figure 3-4).

Given the goal of developing a framework that might spur further empirical research, this study lends itself to opportunities for testing and extending its established framework. Drawing on and learning from the firms assessed in this study, this study investigated 12 ambidextrous firms during the qualitative analysis, along with 160 organizations which operated in more than 12 industries during the quantitative analysis. This study investigated particular sizes as well and made general contributions on SMEs. However, whether these lessons can be applied elsewhere raises important questions. It is therefore recommended to extend this work to cover more areas and more industries. It is also recommend that future scholars increase the focus on particular industries and conduct particular research on SMEs in this context, as well as research on other organizational types or sizes.

Ambidexterity in the public and the private sectors was only mentioned briefly in this thesis, and the only contributing factor of those was the size of organizations which operated in those two

sectors. Further studies on ambidexterity is therefore recommended to cover more aspects of the private and the public sectors in future studies. Likewise, the relationship between the organization's size, industry, and the management approach towards the application of certain mechanisms and dimensions demands further assessment.

Project portfolio management (PPM) practices were assessed herein and a comparative analysis was carried between them. From this, the study established mechanisms of ambidexterity; however, it did not impose a direct change to any of the established and known standards. The author proposes to generalize the application and increase the understanding of this area of knowledge and the retention effect of ambidexterity on performance as achieved through those practices. It is therefore recommended that future works delve in greater detail into establishing those practices that can be used and impose changes, or recommend particular applications in certain areas.

Another direction for future research lies in the application of another research lens. In that case, the study critically examines organizational ambidexterity through the lens of PPM practices. It establishes a relationship between ambidexterity and PBOs which operate in dynamic environments through the use of PPM practices. It is therefore recommended that future studies to look through other research lenses to pick the best routes for ambidexterity and test which of those routes could impose better results for achieving this organizational capability.

It is to be noted here that ambidexterity is an organizational characteristic, a state or a capability that can be achieved along different routes. Some studies talked about achieving it via the application of innovation tactics being incremental in some cases or radical in others (Jansen et al. 2005). Others linked the application of programs to exploratory traits and projects to the

exploitative ones (Pellegrinelli et al. 2015). Mom et al. (2007) established a link between the type and direction of knowledge flow in the various organizational layers and the ability of the organization to becoming ambidextrous. Lubatkin et al. (2006) linked ambidexterity to the traits and behaviours of the management team. Lavie et al. (2010) talked about the various organizational structures and their means to achieve ambidexterity; in their research they suggested the following routes to ambidexterity: contextual, organizational, temporal, and domain separation. Turner et al. (2013) used the Intellectual Capital of the organization to propose micro-mechanisms for achieving ambidexterity. This study on the other hand comes with a new proposition to find better practices and solutions that can help see ambidexterity through in organizations, and it proposes to link ambidexterity with portfolio management. Therefore, and for the sake of completeness, a future study, and an upcoming research question can be proposed to cover the best means or routes for achieving ambidexterity. The outcome of this study, and the answers to the previously mentioned questions, can be used as the point of departure for scholars who are interested in investigating organizational ambidexterity in a similar manner in the future.

6.5 Contribution to knowledge

This research has sought to explain and restructure organizational ambidexterity by investigating actions taken by real organizations in resolving paradoxical situations. In so doing, a better understanding of organizational attributes in the field of ambidexterity – identified here as dimensions of ambidexterity and their mechanisms – was generated. The outcome of this research lends itself to various recommendations that are considered very valuable for managers, practitioners and scholars.

For practitioners, this research provides new means and measures that can be used to assess gaps in organizations with particular focus on PBOs. This study facilitates the identification of those gaps by linking them to the dimensions and mechanisms of ambidexterity as defined and generated during the analysis of the problem defined in this thesis. The study proves that upon bridging those gaps, ambidexterity can see through better development for organizations. Moreover, this new conceptual development in the area of ambidexterity combined with its alignment with PPM practices helps practitioners and managers comprehend the importance and the real influence of this dynamic capability on PBOs, particularly when placed in complex and dynamic environments.

For scholars, this research provides a new theoretical development in the field of ambidexterity. It also generates the substance of a new paradigm shift in this area of knowledge as implied earlier by Raisch and Birkinshaw (2008). This new shift in paradigm and the development of a new theoretical framework for ambidexterity can be used as a foundation by scholars to build on for future studies. Moreover, the generated definitions and the new structuring for ambidexterity with the relevant dimensions and mechanisms can be taken to develop new scales for the measurement of ambidexterity. Ambidexterity in this case can be measured in various contexts, and the overall new structure for ambidexterity can be used to support and grow other areas of knowledge.

Finally, this study offers a new perspective on projects and PPM within the project-based environment. This new perspective solidifies the relationship between operations and projects and PPM in PBOs, an area increasingly featuring in recent research (Svejvig & Andersen 2015).

Chapter 7 Conclusions and recommendations

7.1 Introduction

In today's dynamic and projectified world, flexibility and ambidexterity may pose the ultimate advantage for organizations. The leading firms in this environment embody paradoxes within the organizations, along with the accompanying exploitation/exploration tensions that are interwoven with the contradictory forces within and outside the organizations. The identification of a detailed, comprehensive and yet a more structured definition and approach to ambidexterity that can be applied to manage paradoxes within the organization can help demonstrate a managerial creativity in this context. Slaatte (1968, p. 4) for instance ascribed significant importance to the resolving of paradoxes within the organization, depicting a paradox as "an idea involving two opposing thoughts or propositions which, however contradictory, [but] are equally necessary to convey a more imposing, illuminating, life related or provocative insight into truth than either fact can muster in its own right".

In light of the mix of the complexity and dynamicity of the outside world and the internal inconsistencies of organizations, this research was commissioned to study and align organizational dynamic capabilities represented in its ambidexterity to resolve matters and challenges imposed by the external world on Project Based Organizations (PBOs). These organizations could be infused with rigidity and inflexibility from the application of project management functions (Hodgson & Cicmil 2007; Lenfle & Loch 2010; Candi et al. 2013), and hence may benefit from the introduction of dynamic capabilities through the introduction of PPM practices. In addition, this research has studied a wide range of organizational sizes and also investigated a wide range of industries to facilitate understanding ambidexterity in various contexts. The research establishes that SMEs were more receptive to ambidexterity compared to the other types/sizes of

organizations. This was also the case with the private sector when compared to the public sector. The types of industries on the other hand exhibited no particular relation with ambidexterity. In other means, organizations in a certain industry would not exhibit more or less ambidexterity because they belong to that industry.

7.2 Restructuring organizational ambidexterity

7.2.1 Redefining ambidexterity

A proliferation of research on organizational ambidexterity started picking up fronts in the early 1990s initiated by March (1990) following on from Duncan's (1976) work on the innovative organization. Back then, the definitions of ambidexterity were abstract. Although more research was generated post March (1990) following his lead on organizational ambidexterity, this study detected a lack of an in-depth structure and a comprehensive understanding of this organizational capability. Therefore, in order to progress to research the mechanisms needed to achieve ambidexterity along with their relationship with PPM, or any other management process, this study had to find a strong foundation for ambidexterity. This foundation was established by extensively researching this capability in the literature and in the field. This research has so far been able to build and prove a theory which facilitated moving organizational ambidexterity beyond a point of abstraction.

It has long been known that ambidexterity can be achieved with the simultaneous application of exploratory and exploitative activities or functions within the organization (March 1990). Exploration is generally attached to external functions which are external to the organization and mostly related to the dynamic environment of which ambidexterity seeks to overcome (Teece et al. 2010). Exploitation on the other hand is generally attached to internal functions related to the operations and projects delivery (O'Reilly & Tushman 2008). Gibson and Birkinshaw (2004) viewed those two functions as internalized within the individual and hence promoted what they have identified as contextual ambidexterity. Ambidexterity is mostly linked to the organization's ability to simultaneously and flexibly alter the allocation of their resources (Cao et al. 2009); hence the size of the organization and their resources' munificence is advantageous (Lubatkin et al.

2006). Having the ability to select the type of projects in the organization to be either exploratory or exploitative can set other means of seeing ambidexterity through in organizations (Eriksson 2013).

Ambidexterity can also be achieved through balancing between the strategic effectiveness of the organization and the operational efficiency of either the operation itself or its projects (Kortmann et al. 2014). Or it can be achieved through getting the flow of information and communications right, either through their balance or their direction (Mom et al. 2007). Setting the behavioural aspects of the management team can help in achieving an ambidextrous status as well (Lubatkin et al. 2006); or the behavioural aspects of the teams themselves (Gibson & Birkinshaw 2004; Andriopoulos & Lewis 2009); or that of the project manager (Aubry & Lievre 2010). More research covered other aspects of ambidexterity as examined from different points of views or other fronts.

A common theme in the organizational ambidexterity literature is its ability to overcome the tension or the paradox created in the organization (Smith & Lewis 2011). This tension produces a paradoxical situation which requires a resolution in order to see through continuity in the operation (Andriopoulos & Lewis 2009; Smith & Lewis 2011) which should generate growth and sustainability (O'Reilly & Tushman 2011). The tension within the ambidextrous organization can be explained by the exploratory and the exploitative functions – one function focuses externally and another one focuses internally, with each function trying to pull resources in different directions to fulfill certain requirements. If tension cannot be resolved and/or one function requirement overcomes the other, ambidexterity is ruined (Birkinshaw et al. 2016) – this is similar to a shorter-term success as depicted by an acceptance strategy discussed in Smith and Lewis (2011).

This study takes the above definitions and approaches to ambidexterity into consideration. It also collects and compiles definitions from almost all the research which was published on ambidexterity so far, sets up a theory, and produces a comprehensive and well-proven definition for organizational ambidexterity. Of the important factors that are generally missing with ambidexterity (and confirmed by this study) is the need to have, or create, or induce, tension or paradox in the organization. The new definition of ambidexterity has identified various dimensions within which this tension should be applied in order to nurture ambidexterity in the organization. Those are the knowledge dimension, the behaviour dimension, the technological dimensions and the process dimension. This definition also identifies how these paradoxical situations which are created within each of those dimensions exist in the various levels of the organizations. The definition of ambidexterity as generated in this study can therefore be seen as sufficiently detailed and can also be generalized to assess its applicability in various organizational and environmental contexts:

> *Ambidexterity is the ability of the organization to employ structural, learning, selection and communication techniques to resolve paradoxical challenges within intellectual, behavioural, technological and processual dimensions in the various levels of the organization - these levels (strategic, projects, operations and individual) can be separate or interwoven - to overcome situations of external dynamicity and competitive environments, considering internal limiting factors such as size, resources availability and absorptive capacity of the organization.*

In order to test this comprehensive definition in the field, situations of paradox and tensional forces were looked for in the identified and selected case studies. Tension was identified as forcibly induced in some instances creating not only situations of paradox, but also incentives for an organization to be more innovative and more ambidextrous to overcome identified “challenges”. During the field analysis, those identified dimensions of ambidexterity were investigated to find what induced or non-induced tensional forces reside within each of them. A basic model was

applied looking at where the organization wanted to be at (operating model), and what was holding it back from achieving its goals (challenges). To overcome those challenges ambidexterity at all levels of the organization and throughout the defined dimensions was identified as necessary.

7.2.2 Restructuring ambidexterity

This study addresses the gaps in the organization ambidexterity research domain (Raisch & Birkinshaw 2008; Birkinshaw et al. 2016; Vahlne & Jonsson 2016). The study moves our understanding on organizational ambidexterity from the high level of abstraction that ambidexterity has been dealt with towards a more developed framework which has the ability to address ambidexterity in a systematic and an organized manner. This contention over research gaps agrees with Raisch and Birkinshaw (2008, p. 376) who claimed that this field is yet to "benefit from a comprehensive framework that integrates the various insights [of ambidexterity]". This study therefore recreates ambidexterity and integrates it with the various levels of the organization, and considers it as part of its structure. The level of abstraction that ambidexterity has been dealt with previously prevented this capability from reaching its targets (Birkinshaw et al. 2016; Vahlne & Jonsson 2016). Presenting ambidexterity in this depth along with the enhanced level of details and the proposed integration with the levels of the organization allows ambidexterity to be looked at differently with a different structure in mind. This new structure shall generate a better understanding of this capability and facilitate its integration with the rest of the organizational functions and types.

In earlier research, ambidexterity was looked at as a holistic measure of the organization's ability to explore and exploit (March 1990; Simsek 2009), or align and adapt (Gibson & Birkinshaw 2004). This study introduces four different levels in which this dual organizational capability – so-called ambidexterity – can be applied to, those are: the strategic level, the projects level, the

operations level and the individuals' level. Further, this study proves that each of those levels contains four dimensions of ambidexterity as discussed previously: the knowledge dimension, the technological dimension, the processual dimension and the behavioural dimension. Therefore, in order to achieve ambidexterity in the organization under this new and more defined structure, this study has established the requirement to cross-check all such levels and dimensions totaling 16 areas which ambidexterity needs to be applied to, so that the organization can move up to an ambidextrous status – see Table 7-1 which proposes an example of how organizations can be assessed against their ambidexterity capability.

Table 7-1. Proposed high-level scorecard system for ambidexterity

		DIMENSIONS			
		Knowledge	**Technology**	**Process**	**Behaviour**
LEVELS	**Strategic**	x	x	x	x
	Projects	x	x	x	x
	Operations	x	x	x	x
	Individual	x	x	x	x

A system of Scorecard (Kaplan & Norton 1996a), or a model that is similar to the excellence model (EFQM) in organizations (Wongrassamee et al. 2003) can be used as a framework to host the above proposed assessment framework in which this can be used to measure the degree of ambidexterity for organizations and improve on it. A system of Scorecards measures the maturity and the success of organizations (Kaplan & Norton 1996b; Wongrassamee et al. 2003); in this case it can be customized to include the new structure for measuring the extent of ambidexterity for organizations.

7.2.3 Mechanisms of ambidexterity

This study starts by restructuring ambidexterity and molding it into a new framework against which this capability can be measured. It also generates a detailed and a comprehensive definition for ambidexterity to help scholars and practitioners understand what is happening and what needs to be done in various dynamic and complex situations. Next, the study investigates the mechanisms which are needed in organizations to see this framework integrated with the rest of the activities of the organization when the comprehensive definition is applied.

The study identifies four mechanisms of ambidexterity which need to be applied within the various levels of the organization along with the four dimensions of ambidexterity. The researcher posits that applying those mechanisms as such can elevate the entire organization to an ambidextrous status. The systematic review of the literature identifies four mechanisms of ambidexterity. The field studies add other sub-mechanisms to those four mechanisms, as identified in the qualitative analysis. More sub-mechanisms can be identified or added in future similar studies. The mechanisms and sub-mechanisms of ambidexterity are:

1- Structural mechanisms
    a. Flexibility
    b. Complementary alliances
    c. Roles and responsibility
2- Learning mechanisms
    a. Learn about new direction
    b. Understand what others do
    c. Understand and harness own capabilities
    d. Learn about own projects
3- Selection mechanisms
    a. Selection of pool of clients
    b. Selection of resources
    c. Selection of projects
4- Communication mechanisms
    a. The bond between the leader and the team
    b. Internal communications
    c. External communications
    d. External relationships and networks

The study shows how these mechanisms can be integrated with the various activities of the organization to overcome challenges of various types – each of those challenges could be attached to one or many different dimension(s) of ambidexterity. Those challenges have been identified in the qualitative part of this thesis as occurrences which could create either a tension or a paradox when they work against the status quo of the organization, its operation and its goals (hence the need for ambidexterity kicks in).

Mechanisms of ambidexterity can be used as a tool to fill the ambidexterity gap in the organization; this gap identifies the shortcomings of the organization against what needs to be done in order for it to become ambidextrous.

It is worth noting that many scholars have identified several mechanisms that can be used to bridge the ambidexterity gap in organizations (O'Reilly & Tushman 2008; Turner et al. 2013, 2015). Those mechanisms were consulted in order to finalize the mechanisms identified here. However, what brings uniqueness to the mechanisms presented in this thesis compared to others is their detailed applicability, their wide coverage, their focus on dimensions and levels, and, their direct attachment to the overall framework presented in this study.

7.3 Project-based environments

7.3.1 Project Based Organizations (PBOs)

This study presents the PBO as one of the modern and prevailing types of organizations (Hobday 1998; Geraldi et al. 2011). Hobday (1998, p.874) defined PBOs as those organizations where projects are "the primary business mechanism[s] for coordinating and integrating". This definition along with the proliferation of research on PBOs (Eriksson 2013; Petro & Gardiner 2015; Prado & Sapsed 2016) corroborates the projectified nature of today's world, where all functions and operations are and can be run through projects (Jansen et al. 2016). This study therefore, as it redefines and restructures ambidexterity, prepares PBOs to accept the proposed ambidexterity framework through their PPM functions and practices to benefit from the advantages of becoming ambidextrous.

PBOs constitute project, program and PPM functions. All those functions can be placed perfectly into a matrix to see the PBO operations through. In their definition of PBOs, Thiry and Deguire (2007) integrated the three functions into a single structure. Thiry and Deguire's (2007) definition represents PPM with an important role in setting up the corporate strategy. Program management on the other hand intersects with the strategy offered by PPM to propose and deliver the right projects (Gareis 2007), while project management ensures an efficient delivery for the projects in hand (Serrador & Turner 2015).

7.3.2 Project portfolio management practices

PBOs, as they consist of projects and/or programs (Prado & Sapsed 2016), or being run through projects and/or programs' implementation (Gardiner & Stewart 2000), require specific management functions, procedures and processes to be in place to run their operations (Thiry & Deguire 2007). This is apart from them following a certain project management standard or

function (Gardiner 2005; APM 2012; PMI 2013a) or any sort of a program management standard when programs are in place (Gareis 2007; PMI 2013b). Many scholars and practitioners have identified PPM practices as one of the more suitable management functions and processes that can be integrated with PBOs' managerial functions to manage their operations (Levine 2005).

This study explores the various PPM standards and the practices applied in PBOs to test their relevance to managing their operations and later to compare similarities with the mechanisms of ambidexterity identified here. Some of the standards which this study refers to are the Project Management Institute Standard for Portfolio Management (PMI 2013c), the Chartered Institute of Buildings (CIOB 2014), and the Association of Project Management (APM 2012), along with many other books (Gardiner 2000; Levine 2005), handbooks (Gareis 2007; OGC 2008) and academic articles (Cooper et al. 1997; Archer & Ghasemzadeh 1999; Blichfeldt & Eskerod 2008). The research as grounded out on those standards, books, handbooks and academic articles always represented PPM with a dominant theme, and that is one with a strategic and dynamic direction and one which represents a holistic managerial approach to see better results for the operation.

7.3.3 Project portfolio management practices and ambidexterity

This study investigates and establishes a link between PPM practices and organizational ambidexterity. Firstly, the study carries out a comparative analysis by way of qualitative field investigations between known PPM standards and practices (AMP 2012; PMI 2013c; CIOB 2014) and the mechanisms of ambidexterity as identified in this study. Secondly, the study identifies and establishes a link between the effective use of PPM practices and organizational ambidexterity through the quantitative analysis carried out in this study. This two-way confirmatory analysis represents triangulated proof and a solid outcome which supports the link between PPM practices and organizational ambidexterity for the PBO type of organizations.

7.4 Effect of ambidexterity on organizations

7.4.1 General effect

This study investigates the effect of ambidexterity on the performance of organizations, particularly those which operate in project-based environments and are identified as PBOs. Through this investigation, this study has established a direct link between ambidexterity and the performance of PBOs; it has also established a link between the processes and practices which PBOs exhibit to run their day-to-day operations (mainly the PPM practices) and ambidexterity. The study has also investigated the mediation effect that ambidexterity can have on performance, taking into consideration the effect of those organizational processes or practices on ambidexterity. The mediation effect which organizational ambidexterity has proven to exhibit on performance (represented with ambidexterity as a mediator sitting in between PPM practices and performance in the quantitative research model presented earlier) emphasizes the importance this organizational capability has, and further supports the proliferation of research on ambidexterity and the development of this capability in practice.

This study had performance of organizations as its focal point due to the importance it brings to growth and sustainability, along with its relationship with short- and long-term projects' success and overall business performance; however, this does not ignore projects' performance. Projects' performance was also tested against ambidexterity and similar types of relationships were established – i.e. a link between ambidexterity and projects performance along with a link between PPM practices and projects performance. Nevertheless, a mediation effect of ambidexterity was not detected in this case; in fact, PPM practices were found to be more important in the case of projects and projects' delivery compared to ambidexterity. This could be attributed to the nature of and the means used to measure the targeted performance – i.e. projects' performance was mostly

measured against short-term performance (Jonas et al. 2012; Petro & Gardiner 2015; Turner & Serrador 2015), while in measuring the performance of the organization, a combination of short- and long-term indicators was used (Meskendahl 2010). In addition, the anticipated growth of the organization (Jonas et al. 2012), its current market share (Meskendahl 2010) and future market endeavors (Jonas et al. 2012) along with the sustainability of the business (Meskendhal 2010; Petro & Gardiner 2015) were measured. All this comprises what ambidextrous organizations can do (Lubatkin et al. 2006; Agostini et al. 2016; Tamayo-Torres et al. 2017).

7.4.2 Small to Medium Enterprises (SMEs)

This study examines the established relationships mentioned in the previous section against a selection of control factors. Of those control factors which exhibited a prominent effect when used to control the study outcomes was the effect of the size of the organization on the importance of ambidexterity to the organization, and its ability to act as a mediator to performance and success. Upon testing for the effect of size, the study found that organizational ambidexterity exhibited more impact on Small- to Medium-sized Enterprises (SMEs) compared to their larger counterparts. This finding corroborates that the role of ambidexterity in terms of its relation between PPM practices and performance is actually dependent on the size of the firm.

SMEs face competitive pressures to pursue exploitation and exploration with the lack of resources that their larger counterparts have (Lubatkin et al. 2006). SMEs' lack of resourcing, or the non-slackness of their resources, combined with the lack of administrative and hierarchical systems that may help larger firms in managing their conflicting processes (or paradoxes), affect the ambidexterity of the organization (Lubatkin et al. 2006; Voss & Voss 2012). For instance, "larger firms can manage these processes by creating structurally separate business units, some focusing entirely on exploitation and others entirely on exploration" (Lubatkin et al. 2006, p. 647).

Moreover, and according to Cao et al. (2009, p. 781), "…managers in resource constrained contexts may benefit from a focus on managing tradeoffs between exploration and exploitation demands, but for firms that have access to sufficient resources, the simultaneous pursuit of exploration and exploitation is both possible and desirable".

In light of the above, the study highlights SMEs and their insufficient capacity or capability to separate exploratory activities from exploitative activities as conveniently as large organizations can do. Larger sized organizations can easily go for a temporal separation, a structural separation or a domain separation (Lavie et al. 2010) in dealing with those activities. The number of resources available to carry out those exploitative day-to-day operations, along with the exploratory functions of the organization, is limited in SMEs; hence, this renders ambidexterity as a necessity (Lubatkin et al. 2006; Cao et al. 2009; Voss & Voss 2012).

Larger organizations on the other hand have sufficient resources to enable them to carry out the needed activities to satisfy the strategic direction of the organization and its ambidexterity easier than is the case for SMEs (Cao et al. 2009). The difficulty in the larger sized organizations, though, is achieving operational efficiency (Porter 1996; Kortmann et al. 2014) and cost control (Porter 1996). These issues are handled by installing better processes and practices in those larger firms (Kortmann et al. 2014).

7.4.3 Public versus private organizations

A discussion on the public and the private sectors was carried out at the onset of this thesis. While many differences were recognised between those two sectors were recognized (Mercer 1991; Boyne 2002; Van der Wal et al. 2008; Jung 2014), the study only picks up on the size of those governmental organizations. The field investigations tagged those public organizations with the

larger type of organizations with number of resources in excess of “300”. On the contrary, the private-sector organizations can be of any size. Based on this initial outcome of the study and the field investigations – which is true in most of the cases – the study concludes that the public sector puts more emphasis on their own processes, while the private sector SMEs have a need to achieve ambidexterity to enhance on this performance.

7.4.4 Generalizability of the results

The study investigated more than 12 industries and each of those investigated industries consisted of various organizational types and sizes. One of the intentions of the analysis which was carried out post the quantitative study analysis was to identify particular industries, or particular organizational sizes, or a combination of both, which can be parceled out or identified with their extent (degree) of ambidexterity – i.e. to create clusters of ambidexterity within industries and sizes so one can identify which of those could be more or less ambidextrous than other clusters. The study unexpectedly returned a negative answer on the above quest. That is, the study proves that the extent of ambidexterity was not attached to an industry or size, rather, it was the will of the employees in following the needed mechanisms or processes which could transform an organization to become ambidextrous. The inability to cluster ambidexterity and distribute those clusters into industries and sizes confirms that ambidexterity is independent of static exogenous factors. Rather, such clusters could be created through directing careful consideration towards discovering and resolving paradoxes in the various dimensions of ambidexterity identified here.

7.5 Summary and recommendations

This study took on the resolution of a problem and answering three research questions which are relevant to investigating the relationship between PBOs and ambidexterity through the application of certain practices or processes in organizations. In order to arrive at this resolution, the study started by investigating ambidexterity firstly through a desk-based literature review and analysis and then through qualitative and quantitative field studies. This led to redefining of ambidexterity and adding a more comprehensive description to it. In turn, this description informed the building of a new structure for ambidexterity and building new means for its interaction with the organization. This analysis facilitated understanding what dimensions ambidexterity may comprise, and what those mechanisms are which can be used to touch on those dimensions.

Having redefined and restructured ambidexterity made it easier to investigate this capability in PBOs and link PBOs' specific practices to the dimensions and mechanisms of ambidexterity as defined earlier in this study. This new structure of ambidexterity also made it easier to investigate and further understand the effect of ambidexterity on business performance in general and projects' success in particular. In doing so, it was possible to understand the effect of size on ambidexterity and its relation with the organization and the processes within the organization. Further, the study has proved that no relationship existed between exogenous factors (such as size or industry) and the extent of ambidexterity that organizations could have or score; rather it was the internal processes which mattered in achieving a certain ambidexterity score.

This study allows organizational ambidexterity to take the shape of a research paradigm, and it builds a theoretical framework that can be used in future applications. A paradigm or a theoretical framework requires the identification of units of interests and this was achieved through restructuring ambidexterity (Kuhn 1962). Moreover, based on the work of Dubin (1978) and Fry

and Smith (1987), theories also require congruence between these units, an identification of boundaries within which a theory can be applied to, and the ability to measure their contingency effects. This research has contributed so far with variables and elements which support the development of a new paradigm along with a solid theoretical framework.

Moreover, this research has contributed in enhancing and adding to the knowledge of organizations' dynamic capabilities to put them into proper use in PBOs. This knowledge has so far proven to be of a significant use for:

1- Scholars, by arming them with the latest conceptual development on the subject *ambidexterity*, and by further uncovering the new possible shift in paradigm in this area of knowledge which allows them to further on this study;
2- Managers, by teaching them the needed tricks which can unleash organizations' dynamic capabilities;
3- Practitioners, by allowing them to apply new means and measures to assess performance gaps in organizations and PBOs;
4- Training providers, by allowing them to structure and develop new curriculums which takes into account this new development in organizational knowledge.

Finally, and given the goal of developing a framework that might spur further empirical research, it is recommended to test and extend this framework taking into account the different organizational sizes and/or industries. It is also recommended that future scholars increase their focus on particular industries and conduct particular research on SMEs in this context. It is also recommended to research other organizational types or sizes, and include more relevant aspects of the public and the private sectors when applied in similar future research.

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Appendix A – Qualitative Study Semi-structured Questionnaire

Qualitative study semi-structured questionnaire:

1) How many years have your company been in operation? Growing? Shrinking or sustaining?

2) What do you do in the business and what is your role in doing that?

3) How do you describe the market or the environment in which you are operating?

4) How do you deal with the challenges coming from this external environment?

5) What do you think you do differently as an organization to sustain yourself or grow?

6) How do you define/select the types of projects (or work) which you deliver in your organization (whether this was for internal or for external purposes)?

7) To what extent (and how) might project types be affected by the external environment or the market?

8) Is there a certain procedure by which your organization selects project or clients? Is there a certain strategy that they follow?

9) What sort of challenges, if any, do you face challenges in delivering those projects? How do you overcome these challenges?

10) What sort of challenges, if any, do you face challenges with team members? What do you do to satisfy these challenges?

Appendix B – Case Study Interviews: Summary per informant

This appendix includes the summary of each of the interview transcripts. Twelve interviews were conducted to represent 12 case-study firms. The names of those firms or any other indications to those firms were removed for confidentiality purposes.

Firm	Firm 1	**Revenue**	USD $ 25 million
No of employees	200	**Year est.**	~1960
Type of services	Engineering consultant		
Country of operation	UAE, Qatar, Bahrain, Kuwait & KSA		
Informant/interviewee	Director of Operations		

We have been operating in this region for about 50 or 60 years; we are a branch of an international company. I would say that we are neither growing nor shrinking, we have hopes and plans for growth but the current market conditions are playing against us. So we may be sustaining at this current market situation which I identify as growth in such a declining environment.

We are an engineering consultant; we are specialized in wet infrastructure works. We work with governments and developers and the likes and we produce designs for infrastructures needed for their projects. I am the regional director of projects and the director of operations, in that I monitor the performance of all ongoing projects, I design proposals from a commercial perspective, and I contribute to the inputs of the methodology sections and proposed implementation plans to ascertain that all of our future projects are implementable.

I see the market in which we operate in as stressful and competitive. There are only few projects that are available in the market and many consultants roam around them to get them. Fierce competition on price. Our price has to be tight to make sure we win these projects and the proposals which we bid for.

There is no easy way to overcome those challenges. We need to understand the projects which we are proposing to implement well in advance; we need to talk to our clients beforehand and before an RfP is issued; we need to understand the real drivers from the clients behind issuing those RfPs, work with them hand in hand so they favor us in case our price was not right – or was higher than the competition (this may not always be the case but we had few cases like those where we ended up with an award whilst our price was high). Once we have built this understanding from the client side, we also need to form a good understanding of the market and the competition as well. We need to know who is competing against us and who is not. We shall try to understand why some names have been invited specifically by the client and why some were not invited in the first place. We shall understand how these competitors perceive the market and are they just cheap consultants or ones with a good reputation for delivery. We shall also understand the intentions of the others and if they were planning to buy the proposals/projects or not (i.e. price it very cheaply and at a loss from their side to guarantee win/award).

We work very closely with our clients, we keep ourselves up to date with what is around us from new technologies and the likes, we keep records of previous wins and losses, and we learn from those. We try to hire top-notch people and we try to invest in our people as well. Recently, we have produced a chart that distributes each one's capabilities and importance in the organization; we intend to use this chart to improve on our people skills and capabilities. We monitor the market and we understand what is important, and we build our company CV accordingly.

We are known as a water infrastructure design consultant, so this is how we go by choosing our projects. We mainly look into governmental projects and/or developers and we plan ahead and work with them ahead of time to understand what they do and if there is any chance for us to embed ourselves early on prior to any project inception. We do not go for small things; we go for big projects or strategic projects that can add value to our name and brand.

We are specialized in wet infrastructure projects, so we do what we do, we cannot change what we do that easily, but in some cases we may join other consultants in bidding and in implementation for some of the projects in hand to bring in diversity to what we offer and to increase our pool of clients.

We follow money, we follow reputation, we follow size and we follow safety and the likes; for instance, in terms of safety we do not offer our services to clients who operate in problematic countries or areas, or areas with hazardous waste which no one can enter for instance. So all in all, we have a certain procedure and a formalized process by which we select projects with.

We have various challenges. For instance, scope creep – how to abide within the scope while the client keeps on changing it is one of our biggest challenges. Getting resources on time is another big challenge; lack of resources could be a problem as well. In fact this could be one of the other biggest challenges we face as an organization. We try to grow but we are limited with the resources that we have, and it is not always easy to get good-caliber, skilled and professional resources in a timely manner. We sometimes end up with the chicken and egg situation or the catch 20:20; which one do we bring in first? Resources or projects? Obviously you cannot get both simultaneously as something has to come before the other!

In order to resolve these issues: for scope creep, we try to work very closely with our clients and communicate at the onset of the project what we are doing and what we are not, of course this is not as easy as it seems, but consistently working towards this direction would eventually lead to success. As for resources, this is the usual problem that we have; we have to have a good HR system, and everyone should be interviewing all the time, building relationships and the likes. And during execution, we shall aim to build proper plans for resourcing. “Resource planning” is the famous sentence that we always hear in our organization.

Some of our team members are selective of the type of projects they want to work on. This creates a problem with our resource-planning initiatives. Sometimes we have to threaten our employees to carry out their duties in the best interests of the company, but that does not create harmony in dealership and we may end up with a non-cohesive team. The only solution in this case is mentoring, team building and so on. I would not promise or say this works all the time, hence I think the selection of those people for hire to start with is important so you would not end up with such situations in the future.

Firm	Firm 2	**Revenue**	USD $ 50 million
No of employees	1000 then shrunk	**Year est.**	~1960
Type of services	Engineering consultant		
Country of operation	Egypt, UAE, Qatar & KSA		
Informant/interviewee	General Manager		

We have been in operation for 50 or 60 years, we started as a small one-man-show design firm founded by professor AA and we were able to grow ourselves into a 1000 employee company at peaks. We shrunk back to a few hundreds and are now closing-out the business. We believe this is relevant to a glitch in the process of hand over between the father (the leader) and the son – i.e. the owners of the company.

We are an engineering consultant; we are specialized in providing environmental services, we diversified our environmental disciplines afterwards into providing wet utility services engineering and consultancy. After that we sensed the need for road infrastructure engineering in the KSA and that led us into expanding into the KSA in this discipline.

The market is booming and competitive, a lot of competition is on price. When we used to operate in Egypt alone, we were dominant; when others wanted to come in and penetrate the market of Egypt, they had to lower their prices quite significantly in order to win bids. We used to do the same when we wanted to penetrate markets of other countries in the region. Using this strategy we were able to expand into no less than 17 offices distributed in the Middle East. By doing so we were able to expand into places such as Dubai, Morocco, Ghana, South Africa, Libya, Saudi Arabia and the likes.

Our main strategy for market penetration as I said before was lowering our prices in order to compete; then controlling the cost afterwards. We had people who were specialized at controlling costs and who cared enough about the company and they dealt with the company assets as if they were their own, and the owner trusted them for that.

Also, the company was backed up by freelance professors offering their services without any extra overheads (this provided flexibility and competitiveness into our operation). For those professors, it was like a win-win situation. The owner had strong relationships built across the board in the education sector which led to receiving the services of the best professors in town. This has allowed our brand to shine. The owner was a powerful and a charismatic character and had the ability to build relationships with the powerful and influential people as well with the intellectuals; this was one of our main differentiators.

The relationships built between the owner, the company and the various authorities were one of our main differentiators as mentioned earlier. The owner used to be a part-time professor in one of the powerful and well-known universities in Egypt and he was promoted to the vice president of that university and he stayed in this position for some time. Most of the people who worked with

our clients have been either taught or mentored by him. This has led to building another type of a relationship which facilitated approval in the work place and enhanced trust between the authorities and our organization. We struggled in places such as Qatar due to the lack of these types of relationships.

The owner also used to build personal and very close relationships with all the employees; these relationships worked on enhancing the loyalty of the employees and increased their sense of security, and that has reduced employees' turnover quite significantly – in other words no one used to leave us unless there was an emergency that pushed them to do so.

Moreover, this charismatic leader of ours managed to build a loyal and a strong team amongst the company. The bond between this team and the leader was very strong. The bond between peers was not as strong and this may have led to the demise of the company later on.

The structure of our organization was centralized around the leader with only a few people, about five or six, who had a direct power of attorney from the owner.

We have a strategy for selecting projects; we started in a discipline, then sensed change in the market or the region and started diversifying in our offerings. We for example sensed and seized the opportunity of USAID-funded projects in Egypt - this was a big jump for us. These projects helped in boosting the company revenue.

We faced few issues in delivery since we had professors working as freelancers backed up with knowledge and strong relationships with clients. Our quality was high at all times and I can define our designs as flawless.

The delivery team was sort of distant from the leadership team. However, the leadership team tried to cascade down to the delivery team the trustworthy relationships and tried to get their loyalty with the least amount of costs.

Firm	Firm 3	**Revenue**	Unidentified
No of employees	Mostly subs	**Year est.**	2003
Type of services	Logistics – large projects		
Country of operation	Jordan		
Informant/interviewee	Treasury Manager		

We have been in operation since 2003. We have many offices in this region: Jordan is the financial services office, Kuwait is one of the sites, and the U.S. office is the relationship office. We have other sites and offices in other locations mostly in areas affected by war – hence our sites are located mostly in the Middle East. We experienced growth, we did shrink at times and we sustained our size at other times. Our contracts/projects are of five years' type of contracts/projects - once projects are done/completed we shrink, once we win another one we grow. We try to bid successfully but results are never certain so there is always a risk of losing bids and job security is always at stake. We have thousands of employees but those employees are contracted in accordance to a fixed type or a limited type of contracts and they work on the various sites which we have (this provides flexibility when shrinking and growing).

We are a logistics company; we work with the US government on funded projects, the scope of these projects are of delivery type, which means we deliver food, goods, motorcycles, you name it. Some of our known projects we deliver food to the American and the Iraqi troops camping in certain areas such as Kuwait. In delivering projects we follow the exact specifications provided in the initial bid which specifies how we deliver these types of goods or food. For instance, the specifications are quite particular for the American army compared to the Iraqi army. For instance, the Americans shall receive their food at a much higher quality compared to their Iraqi counterparts with much more variety as well. As an example, Iraqis are specified to receive the basic type of food such as rice and the likes, while Americans could receive a turkey at Christmas, (sincker bars!) and all types of normal food they get while in the States. My role in this is the treasury manager, so I am responsible for facilitating payments, banks' dealership and strategic relationships with main stakeholders, vendors and the likes.

The market is booming and very competitive, and lots of other similar companies compete with us. Compared to those other companies, we work in a niche type of service and we work with mostly a single client, which is the US government. We cannot operate in small project environments which provide low profitability.

In projects' implementation, we rely on our superiority in our delivery methodology, and we rely on our reliability in delivery and our competitiveness. Ion 2003 we started our first operation/project in 2003 and we lost lots of money during implementation, and we learned a lot from it; we learned things which we are currently implementing in new projects. What we learned were part of the reason behind our reliability and performance superiority today and this is why the U.S. government likes to work with us compared to other competitors.

We managed to build very good relationships across the board; we have a specially appointed relationship employee whose designation is a Pasha, and his job function is to facilitate things for us through his contacts and network.

Our differentiators are summarized with our technical superiority, knowledge of what needs to happen topped with our credibility and reliability in delivery. We implement everything in our contracts regardless of what happens. This has increased the US government's level of confidence in us. We sometimes used to receive impossible requirements in our contracts; these issues would be escalated by our site managers, brainstormed and resolved (at cost most of the time) and claimed later from the US government – so we never delay delivery or implementation of a resolution while waiting on a certain resolution of contractual issues between us and the U.S government. We also show our abilities to finance those projects and we depend on our bank facilities in doing so.

An example of the above: we have faced impossible contract requirements in one of the Muslim countries which is the delivery of pork (i.e. we could not deliver pork to a project or a site due to a country regulation); this issue was escalated to the management and brainstormed – as mentioned earlier and resolved and claimed later.

Another issue is vendors' monopolization of the market. In such cases we just have to obey and do what is needed at our own cost and own risk.

Competition is another challenge, which we try to overcome with our differentiators mentioned previously – i.e. reliability, technical and performance superiority, financial capability and the likes.

Firm	Firm 4	**Revenue**	USD $ 9.0 million
No of employees	From 15 to 40	**Year est.**	2005
Type of services	Management consultant		
Country of operation	UAE		
Informant/interviewee	Business Development Manager		

Our company was established in 2005; it started with 15 employees only, and in 2010 we managed to expand to 40 employees. We managed to do this with contracts/projects which we used to win with the government especially with the Ministry of the Interior (MOI). The MOI acquired part of our company with a share of 51% and this has led to our exponential growth. The reason they have acquired us is due to the type and size of contracts which we had with them, mostly the outsourcing type. MOI has an internal law which stipulates that if a company won contracts worth of more than 10 million AED (nearly USD $3.0 million) then the Ministry has either to establish their own office to replace this service or acquire 51% of the company shares to stay in control, and this is why the acquisition took place.

We are management consultants, we compete with the big 5 and with the likes of PWC and Accenture. We offer mystery shopper services, customer feedback and satisfaction surveys, and recently we started offering outsourcing services. Our outsourcing services have been supported by the Ministry and it provides the company with a constant stream of revenue and cash as well.

I am the business development director for the company. I used to be a programmer, then a project manager and finally got promoted to this position. The company notices talented people and they deal with them with care and grow their talents, which puts them into good positions at the end of the day.

The market is very competitive - there are lots of companies which offer their services with a cheap price. We are not sure of their quality though. The acquisition of MOI to 51% of our shares provided more reliability to our services and we managed to overcome those cheap consultants. The brand of the MOI and their strength provided comfort to our other clients and infused in them trust in regards to our services. The MOI used to market our services and sometime forces other governmental organizations to use us rather than use the services of others.

The owner of our company is very well connected and a relationship-oriented type of a person. He is a strong leader and a well-known character in the society. Moreover, he is an innovative person and encourages others to innovate and incentivizes them for doing so. Everyone liked the work environment, no one left/resigned – probably very few only, and everyone was loyal to the company.

When we have less work, the employees take it on themselves to brainstorm several ideas to put them to work. One of the ideas which succeeded was a bank mystery shopper; this was an idea

which was implemented across banks in the Middle East with the aim to decide the best bank based on our own matrix for customer satisfaction. We wanted to place ourselves as leaders in this field. We took the results of the mystery shopper and invited all involved bank CEOs to an event in Burj Al Arab in the UAE to disclose the results. This whole exercise cost us around 300 k AED (slightly less than USD $90 k) and we funded this ourselves and considered it as an investment in our brand. It worked out at the end and everyone attended the event and it was a success. I managed this event from A to Z.

We select the right people that fit into the culture of our organization. They all have to be friendly so we make sure that our clients are happy in dealing with them at all times. We try to retain our employees as much as we can with the way we deal with them and in the way that we grow and develop them.

We have three streams in our business offerings: outsourcing, mystery shoppers and customer satisfaction. We also implement internal projects of our own; we direct those projects towards marketing and investment in our branding and so on.

We have a strategy, we work mostly on governmental contracts, and now with the relationships we inherited post the MOI acquisition we have more authority and tendency to win more projects of the same type.

We have a system of portfolio management as well. We see this system as more for organizing, we don't see it as enhancing our performance.

We have two main challenges: payment – negative cash flow affects our investments, we cannot innovate and hence we need to find a solution for this issue. The other problem is scope creep initiated by our clients. In order to resolve the second problem we usually take the hit and allocate staff because we need to make sure that the client is happy. The first one was resolved via the inclusion of outsourcing services in the out-streaming of services.

Team members are loyal, they like working with the company. We won best employee awards before. Everyone stays and this is one of the secrets of success for our organization.

Firm	Firm 5	**Revenue**	Unidentified
No of employees	Unidentified	**Year est.**	2000
Type of services	Paint and Insulation Manufacturer		
Country of operation	UAE, Qatar & KSA		
Informant/interviewee	Managing Director		

We have been in operation for 17 years in the Middle East, but we are a German company and have been around since a long time. In terms of business and growth, we were not really doing well until we changed management and restructured in 2014; it was only after that when we started sensing some of the good changes.

We are paint and insulation manufacturers. Our business is divided mainly into two streams, we have the projects operation and we have the retail business, for now our focus is more on projects not the retail since the retail business requires lots of infrastructure and preparation and other types of marketing campaigns which we don't have at the moment. We wish we can be doing better in retail since it has better DSO and collection system compared to those of projects. For now we have our products distributed in a few shops and no whole shop accepts to take on our products exclusively due to weakness in our media coverage along with the infrastructure needed for that. This requires some time and work and investment from our side until we reach this point.

Management changed in 2014. Along with that we changed/replaced lots of people, we started hiring people who are passionate and like to work with our company and the product. We try as much as possible to select and hire the right people and the best of those, but it is not always easy. We started focusing more on sales, unlike before where our focus was mainly on interior decorations and showing off our paint capabilities inside of our offices only. We follow a transparent system of targets and sales, in that I mean that all salespeople can see what others have achieved as their target and then start competing with each other. We have installed an incentive system for sales people as well.

All the products which we produce are similar to those produced or manufactured by other competitors; we try to innovate and come up with new things though, as others do. So the only way that we can differentiate ourselves is through the service that we provide.

We have lots of focus on projects and less focus on retail. This is causing major cash flow issues for us since collection from projects tends to be problematic compared to retail.

We are affected by the external environment; we sometimes need to change the type of products to fit in the requirements of the UAE. We are a German company and we cannot use the products which we produce in Germany as they do not fit for use in this country.

We look around for opportunities through MEED and through B&C databases, we understand the developers and we select them, and we try to imbed ourselves early with the consultant of the job to get ourselves listed in the approved vendor's list. The only way we can do so is through building

good networks and relationships amongst consultants and keeping ourselves up to date in regards to changes in the market and the technology. By doing so, we try to create or find “door openers” to facilitate our work.

We face challenges in collections - payment terms are terrible, and sometimes it goes for more than 180 days even after we deliver the service or the product or the project. We started hiring debt collectors to collect all of our long dues from clients.

We have issues in regards to obtaining certifications and approvals from local authorities, we manufacture/produce products and these have to be approved by certain authorities prior to being put into use. We have a specialized team who looks into this matter.

We think that the solution, which is not implemented here but in other countries where I come from and works just fine, is establishing what is called an “industry organization”. These organizations, once established, can talk to authorities and help facilitate things for us.

Firm	Firm 6	**Revenue**	USD $ 600.0 million
No of employees	300	**Year est.**	2006
Type of services	Humanitarian projects		
Country of operation	Egypt, UAE & KSA		
Informant/interviewee	Local Manager		

We have been in operation since 2006 or so. We are a need-driven NGO and a nonprofit organization and we serve the community with the following five pillars: 1- food waste pillar, 2- feeding pillar, 3- developing pillar, 4- organizing charity, and 5- investments. We started as small as any other company, and we worked hard through the various regulations – to start with Egypt – until we have expanded into 22 other countries. We do not really have offices in all these countries - you can say that some of them carry agreements or work on certain arrangements - but nonetheless our work has made an effect which has reached out to many others.

We are a non-government and a not-for-profit organization, but we have revenues which reach USD $ 600 million. This revenue is needed in such a not-for-profit arrangement to support the various types of work we do along with projects and services and also to pay for employees' salaries. As a matter of fact, employees' salaries come directly from the board so as to allow us to select/hire the best of employees.

I will give you an example from the first pillar. We were the first in Egypt to identify the big wastage in food that was going out of hotels and big restaurants. We have initiated a project with the aim of collecting this wastage to distribute it to the needy and the poor. This was not an easy project and required lots of lobbying and the likes to get it to succeed. At the beginning of the project we thought it was successful but that was so until the media started attacking us for reasons relevant to dignity of the people who receive this waste as food for their families. We continued fighting, it was not easy, at the end of the day it worked out, and other countries started hearing about our work and wanted to adopt our model. We produced a model for the food waste and other models for the other pillars as well.

I am handling the office of Dubai and I am trying to work my way through negotiating partnerships with the various authorities, sponsorships and memberships. It is not as easy as you think, but the purpose that we carry and our credibility have opened many doors for us, and now we heard that Dubai Municipality has started their own pilot project mimicking our success after hearing about us.

The challenges we face are generated mainly from authorities and the media and the likes. Also legislations, laws and so on. Our only way through this is partnership with known names (like municipalities or certain governments) so we get better results and so. In Italy for example we worked very closely with the government and we managed to influence their legislating of a law that prevents food wastage.

Although you can find other organizations who provide similar services to us, we however pride ourselves on the unique models that we created which allow interlinking all those pillars. Those pillars for us now became interdependent and their results feed into the other pillars, which contributes to our KPIs. We have also built credibility. It is not easy to get donations if you are not a credible source, for example. We have also managed to add one more pillar to contribute to our revenues when cash is down. This pillar allows for investments to take place. Revenues and profits that come out of those investments contribute to the sustainability of the other pillars. For instance, we own farms which help generate revenues to help out our other pillars. We have built a factory which produces disposable plates to cut down on cost of purchasing from external vendors.

We have an innovative team; for instance, we innovate with new ideas and see what solutions follow through from those ideas. For instance we influenced the reduction of plate sizes in hotels by a few centimeters to produce a 30% reduction in food wastage. We have lots of similar ideas.

Our food waste model of which we were the pioneers to work on in Egypt received an excellence award in 2015, which of course goes towards supporting our credibility. After Egypt it looks like Saudi is going to be the next in place that may reap the fruits of success in implementation. In Dubai we have not yet found our way in through food wastage as culturally it is still considered as a matter of dignity.

We are a need-driven organization and we have pillars which define our (strategy) in selecting what type of work we do. We started with a few pillars and we ended up with whatever we have now. The investment pillar was added to secure the necessary funds for this organization.

Challenges are mainly those which arise from legislations of the country and media. The solution to those is lobbying, relationship building, and establishing partnerships. Other types of problems which we face as an organization is the process of selecting beneficiaries; these are long processes and it is not easy to get a credible source that tells you what to do and how to do it (e.g., a process that tells you who is really in need and what needs to be done to get them to safety).

Firm	Firm 7	**Revenue**	USD $ 650.0 million
No of employees	Grew to 1500	**Year est.**	1988
Type of services	Recycling and manufacturing (the trading part only)		
Country of operation	KSA		
Informant/interviewee	Operations Manager		

We have been in operation since 1988, started as a small scrap yard only and have now grown into a multi-billion Riyals organization which handles a big supply chain, manufacturing, shipping and trading. The trading business on its own generates more than 2.5-3.0 billion in revenue per year and grew to 1500 to 1600 employees recently. We have many functions/companies in our group and they are all interlinked somehow and they cover shipping, trading, manufacturing and the likes.

For instance we knew that aluminum is going to be the next new thing and that there will be a huge demand for aluminum, and as you know digging mines is not really feasible for us or for anybody, it is easier to get/collect scrap material and recycle it into new palettes. We did that and we have the biggest share in the market for selling palettes of aluminum. Now we export our products to many countries such as Qatar, China, US, Korea, etc.

For us, the market is defined by the big projects going on in the KSA. We collect the waste material from these projects and we recycle those. When big projects are no more, or the capital expenditure slows down in the country – which is a case that we are currently facing, we face a big issue in our operations and we have to act fast to find other locations or ways to collect waste. Our scrap collection business is divided into three main streams: (1) customer walk-ins with waste they need to get rid of, (2) service contracts where we work very closely and embed our people with big manufacturers such as the likes of Sabec for instance, and we collect waste as they go, and finally, (3) projects: these could be dismantling old projects which we do for a fee (not always profitable for us but we consider it as marketing and a door opener for other projects and opportunities), or we work with big contractors to collect their waste/scrap.

We need to always balance between those three streams and understand what is going on. Our work involves millions of Riyals and any single market misinterpretation or mistake could cost us losses which could account for as high as 20-30 million Riyals per mistake.

Another issue which we face is the volatility in the steel index in the exchange market – LMA – we buy and sell in accordance with this index, we may buy at a high rate but then are forced to sell at a much lower rate because we cannot keep material in our yards and we always need cash to run our operations, so we are forced to lose money in some cases just to prevent the operation from stopping or from reaching a halt situation due to lack of space.

Also sometimes, and due to the regulations in the country, we are forced to sell locally and not export certain products at lower rates.

As indicated previously, challenges come from our interpretation of the market and our reaction to it. We consider ourselves as a very flexible organization, our organizational structure can change instantly where, for example, I am running the operation today, tomorrow me and my colleagues may wear a business development hat and chase up service contracts because capital expenditure has reduced quite significantly in this country and we are unable to collect scrap from projects. Our machinery is worth no less than 600 million Riyals. We need to keep feeding these machines and we cannot be held at any point with a halt situation.

We are not a (structure) based organization, we are function-based and we wear different hats when and as needed. We also follow international known standards, the ISRI standards (Institute for Scrap Recycling Industry) to refine our processes and operations.

We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects. Out of all these connections we receive various types of information, all such information is filled/entered in our SAP system, and we have visibility for this system. We organize all such information, analyze it and determine the next best direction for our portfolio and operation. We take this analysis to the executive board meetings and we decide what the next step in business should be.

Challenges that we face arise mainly from balancing out the portfolio of projects and service contracts we have. Projects for us are just marketing and networking tools. Once we were awarded a project to dismantle a desalination plant; we did it at a loss, but we secured more contracts out of the network that we have generated out of this project.

Most of our employees are of the non-professional but skilled type with the exception of the board and operation. There is a big gap between me as operations manager and the next layer. This gap causes issues of hand-over sometimes.

Firm	Firm 8	**Revenue**	~ USD $ 100.0 million
No of employees	Grew to 56 + subs	**Year est.**	2000
Type of services	Specialized DBO contractors		
Country of operation	UAE, Libya and other parts of the region		
Informant/interviewee	Projects director		

We are a part of a larger company/group who carries out DBO contracts. We are specialized in building and operating hospitals and medical facilities. We talk to our clients about the benefits of using DBOs and sometimes PPPs which removes the headache of the client when dealing with various contractors. In the UAE we started in the early 2000s, we were in the range of 15-20 employees and used to work on one small project. We had issues in our operation, and all these issues I would assume were attributed to the personality of the previous manager. Once restructuring took place in 2006 we managed to grow our operation into 56 employees and we are currently running 4 large projects.

We are a design-build-operate DBO contractor specialized in building and operating hospitals. We have a large supply chain; for example we outsource the design, the civil construction and so and we overview the entire process. We take full liability for the work which we deliver since it is all ours. Upon hiring contractors or designers we ensure that they have the proper registration with authorities in the relevant country or Emirate that we intend to work in so that their work does not get hampered and they can process permits quickly. Sometimes we work using the same concept on PPPs or what we call DBOF, and F stands for financing. By that we engage with banks and what we call ECFs (External Credit Facilities).

When we work with clients, we sell them our model, we take from them the headache of dealing with many contractors and their subs, and we even take the operation part of the client (i.e. the operation of the facility once it is handed over) and commit to deliver the needed KPIs for them, and we share any losses in case of any deficiency in the promised KPIs. Due to our specialization in this field, we work on trust and word of mouth most of the time – project Alpha was awarded to us upon the good relations between our manager and the owner, for example, supported by our known reputation in the market and our credibility. Relationship is important of course as well as the network which we built and are building through our contracts, contacts, contractors and consultants.

I am the project director for one of the large projects in Abu Dhabi, it is a hospital owned by Alpha. We were awarded this project after the client faced issues in dealing with various contractors and the quality of construction was poor prior to our involvement. As a matter of fact this project was awarded to us upon our successful work on a similar project in Al Ain – i.e. word of mouth.

In my role as a project director I have several functions which report to me, such as PM engineering, site management, procurement, logistics, structured finance department, etc. Some of these functions could report to any other project as well since we operate as a matrix organization.

My project, similar to any other project, reports to the Project Supervisory Board PSB which constitutes of the CEO, CFO, CTO, head of procurement, head of finance, regional director and regional manager.

The market is very competitive. We did not gain easy entry at the beginning and we had to lower our prices. As a matter of fact we had to reassess our overhead structure and depart from using the overhead structure imposed on us by our headquarters HQ.

We had to invent and use local multipliers which enabled us to compete with the local market. We also have a big supply chain, so we can control all the procurement and direct it in our favor. We also sell our model which is cleverly designed to serve the purpose of what we build – it is the model which sells us. No other competitor can offer the same – others tried but failed, they even tried to poach people from us but failed to do so as well. In Jordan we could not succeed in securing any work due to low margins which we could not compete with, and the model was not so interesting to the Jordanians due to other preset agendas which we have no control of. Also, a differentiating element in our operation is that, we acquired, and we have acquired, many other companies which have similar nature to our business. This has led to our growth and contributed to our strength. Moreover, our people do not leave us, the company tries its best to retain them, they are fighters (the employees) and they are determined to win projects and deliver.

We are specialized; however we sometimes need to chase some other types of projects to keep the ball rolling. In that, we diversify in our own field and we sometimes work on turnkey projects where we supply medical packages. We also work and help third world countries to get loans and we build Master Plans where we identify critical locations for regional hospitals or medical centers and we engage ourselves with the clients to build them.

Our previous manager was not charismatic, he did not even have the right personality, and we lost a lot because of him. We did not have access to the simplest things, such as a list of competitors, or a network within competitors to use for simple market intelligence. I used to fight with him all the time. He had a provocative personality and that does not go so well with our clients in this region. The new manager now is more open, he has built many relationships everywhere and he can get access anywhere he wants. We had to restructure and by that we replaced all of our unproductive employees including this manager – and this is how I was introduced to this region. The new manager is easy going, has lots of relations, spends time and energy with clients. I don’t know how he gets this energy, but I guess this is one of the requirements needed to drive a successful organization behind you.

Firm	Firm 9	**Revenue**	USD $ 150.0 million
No of employees	400 shrunk to 200	**Year est.**	1981
Type of services	Contractor		
Country of operation	Jordan		
Informant/interviewee	Head of Projects Control		

We have been in operation for 26 years, at times we were growing, but now the market is so tough that it has forced us to shrink. We are specialized first class (class "A") civil contractors. Competition is high particularly coming through from lower-level contractors. Our specialized staff count reached up to 400 - now we shrunk into 200. Our labor count used to be in the range of 6,000 but has now dropped to 3,500 due to market shrinkage and high competition.

The market here is risky and sometimes we feel that the competition is not fair. In terms of risk, we don't feel that there is anything or any regulation that protects investors – like us. Laws and regulations are so strict, however, when a problem occurs, there is no clear regulation of how a problem or an issue shall be resolved. Many operations, known companies and the likes closed their operations or declared bankruptcy due to this issue. The dealership with the owner/client is not straightforward. Consultants on the job, although they want to help, have no hand or authority that they can exercise. Clients are everything and their requirements shall be fulfilled. It is sometimes that the client could benefit from the end product of the project which we deliver whilst we are not paid in full yet. We do not go to arbitration, although we can and we have the full right to, but we want to maintain a good relationship at the end of the day and a good name in the market to win new projects. We are also concerned that going to arbitration could affect our reputation and qualifications in the coming projects especially if it was coming through from the same client or even other clients.

In term of fairness, we feel that contractors' classification is not strictly followed up here; this leads to several other contractors being on the same bidding list where people like us who are classified as class "A" worked very hard to be on this list. We lose competitiveness like this. We are classified as a class "A" contractor and we have certain overhead structure which may not be the case for other lesser classified contractor organizations. Those contractors could be a one man show or the likes; we are not like this. This leads to the inflation of our prices in comparison to others and eventually leads us to lose on bids.

In terms of risk, we prepare a detailed risk assessment and risk evaluation, we understand what is risky and what is not, and we price it in the bid. This would increase our price though and decrease our competitiveness. In order to do this, we opt to be selective on the projects that we go after. When we go after highly specialized projects with certain qualifications and technical requirements, we bid high, but with carefulness; at least we guarantee that most of the competition will be reduced by technical disqualification, hence our chances of winning could be higher when compared to using the same procedure for normal projects.

We care about our reputation, our brand, and our technical delivery. We are a class "A" contractor and there are many things that we do and others cannot do; for example we were the pioneers in introducing BIM (Building Information Modelling) to the market in Jordan. None has done this before. There are many projects which we have recently delivered that we are proud of, such as the cement factory, the Qatranah project and Aquaba water. When we bid for those projects our technical marks were very high and in most of them we received full marks against our technical proposal, this led to better chances for us – and eventually winning the bid despite our price.

We try to locate/find projects with high qualifications and technical requirements. By doing this we can define/propose a higher price and rely on our technical superiority and secure a seat at the negotiation table. However, it has not been so easy recently. We look for these projects but with the market condition nowadays we are struggling, so we are forced sometimes to do things that we don't like or we don't see as fitting with our strategy or our brand and reputation, such as building finishes and so on.

In terms of projects' selection, we have a business development manager and a business development team. Their duty is to identify projects, explore the market and raise recommendations to the board. The board in their turn would take a decision on these things and they would select projects either based on their alignment with the strategy or based on other attributes.

Firm	Firm 10	**Revenue**	USD $ 0.5-1.0 million
No of employees	20 grew to 70	**Year est.**	2007
Type of services	Web developers		
Country of operation	Jordan, KSA, Qatar & UAE		
Informant/interviewee	Partner and the Business Development Manager		

We are an online marketing company; we also do web development, website integration, SEM (Search Engine Marketing), which mostly depends on what is called SEO (Search Engine Optimization). We also work in social media, we work with companies to carry out market campaigns for them on these various platforms. We have been in operation for 9 years. We started small in Dubai, we closed the operation in Dubai post the financial crisis, we moved the (kitchen) to Jordan and we serve countries like Kuwait, Qatar, the KSA – mainly the GCC. We have now a total of 60-70 staff distributed between those countries along with Jordan.

In addition to that, we have a certain model or a procedure that we work on and that enables us to operate. The online marketing business has some certain requirements in the market which we had to learn the hard way. We read books and we sat for exams in order to advance in whatever we are trying to do, and we have achieved to become partners in Google now, which is a very unique thing and very good for our name.

I have two roles in this organization. Apart from being a partner, I do business development management in those GCC countries and try to bring work; at the same time I am the Media Booking Coordinator. In that I maintain relationships and contacts with companies like Google, LinkedIn and the likes.

The market we are in is competitive; we have to be aware of the competition, their pricing, and their (cost per click) – as you know our cost is calculated per click which is known to be in this market as CPC (Cost Per Click). So we sell our services to clients and our cost is calculated by how much we can buy the click from companies like Google (along with our other internal costs), and we make profit with the difference between both – i.e. what we sell and what we spend. We were affected by the financial crisis of 2008/2009 - this led us to withdraw and move back to Jordan – sort of what we have called crisis management. The market in Jordan is very competitive and clients haggle a lot with us causing the devaluation of our services, hence we decided to move out but keep the kitchen in Jordan for cost efficiency and competitiveness.

We moved locations, we changed commercial model and we selected better countries to sell our services to, such as the GCC. Clients in the GCC are willing to pay the premium for our services; hence we locate those clients and work with them.

We have also added a new service model into our operation, which is franchising. We have agents in those GCC countries who are willing to do the sales for client; they take our name and they sell

our services and do the needed campaigns. In our turn, we provide them with back office support and training.

We have various types of clients; we deal with big names and known brands. Our work comes from three different streams: either through relationships or word of mouth, or through normal enquiries/bidding. We do not go after any client or project, we are selective, we study the client and we study the market, and we sometimes go back to the client and advise them on what needs to be done or a feasibility of something and what not. We work very closely with our clients; we are proud of that; we have account managers and coordinators embedded in all the organizations that we work for. Subsequently we add client names to our portfolio and that basically gives us more credibility for future sales.

One of the projects which we won with a company known as LG was in pure competition and through offering a low price to the client – a price that was lower than the competition. We were very competitive and the price and schedule were both tight. Once we succeeded in delivering the project our name was added to the vendors' list of that client and we started receiving more enquiries, basically because they liked us.

We have many challenges in delivery and in the market as well. We have to compete on "Key Words" and that affects the cost per click as discussed earlier. We try to resolve this issue by enhancing the customization of the web design to be more searchable and relevant. If we fail to do so we have to then depend on increasing our bidding on the cost per click and reduce our profitability and that would be the only solution to be successful and be awarded jobs. Cash flow is another problem that we have. Clients may not be willing to pay on time, and that causes an issue of cash availability. We try to overcome that by designing a good and a suitable payment schedule. Resources are very critical, they are very hard to find in our type of business, we have to look for talented and motivated people. These things that we sell are not taught in universities; we therefore opt to hire juniors and fresh grads and train them.

Fresh grads come and go, but we have a core team who would not leave us. We depend on this team; they have been with us forever and now they are all shareholders. Our relationship with them is of a friendly type and this is what allows us to perform.

Firm	Firm 11	**Revenue**	Unidentified
No of employees	600	**Year est.**	2014
Type of services	Project management consultant		
Country of operation	Qatar		
Informant/interviewee	Technical Manager		

We have been established for two years now as a governmental need organization started for the need to separate the project management department from AB organization – AB is a known governmental organization. We are now a project management consultant which offers its services to AB. I would say we have been growing ever since due to the projects and the backlog that we used to receive from AB which we separated from to start with. This helped in our growth along with the financial support which we used to receive from them as well. Also, certain country legislations were created to support our existence and dictated a certain share for us from the market.

We are a project management organization - we have one client only, which is AB, which we departed from. Recently we have been trying to diversify too many clients due to reduced funding and support from that one client of ours. We have added other functions into our organization, such as design, construction management and so on. We used to employ many sub-consultants, however, and recently, in order to enhance cost efficiency we decided to mutually and amicably terminate/end all their contracts and grow ourselves organically. I am one of the technical managers and I am responsible for a few of the project closeouts. In fact I used to work for one of the consultants whose contract was ended and I joined this firm shortly after that. I also used to be involved in bidding – which I would call the most demanding job in this company I have ever worked in due to the many requirements needed to be done for this type of work.

The market is tight; we started sensing that less and less work is coming from AB, so we had to act accordingly lest we shrink. We therefore started diversifying and we created the new services that we currently offer. We have also started diversifying our regional presence, and we have started bidding on a few other bids in Egypt and other countries.

There is too much politics inside this organization, there is much tension between employees; you are always faced with email fights and the likes, and this causes major issues in project delivery. Each one of us wants to protect his own career and they all do so by investing in internal relationships building. Although we work as a consultant, but yet we carry a governmental mentality in dealership amongst ourselves and we are a highly bureaucratic organization which leads to things moving slowly. Once funds were cut on us we started struggling, and if it is not up to the internal relationship I built with my bosses I think I may not have been still employed by this company.

Firm	Firm 12	**Revenue**	USD $ 12 million
No of employees	57 to 17 to 35	**Year est.**	1991
Type of services	Energy consultant		
Country of operation	UAE, Jordan & KSA		
Informant/interviewee	CEO		

I established the company in 1991 after I identified a gap in the market of energy savings and energy efficiency. I started the company in Jordan and now I have managed to expand it into several other countries. Now I have several branches and I run my operations out of Dubai. We started small, we boomed to about 57 employees, we shrunk back into 17 due to the financial crisis that hit us in 2009, but managed recently to grow back to 35. I have new ideas and high hopes and we shall be able to grow back even more than what we used to be before.

As I said, I identified a serious gap in energy efficiency in the market of Jordan in 1991, followed after that in the rest of the Middle East. I was the first to see it. I would call what I invented and invested in a Blue Ocean technology. What we do is we help users save energy, mainly on electricity now, by adding energy-efficient retrofits. I have founded this company and I am the CEO. I started out of a basement back in the day along with a friend of mine. We managed to sell our services to big names such as the Marriott which gave us credibility to start with. Prior to the Marriot it was really tough, and even tougher to penetrate the Marriot projects themselves since we never had any track record. We had to build the track record out of our own cost by working free of charge for a certain period of time. The idea behind this was creating what we have identified as “performance contracts”; in this we invest from our own resources and fix retrofits to clients’ assets to then collect our fees from the savings in those clients’ energy bill. We have many other services all related to energy and energy savings which I started identifying and adding to the list of our services.

When we started we were on our own; we were the first to have created such a concept. Now there are many others who do the same, so this leaves us with no option apart from working in an untraditional way to win contracts and sell our services. What I mean by untraditional is basically being innovative and being able to sense the future.

We faced many challenges mainly coming from the external environment; each challenge left us stronger than the one before. The latest of those was the financial crisis which hit us in 2009, but we came out of it stronger than ever.

When we started in 1991 we had no experience of how things needed to be run, and we were the first locals in Jordan to carry out such an innovative and new business idea. This was one of the first challenges. In order to resolve this challenge I started looking at similar companies outside of the Middle East to see how they go about running their operation. I used some of the contacts through the Canadian embassy and they then facilitated a site visit for me to more than 45 similar business sites in Canada. I then received a grant from the Canadian government paid to one of their

local consultants in exchange to transfer knowledge of such type of a business process and technology into my company. This happened in 1993 and the transfer was successful. This was not easy though; I had to meet lots of people and I had to allocate that consultant who I wanted to transfer the knowledge from and I had to convince all parties of this agreement and the grant.

Another challenge was funding. I wanted to sell more services, so I had to find and get partners into my business and they invested after I convinced them of my business ideas. After I brought more partners into my company I was then able to provide collaterals to banks and the likes to push my business forward. I also managed to get exclusive international partners to increase our reliability and credibility with our clients.

I started expanding into many other countries such as Egypt and Lebanon to find myself spreading out too thinly and I had to take a hit and close-out those offices in those countries where I expanded to. One of the issues I identified was unplanned expansion. The selection of the management was another mistake which I made; I did not select an old existing leadership team to run my business in Lebanon and Egypt. Those who I selected were not as loyal as my own team and hence there was no point to continue the investment.

I faced more issues in funding, so we had to sell shares to others and expand the pool of investors. Shares were bought and sold but I still handle the management. Some of the acquisitions of my company added a corporate touch and structure into our operation and that provided us the exposure and allowed us to expand even further.

The financial crisis which hit us in 2009 was one of the biggest challenges. Instead of reducing staff like others did, I gathered all my employees and requested them to contribute ideas to resolve the challenges generated by this crisis. My staff came up with brilliant ideas, such as part-time work and the likes. By them being so loyal to me and to the company and working out of their comfort zone we managed to survive. We lost some of them but that was not involuntary. Also, by the employees selecting to work on a reduced hours scale due to reduced amount of work, and them accepting lower salaries paid on fluctuating time bookings, everyone wore a salesman hat, and by that they were all determined to bring in more work so that they can increase their time booking and increase their pay. Really the employees carried the business, not even the investors cared about it. We also came up with other cost reduction ideas such as moving into a cheaper office space and so on.

In addition to the above, all my work was unique and I had an edge in doing everything; as I mentioned before, using untraditional ways and understanding market trends was key.

We are creative, we always create new ways, new processes, new frameworks and new services. All with using our core strength which is energy savings. We have created performance contracts where we collected our fees from clients' energy savings monitored through their monthly bills. We provide those clients with the needed investment to get retrofits installed into their assets and

facilities. This gave them more confidence in our business since they would not invest anything prior to seeing the system working. We then created what we called EVA - "Energy Value Analysis" - type of contracts where we interfere early in the design phase. Recently I am thinking of introducing a new strategy into my services structure. I am thinking of converting my company into a utility provider where I can save energy for entire communities and collect fees from those savings.

In addition to the points mentioned above, I noticed that when I was expanding in one direction I overlooked other directions or services and that was risky for me. For example when I started the EVA type of contracts, it was so good for short-term gains, but for that it seems that I overlooked the original idea I came up with which is the performance contracts – identified with its longer term gains. I had to go back to that and design something different to catch up.

Appendix C – Cross-case analysis

This section is to be read in conjunction with section 5.2.6.2 *Dimensions of ambidexterity* 5.2.6.3 *Mechanisms of ambidexterity*. This appendix consists of the following tables:

Table C 1. Tension within organizations and dimensions of ambidexterity
Table C 2. Mechanisms of ambidexterity

Table C 1. Tension within organizations and dimensions of ambidexterity

	Tension	
Proposed dimensions and levels	**Business/operating model**	**Challenges**
Knowledge	1. Offered services	1. Market competitiveness
Strategic level	Firm 11 *"We are now a project management consultant which offers its services to AB"*	Firm 11 *"The market is tight, we started sensing that less and less work is coming from AB, we had to act accordingly lest we shrink, we therefore started diversifying and we created the new services that we currently offer"*
Strategic level	Firm 3 *"We are a logistics company, we work with the US government on funded projects, the scope of these projects are of delivery type"*	Firm 3 "The market is booming and very competitive, lots of other similar companies compete with us. Compared to those other companies, we work in a niche type of service and we work with mostly a single client"
Projects and individual levels	2. Work with changing client requirements	2. The generation of scope creep with clients
	Firm 1 "We work with governments and developers and the likes and we produce designs for infrastructures needed for their projects"	Firm 1 "how to abide with the scope while the client keeps on changing is one of our biggest challenges"
Operations level	3. Work with changing market requirements	3. Failure to understand market requirements
	Firm 9 "Laws and regulations are so strict, however, when a problem occurs, there is no clear regulation of how a problem or an issue shall be resolved"	Firm 9 "The market here is risky and sometimes we feel that the competition is not fair"
Operations level	Firm 10 "…we sell our services to clients and our cost is calculated by how much we can buy the click from companies like Google"	Firm 10 "The market we are in is competitive, we have to be aware of the competition, their pricing, etc…"
Behaviour	4. Projects resourcing requirements	4. Find the right resources and staff with the right caliber and passion
Projects & strategic levels	Firm 1 "We are specialized in wet infrastructure works"	Firm 1 "Getting resources on time is another big challenge, lack of resources could be a problem as well"
Projects level	Firm 10 "These things that we sell are not taught in universities, we therefore opt to hire juniors and fresh grads and train them"	Firm 10 "Resources are very critical, they are very hard to find in our type of business, we have to look for talented and motivated people"
Individual level	5. Work on common goals	5. Team collaboration/harmony
	Firm 1 "That does not create harmony in dealership and we may end up with a non-cohesive team"	Firm 1 "Some of our team members are selective of the type of projects they want to work on"
Individual level	Firm 12 "My staff came up with brilliant ideas, such as part time work and the likes. By them being so loyal to me and to the company and working out of their comfort zone we managed to survive"	Firm 11 "There is too much of politics inside this organization, there is much of tension between employees"

Technology	6. Identify gaps in knowledge/market	6. Implementability of projects
Strategic level	Firm 12 "I identified a serious gap in energy efficiency in the market of Jordan in 1991, followed after that in the rest of the Middle East. I was the first to see it. I would call what I invented and invested in a Blue Ocean technology"	Firm 12 "We had no experience of how things needed to be run, we were the first locals in Jordan to carry out such an innovative and new business idea"
Operations level	Firm 5 "We are affected by the external environment, we sometimes need to change the type of products to fit in the requirements of the UAE. We are a German company and we cannot use the products which we produce in Germany as they do not fit for use in this country"	Firm 5 "All the products which we produce are similar to those produced or manufactured by other competitors, we try to innovate and come up with new things though, as well as others do. So the only way that we can differentiate ourselves is through the service that we provide"
Strategic level	Firm 7 "We knew that aluminum is going to be the next new thing and that there will be a huge demand for aluminum"	Firm 7 "Digging mines is not really feasible for us or for anybody, it is easier to get/collect scrap material and recycle it into new palettes"
	7. Internal capabilities	7. External technology and outsourcing
Operations level	Firm 8 "We talk to our clients about the benefits of using DBOs and sometimes PPPs which removes the headache of the client when dealing with various contractors"	Firm 8 "We have a large supply chain, for example we outsource the design, the civil construction and so and we overview the entire process"
Projects and individual levels	Firm 3 "Our contracts/projects are of five years' type of contracts/projects, once projects are done/completed we shrink, once we win another one we grow"	Firm 3 "We have thousands of employees but those employees are contracted in accordance to a fixed type or a limited type of contracts and they work on the various sites which we have - this provides flexibility when shrinking and growing"
Process	8. The tendency to expand and spread all over	8. Perform simultaneous strategic processes
Strategic level	Firm 12 "I started expanding into many other countries such as Egypt and Lebanon to find myself spreading out too thinly and I had to take a hit"	Firm 12 "I was expanding in a direction I overlooked other directions or services and that was risky to me"
Strategic and operations levels	Firm 10 "We started small in Dubai, we closed the operation in Dubai post the financial crisis, we moved the (kitchen) to Jordan and we serve countries like Kuwait, Qatar, the KSA – mainly the GCC"	Firm 10 "The market in Jordan is very competitive and clients haggle a lot with us causing the devaluation of our services; hence we decided to move out but keep the kitchen in Jordan for cost efficiency and competitiveness"
	9. Keep the ball on rolling	9. Market exploration – contacts & clients
Operations level	Firm 7 "Our machinery is worth no less than 600 million Riyals. We need to keep feeding these machines and we cannot be held at any point with a halt situation"	Firm 7 "We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects. Out of all these connections we receive various types of information"
Operations level	Ditto above	Firm 7 "Projects for us are just marketing and networking tools"
	10. Keep the ball on rolling in the right direction	10. Market exploration – balance the portfolio
Strategic level	Firm 7 "We take this analysis to the executive board meetings and we decide what the next step in business should be"	Firm 7 "Challenges that we face arise mainly from balancing out the portfolio of projects and service contracts we have"

Strategic and operations levels	Firm 5 "We wish we can be doing better in retail since it has better DSO and collection system compared to those of projects"	Firm 5 "We have lots of focus on projects and less focus on retail, this is causing major cash flow issues"
Individual level	11. Make sure that staff are busy on projects Firm 4 "negative cash flow affects our investments, we cannot innovate and hence we need to find a solution for this issue"	11. Ability to invest in innovating new ideas during free time Firm 3 "When we have less work, the employees take it on themselves to brainstorm several ideas to put them into work"
Projects level	12. Project delivery Many examples and references can be found distributed across most of the case-study firms for number (12), in particular check firms 3,5,6 and 7	12. Approvals and regulations requirements

Table C 2. Mechanisms of ambidexterity

Proposed mechanisms of ambidexterity	***First-order concepts /References***
Structural	1. Flexibility
Operations level	Firm 10 "I have two roles in this organization, apart from being a partner, I do business development management"
Operations level	Firm 12 "…everyone wore a salesman hat, and by that they were all determined to bring in more work so that they can increase their time booking and increase their pay"
Projects level	Firm 2 "The company was backed up by freelance professors offering their services without the extra overhead structure needed as if they were employees of the company"
Projects level	Firm 3 "We have thousands of employees but those employees are contracted in accordance to a fixed type or a limited type of contracts and they work on the various sites which we have - this provides flexibility when shrinking and growing"
Operations level	Firm 7 "We consider ourselves as a very flexible organization, our organizational structure can change instantly were for example I am running the operation today, tomorrow me and my colleagues may wear a business development hat and chase up service contracts"
	2. Complementary alliances
Strategic level	Firm 12 "Another challenge was funding, I wanted to sell more services, so I had to find and get partners into my business and they invested after I convinced them of my business ideas"
Strategic level	Firm 12 "Some of the acquisitions of my company added a corporate touch and structure to our operation and that provided us the exposure and allowed us to expand even further"
	3. Roles and responsibility
Operations levels	Firm 5 "We were not really doing well until we changed management and restructured"
Strategic and operations levels	Firm 8 "Once restructuring took place in 2006 we managed to grow our operation into 56 employees and we are currently running 4 large projects"
Individual level	Firm 8 "We replaced all of our unproductive employees"
Learning	*4. Learn about future directions*
Strategic level	Firm 1 "We keep ourselves up to date with what is around us from new technologies and the likes"
Operations level	Firm 10 "The online marketing business has some certain requirements in the market which we had to learn the hard way"
Operations and projects levels	Firm 12 "…working in an untraditional way to win contracts and sell our services - what I mean by untraditional is basically being innovative and being able to sense the future"
Operations level	Firm 7 "Another issue which we face is the steel index in the exchange market – LMA – we buy and sell in accordance to this index, we may buy at a high rate but then are forced to sell at a low rate"
	5. Understand what others do
Strategic and operations levels	Firm 10 "The market we are in is competitive; we have to be aware of the competition, their pricing…"
Strategic level	Firm 8 "… we have acquired many other companies which have similar nature to our business"
	6. Understand/harness own capabilities

Operations level	Firm 10 "We decided to move out but keep the kitchen in Jordan for cost efficiency and competitiveness"
Projects level	Firm 3 "We lost lots of money, and we learned a lot from it, we learned things which we are currently implementing in new projects"
Strategic and operations levels	Firm 12 "We are creative, we always create new ways, new processes, new frameworks and new services"
Strategic level	Firm 9 "We were the pioneers in introducing BIM (Building Information Modelling) to the market"
Operations level	Firm 6 "We produced a model for the food waste and other models for the other pillars as well"
	7. Learn about own projects
Projects level	Firm 1 "We need to understand the real drivers from the clients behind issuing those RfPs, work with them hand in hand so they favor us in case our price was not right"
Projects level	Firm 10 "We sometimes go back to the client and advise them on what needs to be done or a feasibility of something"
Selection	*8. Clients' selection*
Strategic level	Firm 1 "We do not offer our services to clients who operate in problematic countries or areas"
Strategic level	Firm 10 "We selected better countries to sell our services to such as the GCC … clients in the GCC are willing to pay the premium for our services, hence we locate those clients and work with them … We do not go after any client or project, we are selective"
Strategic level	Firm 11 "Recently we have been trying to diversify to many clients due to reduced funding and support from that one client of ours"
Operations level	Firm 5 "We understand the developers and we select them, and we try to embed ourselves early with the consultant of the job to get ourselves listed in the approved vendors' list"
Operations level	Firm 7 "We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects. Out of all these connections we receive various types of information"
	9. Resources' selection
Projects and individual levels	Firm 1 "We try to hire top notch people and we try to invest in our people as well"
Projects and individual levels	Firm 10 (development) "Resources are very critical, they are very hard to find in our type of business, we have to look for talented and motivated people, these things that we sell are not taught in universities; we therefore opt to hire juniors and fresh grads and train them"
Individual level	Firm 4 (development) "I am the business development director for the company. I used to be a programmer, then a project manager and finally got promoted to this position. The company notices talented people and they deal with them with care and grow their talents, which puts them into good positions at the end of the day"
Operations level	Firm 12 (leadership selection) "The selection of the management was another mistake which I made, I did not select an old existing leadership team to run my business"
Individual level	Firm 5 "We started hiring people who are passionate and like to work with our company and the product"
	Firm 5 (incentivize) "We follow a transparent system of targets and sales, in that I mean that all salespeople can see what others have achieved as their target and then start competing with each other"
Operations level	Firm 6

	"Employees' salaries come directly from the board so as to allow us to select/hire the best of employees"
Operations level	Firm 4 (retention) "Everyone liked the work environment, no one left/resigned – probably very few only, and everyone was loyal to the company"
	10. Projects' selection
Project level	Firm 9 "In order to do this, we opt to be selective on the projects that we go after"
Projects and operations levels	Firm 1 "We are known as a water infrastructure design consultant, so this is how we go by choosing our projects. We mainly look into governmental projects and/or developers and we plan ahead and work with them ahead of time"
Projects and operations levels	Firm 8 "We sometimes need to chase some other types of projects to keep the ball rolling"
Strategic level	Firm 2 "We are specialized in providing environmental services, we diversified our environmental disciplines afterwards into providing wet utility services engineering and consultancy. After that we sensed the need of road infrastructure engineering in KSA and that led us into expanding into the KSA in this discipline"
Projects and operations levels	Firm 7 "For us the market is defined by the big projects going on in the KSA. We collect the waste material from these projects and we recycle those"
Strategic and operations levels	Firm 5 "Our business is divided mainly into two streams, we have the projects operation and we have the retail business, for now our focus is more on projects not the retail since the retail business requires lots of infrastructure and preparation and other types of marketing campaigns which we don't have at the moment. We wish we can be doing better in retail since it has better DSO and collection system compared to those of projects"
Communication	*11. Bond between the leader and the team*
Operations level	Firm 12 "Instead of reducing staff like others did, I gathered all my employees and requested them to contribute ideas to resolve the challenges generated by this crisis"
Individual level	Firm 2 "The bond between this team and the leader was very strong. The bond between peers was not as strong and this may have led to the demise of the company later on"
Individual level	Firm 4 "He is an innovative person and encourages others to innovate and incentivizes them for doing so"
	12. Internal communications
Operations and projects levels	Firm 4 "When we have less work, the employees takes it on themselves to brainstorm several ideas to put them to work"
	13. External communications
Operations level	Firm 12 "I had to meet lots of people and I had to allocate that consultant who I wanted to transfer the knowledge from"
Individual and operations levels	Firm 2 "The owner had strong relationships built across the board in the education sector"
Operations and projects levels	Firm 2 "This has led to building another type of a relationship which facilitated approval in the work place and enhanced trust between the authorities and our organization"
	14. External relationships and networks
Individual and operations levels	Firm 4 "The owner of our company is very well connected and a relationship-oriented type of a person. He is a strong leader and a well-known character in the society"
Operations level	Firm 5

	"The only way we can do so is through building good networks and relationships amongst consultants and keeping ourselves up to date in regards to changes in the market and the technology"
Operations level	Firm 6 "Challenges are mainly those which arise from legislations of the country and media. The solution to those is lobbying, relationship building, and establishing partnerships"
Operations and individual levels	Firm 8 "We work on trust and word of mouth most of the time – project Alpha was awarded to us upon the good relation between our manager and the owner for example supported by our known reputation in the market and our credibility. Relationship is important of course as well as the network which we built and are building through our contracts, contacts, contractors and consultants"
Operations level	Firm 7 "We have operations that run in more than 30 locations or so; each of these operations has its own networks, connections and projects"

Appendix D – Quantitative study constructs

Quantitative study constructs

Business success (Meskendahl 2010; Petro & Gardiner 2015)

1. How do you evaluate the success of your organization/entity compared to your competitors regarding the overall business success?
2. How do you evaluate the success of your organization/entity compared to your competitors regarding the market share?
3. How do you evaluate the success of your organization/entity compared to your competitors regarding the revenue growth?
4. How do you evaluate the success of your organization/entity compared to your competitors regarding the profitability?

Average project's success (Jonas et al. 2012; Petro & Gardiner 2015)

1. On average our projects achieve a high schedule adherence
2. On average our projects achieve a high budget adherence
3. On average our projects achieve a high quality adherence
4. On average our projects are completed with a high degree of customer satisfaction

Future Preparedness (Meskendahl 2010; Petro & Gardiner 2015)

1. We sufficiently develop new technologies and/or competencies in our projects
2. With our projects we are a step ahead of our competition with new products, technologies or services
3. The projects enable us to shape the future of our industry

Strategic Fit (Jonas et al. 2012; Petro & Gardiner 2015)

1. The project portfolio is consistently aligned with the future of the company
2. The corporate strategy is being implemented ideally through our project portfolio
3. Resource allocation to projects reflects our strategic objectives

Project Portfolio Balance (Jonas et al. 2012; Petro & Gardiner 2015)

1. There is a good balance in our project portfolio between new and old areas of application
2. There is a good balance in our project portfolio between new and existing technologies
3. There is a good balance in our project portfolio of project risks
4. There is a good balance in our project portfolio of projects in different implementation phases (early/late phases)
5. There is a good balance in our project portfolio to generate a constant cash-flow

Exploration (Agostini et al. 2016; Lubatkin et al. 2006)
Your organization is a one that:

1. Looks for novel technological ideas by thinking outside the box
2. Bases its success on its ability to explore new technologies
3. Creates products or services that are innovative to the firm
4. Looks for creative ways to satisfy its customers' needs
5. Aggressively ventures into new market segments
6. Actively targets new customer groups

Exploitation (Agostini et al. 2016; Lubatkin et al. 2006)
Your organization is one that:

1. Commits to improve quality
2. Commits to lower cost
3. Continuously improves the reliability of its products and services
4. Increases the levels of automation in its operations
5. Constantly surveys existing customers' satisfaction
6. Fine-tunes what it offers to keep its current customers satisfied

Use of Synergies/Collaboration between Business Units (Jonas et al. 2012)

1. We are able to leverage synergies between projects in our portfolio
2. We consistently make use of technical synergies (e.g., shared usage of modules, platforms, technologies, etc.) between our projects
3. We consistently make use of market synergies (e.g., shared distribution channels, infrastructure, etc.) between our projects

Appendix E – Quantitative study questionnaire

Organizational ambidexterity: performance, growth and sustainability

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This questionnaire gives you the opportunity to express your views on a wide range of issues related to the organizational performance. There is no right or wrong answer.

This survey involves filling in an online survey that will take approximately 5-7 minutes. Your responses will be confidential and we do not collect identifying information such as your name, email address or IP address.

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1. **Age group:**

□ Below 30 □ 31-40 □ 41-50 □ 51-60 □ Above 60

2. **Gender**

□ Male □ female

3. **How many employees does your local operation currently have?**

□ Below 20 □ 20-75 □ 75-150 □ 155-300 □ Above 300

4. **What is your level in your organization?**

□ Entry level □ Mid-level □ Senior level □ top management

5. **Which industry does your organization operate in?**

□ Engineering □ Banking □ Construction □ Insurance
□ Pharmaceutical □ Manufacturing □ Management consulting □ Consultant
□ Finance □ Others, please specify: _____

6. **How do you evaluate the success of your organization/entity compared to your competitors regarding the overall business success?**

□ Very low □ Low □ Medium/unsure □ Moderately high □ Very high

7. **How do you evaluate the success of your organization/entity compared to your competitors regarding the market share?**

□ Very low □ Low □ Medium/unsure □ Moderately high □ Very high

8. **How do you evaluate the success of your organization/entity compared to your competitors regarding the revenue growth?**

□ Very low □ Low □ Medium/unsure □ Moderately high □ Very high

9. **How do you evaluate the success of your organization/entity compared to your competitors regarding the profitability?**

□ Very low □ Low □ Medium/unsure □ Moderately high □ Very high

10. Please answer on the following questions:

	Strongly Disagree	**Disagree**	**Neutral/ Unsure**	**Agree**	**Strongly Agree**
On average our projects achieve a high schedule adherence					
On average our projects achieve a high budget adherence					
On average our projects achieve a high quality adherence					
On average our projects are completed with a high degree of customer satisfaction					
We sufficiently develop new technologies and/or competencies in our projects					
With our projects we are a step ahead of our competition with new products, technologies or services					
The projects enable us to shape the future of our industry					
The project portfolio is consistently aligned with the future of the company					
The corporate strategy is being implemented ideally through our project portfolio					
Resource allocation to projects reflects our strategic objectives					
There is a good balance in our project portfolio between new and old areas of application					
There is a good balance in our project portfolio between new and existing technologies					
There is a good balance in our project portfolio of project risks					
There is a good balance in our project portfolio of projects in different implementation phases (early/late phases)					
There is a good balance in our project portfolio to generate a constant cash-flow					

11. Your organization is a one that:

	Very low	**Low**	**Medium / unsure**	**Mod. high**	**Very high**
Looks for novel technological ideas by thinking outside the box					
Bases its success on its ability to explore new technologies					
Creates products or services that are innovative to the firm					
Looks for creative ways to satisfy its customers' needs					
Aggressively ventures into new market segments					
Actively targets new customer groups					
Commits to improve quality					
Commits to lower cost					
Continuously improves the reliability of its products and services					
Increases the levels of automation in its operations					
Constantly surveys existing customers' satisfaction					
Fine-tunes what it offers to keep its current customers satisfied					

Some more questions on synergies and collaboration between projects:

12. We are able to leverage synergies between projects in our portfolio

□ Strongly disagree □ Disagree □ Neutral/unsure □ Agree □ Strongly Agree

13. We consistently make use of technical synergies (e.g., shared usage of modules, platforms, technologies, etc.) between our projects

□ Strongly disagree □ Disagree □ Neutral/unsure □ Agree □ Strongly Agree

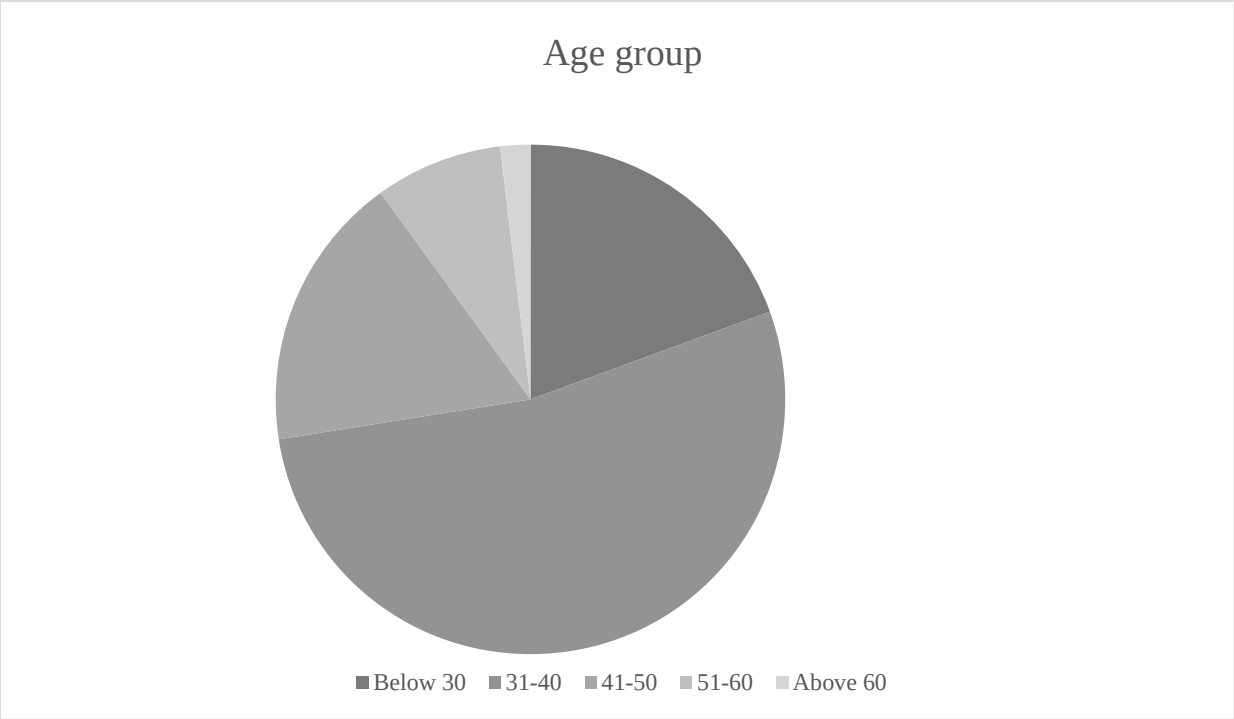
14. We consistently make use of market synergies (e.g., shared distribution channels, infrastructure, etc.) between our projects

□ Strongly disagree □ Disagree □ Neutral/unsure □ Agree □ Strongly Agree

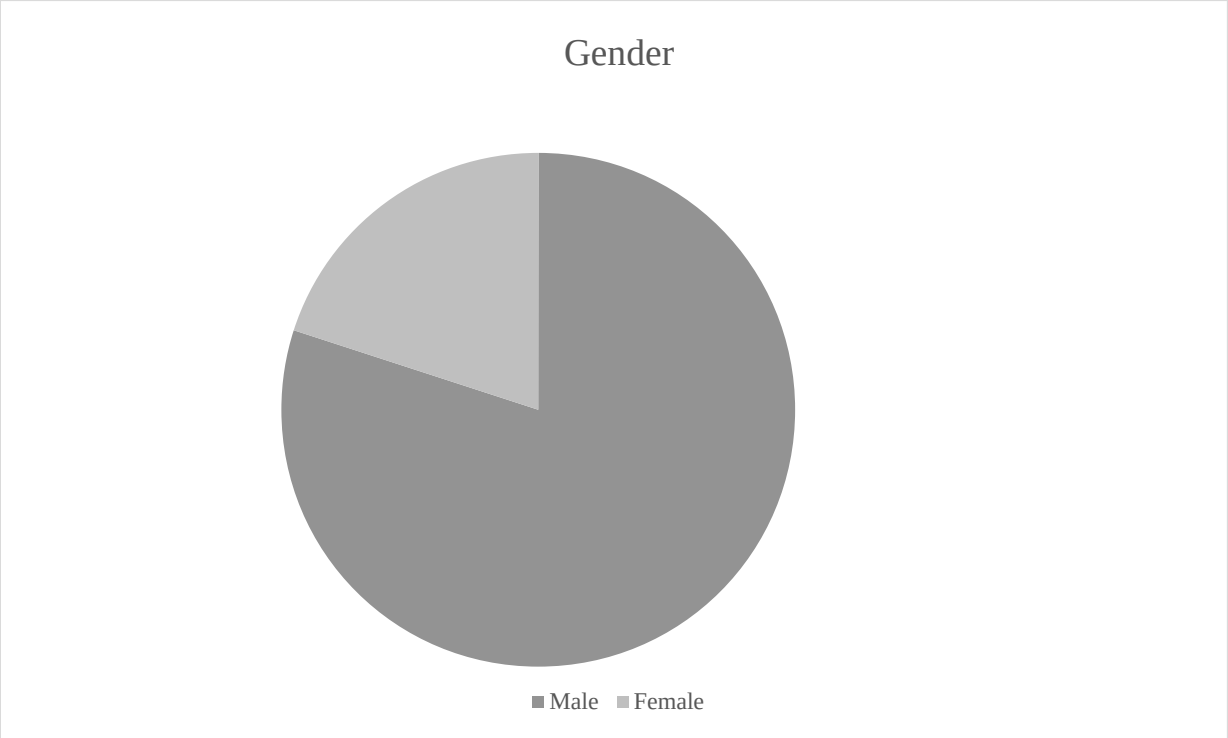
Appendix F – Descriptive analysis

Descriptive analysis, demonstration and diagrams for all the data

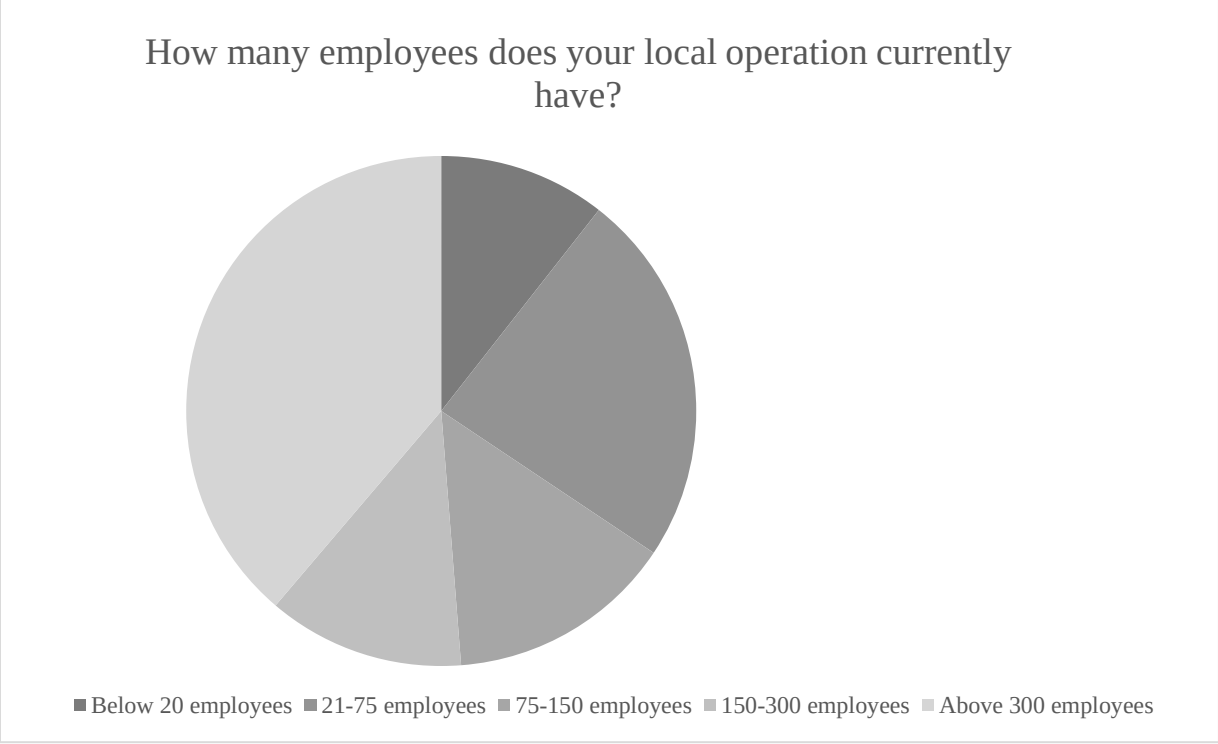
Question 1: Age group		
Answer Options	**Response Percent**	**Response Count**
Below 30	Below 30	19.4%
31-40	31-40	53.1%
41-50	41-50	17.5%
51-60	51-60	8.1%
Above 60	Above 60	1.9%
	answered question	**160**
	skipped question	**0**



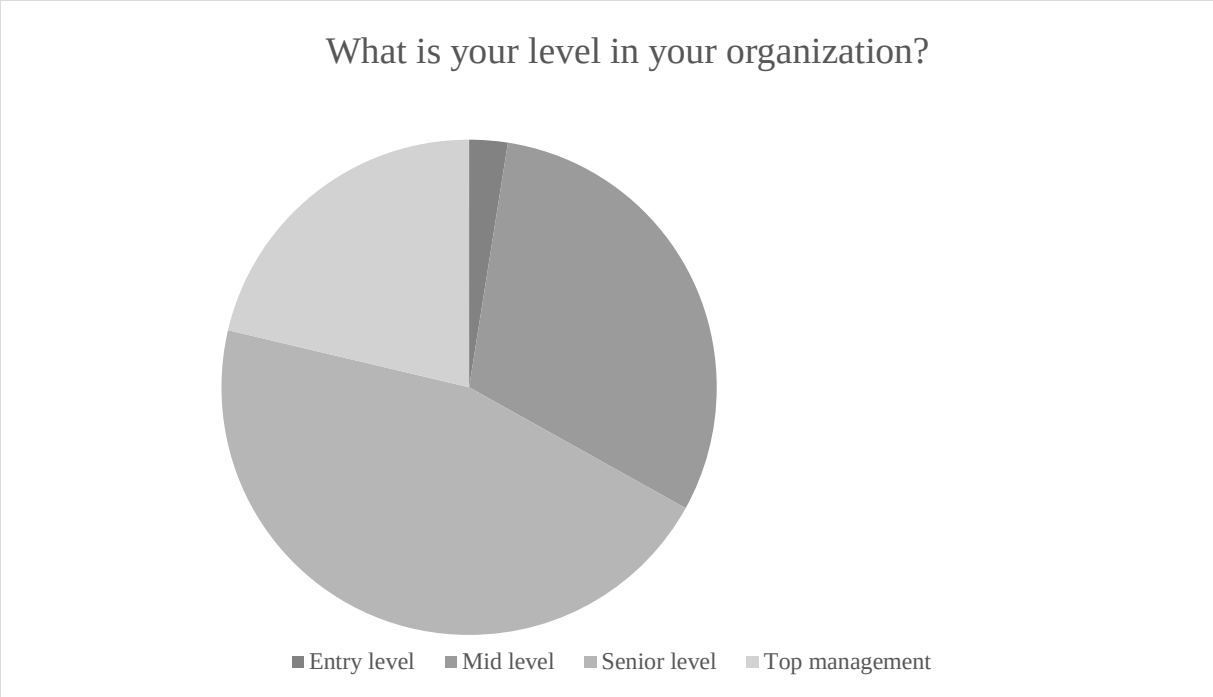
Question 2: Gender		
Answer Options	**Response Percent**	**Response Count**
Male	80.0%	128
Female	20.0%	32
answered question		**160**
skipped question		**0**



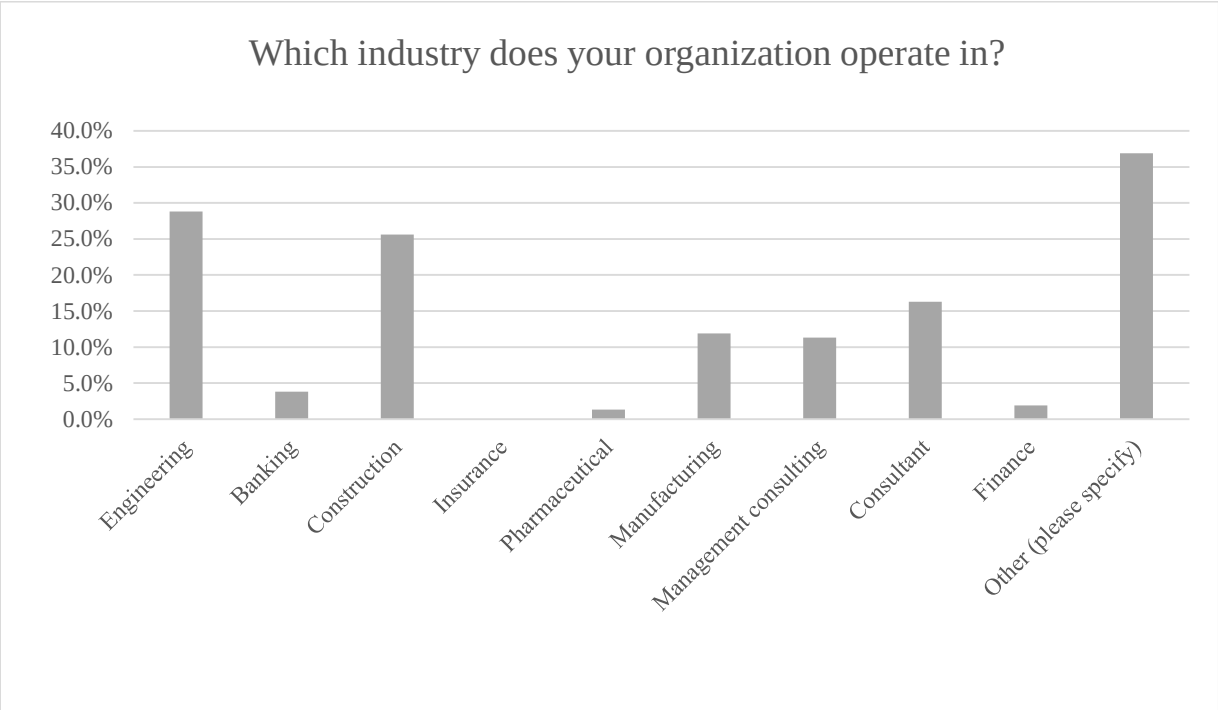
Question 3: How many employees does your local operation currently have?		
Answer Options	**Response Percent**	**Response Count**
Below 20 employees	10.6%	17
20-75 employees	23.8%	38
75-150 employees	14.4%	23
150-300 employees	12.5%	20
Above 300 employees	38.8%	62
	answered question	**160**
	skipped question	**0**



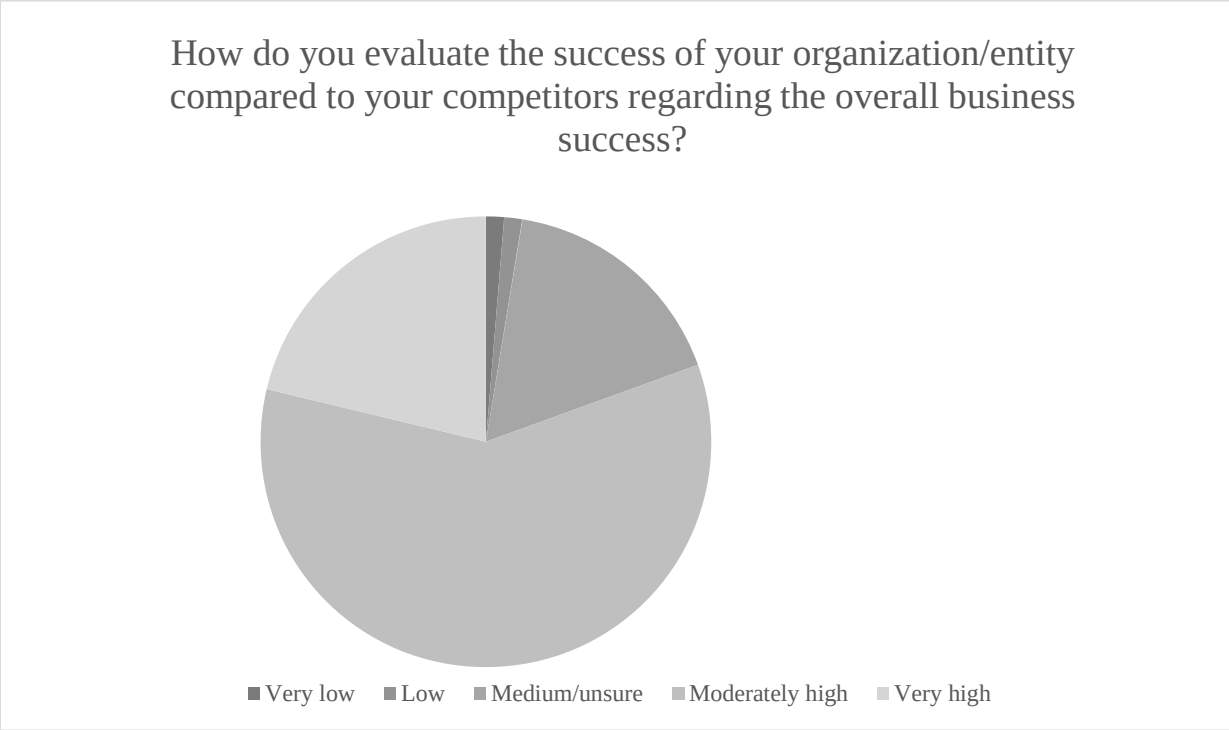
Question 4: What is your level in your organization?		
Answer Options	**Response Percent**	**Response Count**
Entry level	2.5%	4
Mid level	30.6%	49
Senior level	45.6%	73
Top management	21.3%	34
	answered question	**160**
	skipped question	**0**



Question 5: Which industry does your organization operate in?		
Answer Options	**Response Percent**	**Response Count**
Engineering	28.8%	46
Banking	3.8%	6
Construction	25.6%	41
Insurance	0.0%	0
Pharmaceutical	1.3%	2
Manufacturing	11.9%	19
Management consulting	11.3%	18
Consultant	16.3%	26
Finance	1.9%	3
Others	36.9%	59
	answered question	**160**
	skipped question	**0**



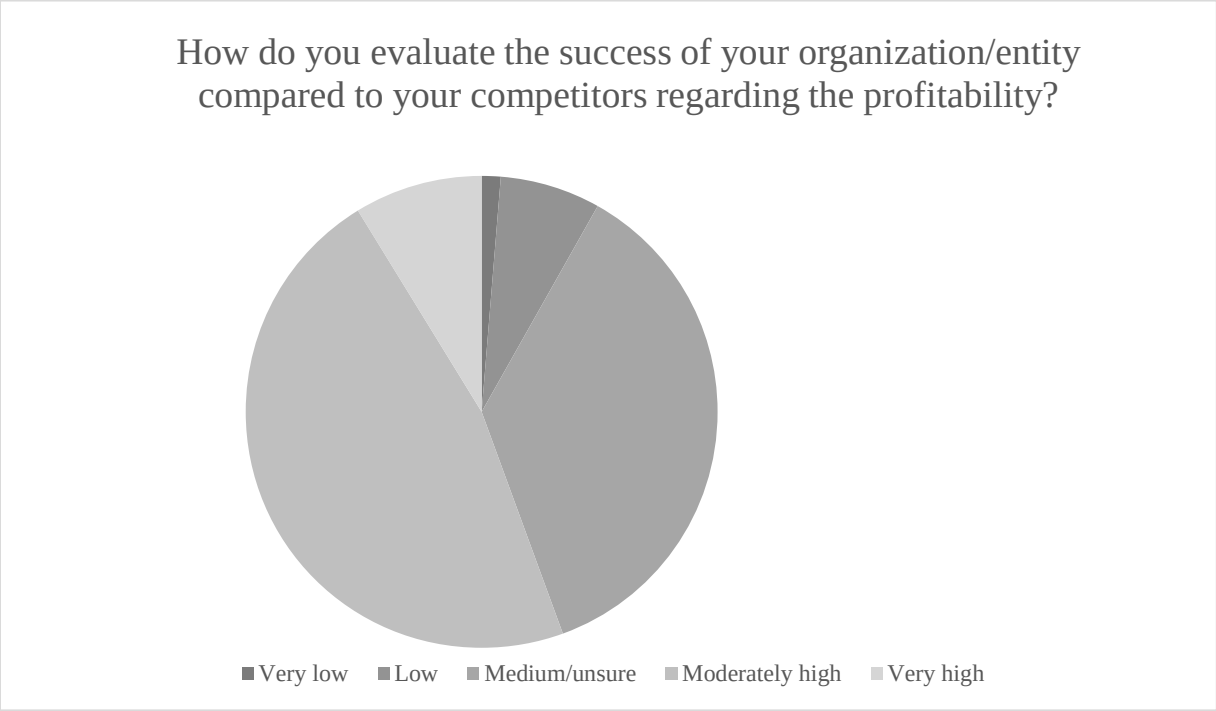
Question 6: How do you evaluate the success of your organization/entity compared to your competitors regarding the overall business success?		
Answer Options	**Response Percent**	**Response Count**
Very low	1.3%	2
Low	1.3%	2
Medium/unsure	16.9%	27
Moderately high	59.4%	95
Very high	21.3%	34
	answered question	**160**
	skipped question	**0**



Question 7: How do you evaluate the success of your organization/entity compared to your competitors regarding the market share?		
Answer Options	**Response Percent**	**Response Count**
Very low	1.3%	2
Low	9.4%	15
Medium/unsure	30.6%	49
Moderately high	39.4%	63
Very high	19.4%	31
	answered question	**160**
	skipped question	**0**

Question 8: How do you evaluate the success of your organization/entity compared to your competitors regarding the revenue growth?		
Answer Options	**Response Percent**	**Response Count**
Very low	0.6%	1
Low	6.3%	10
Medium/unsure	33.3%	53
Moderately high	47.8%	76
Very high	11.9%	19
	answered question	**159**
	skipped question	**1**

Question 9: How do you evaluate the success of your organization/entity compared to your competitors regarding the profitability?		
Answer Options	**Response Percent**	**Response Count**
Very low	1.3%	2
Low	6.9%	11
Medium/unsure	36.3%	58
Moderately high	46.9%	75
Very high	8.8%	14
	answered question	**160**
	skipped question	**0**



Question 10a: How do you rate the following on your organization's project management?							
Answer Options	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Rating Average**	**Count**
On average our projects achieve a high schedule adherence:	3	13	44	81	19	3.63	160
On average our projects achieve a high budget adherence:	1	16	42	83	18	3.63	160
On average our projects achieve a high quality adherence:	0	6	30	92	31	3.93	159
On average our projects are completed with a high degree of customer satisfaction:	0	2	39	74	45	4.01	160
						answered question	**160**
						skipped question	**0**

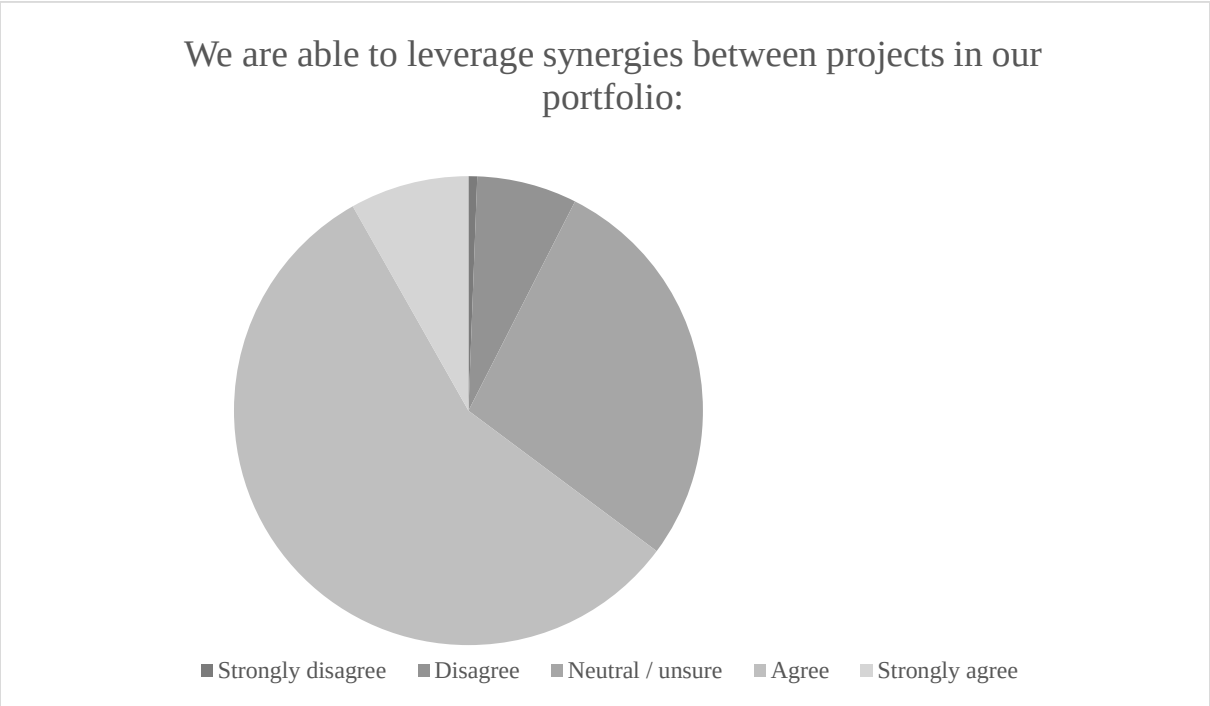
Question 10b: How do you rate the following on your organization's future preparedness?							
Answer Options	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Rating Average**	**Count**
We sufficiently develop new technologies and/or competencies in our projects:	2	11	37	84	25	3.75	159
With our projects we are a step ahead of our competition with new products, technologies or services:	6	12	49	65	28	3.61	160
The projects enable us to shape the future of our industry:	3	17	31	83	26	3.70	160
						answered question	**160**
						skipped question	**0**

Question 10c: How do you rate the following on the strategic fit of your projects with the overall strategy?							
Answer Options	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Rating Average**	**Count**
The project portfolio is consistently aligned with the future of the company:	2	4	34	96	24	3.85	160
The corporate strategy is being implemented ideally through our project portfolio:	2	10	48	87	13	3.62	160
Resource allocation to projects reflects our strategic objectives:	3	16	39	87	15	3.59	160
						answered question	**160**
						skipped question	**0**

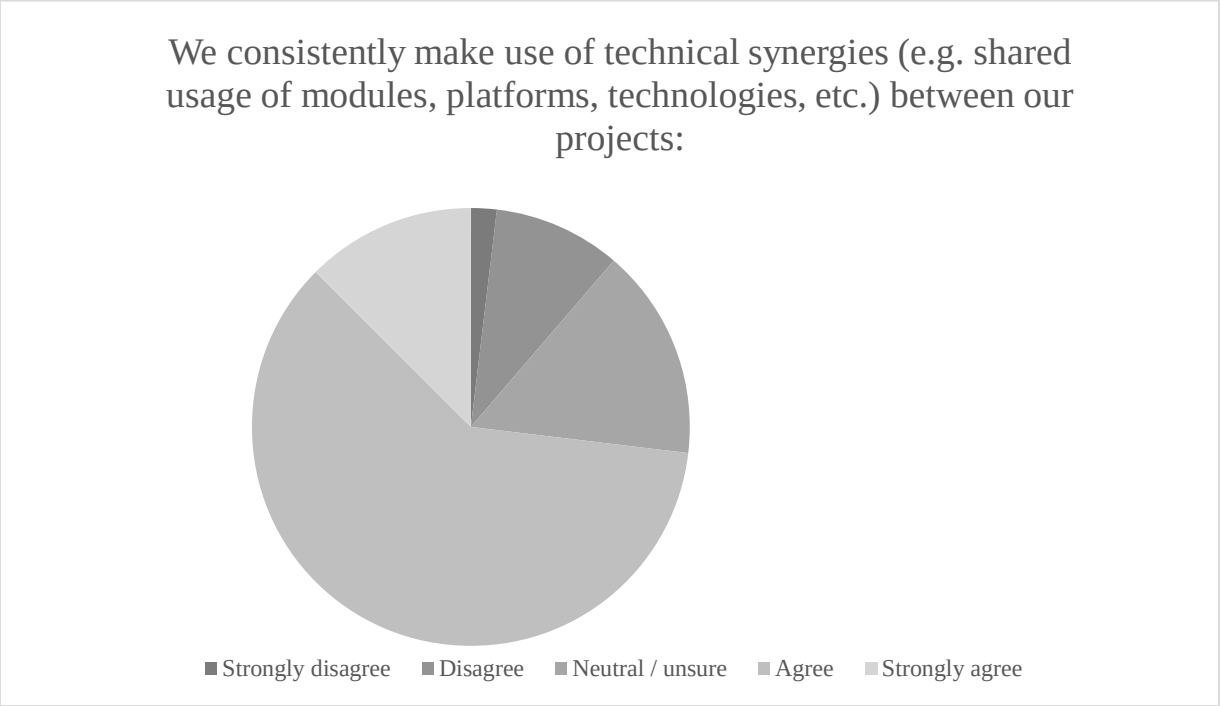
Question 10d: How do you rate the following on your project portfolio balance?							
Answer Options	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**Rating Average**	**Count**
There is a good balance in our project portfolio between new and old areas of application:	1	10	53	82	13	3.60	159
There is a good balance in our project portfolio between new and existing technologies:	1	16	34	96	10	3.62	157
There is a good balance in our project portfolio of project risks:	0	12	57	75	15	3.58	159
There is a good balance in our project portfolio of projects in different implementation phases (early/late phases):	1	10	51	84	13	3.62	159
There is a good balance in our project portfolio to generate a constant cash-flow:	2	16	37	89	15	3.62	159
						answered question	**159**
						skipped question	**1**

Question 11: Your organization is a one that:							
Answer Options	**Very low**	**Low**	**Mid.**	**Mod. high**	**Very high**	**Rating Average**	**Count**
Looks for novel technological ideas by thinking outside the box	6	19	39	68	28	3.58	160
Bases its success on its ability to explore new technologies	5	20	49	66	19	3.47	159
Creates products or services that are innovative to the firm	5	17	57	58	21	3.46	158
Looks for creative ways to satisfy its customers' needs	2	15	32	63	48	3.88	160
Aggressively ventures into new market segments	5	26	47	61	19	3.40	158
Actively targets new customer groups	3	20	59	55	22	3.46	159
Commits to improve quality	3	3	35	71	48	3.99	160
Commits to lower cost	3	5	61	65	25	3.65	159
Continuously improves the reliability of its products and services	3	9	43	84	21	3.69	160
Increases the levels of automation in its operations	4	18	53	64	21	3.50	160
Constantly surveys existing customers' satisfaction	7	12	48	67	26	3.58	160
Fine-tunes what it offers to keep its current customers satisfied	2	12	42	72	32	3.75	160
						answered question	**160**
						skipped question	**0**

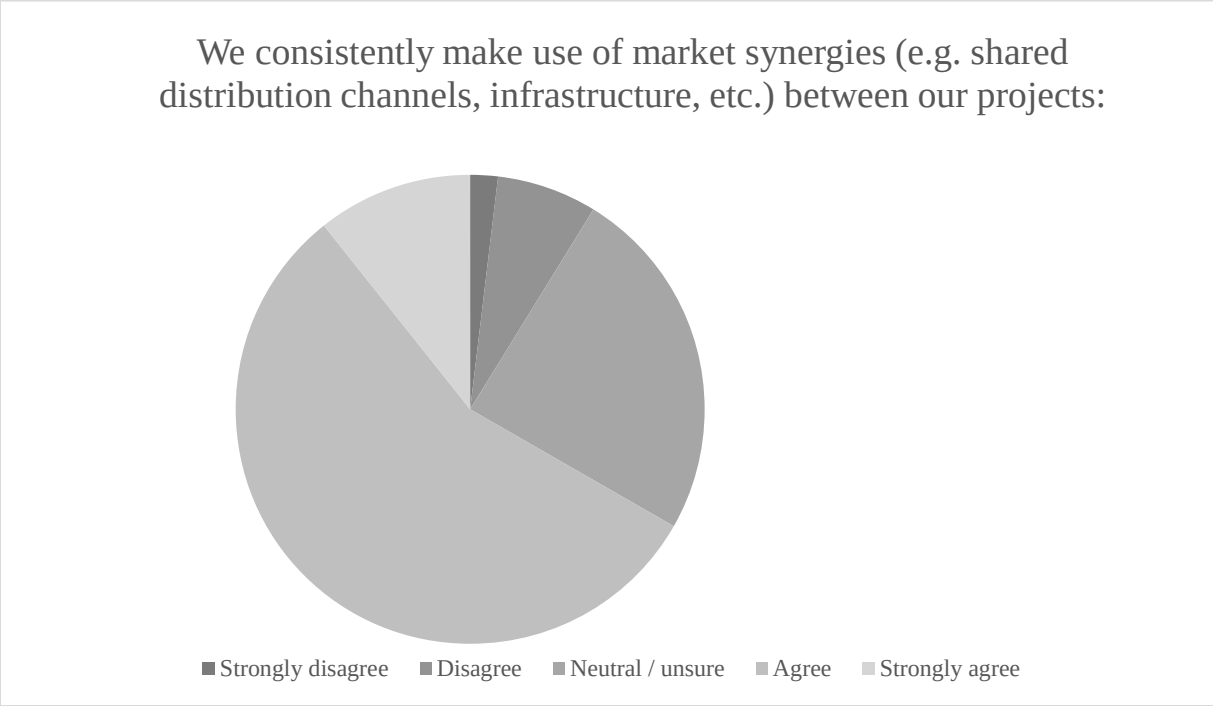
Question 12: We are able to leverage synergies between projects in our portfolio:		
Answer Options	**Response Percent**	**Response Count**
Strongly disagree	0.6%	1
Disagree	6.9%	11
Neutral / unsure	27.7%	44
Agree	56.6%	90
Strongly agree	8.2%	13
	answered question	**159**
	skipped question	**1**



Question 13: We consistently make use of technical synergies (e.g., shared usage of modules, platforms, technologies, etc.) between our projects:		
Answer Options	**Response Percent**	**Response Count**
Strongly disagree	1.9%	3
Disagree	9.4%	15
Neutral / unsure	15.6%	25
Agree	60.6%	97
Strongly agree	12.5%	20
	answered question	**160**
	skipped question	**0**



Question 14: We consistently make use of market synergies (e.g., shared distribution channels, infrastructure, etc.) between our projects:		
Answer Options	**Response Percent**	**Response Count**
Strongly disagree	1.9%	3
Disagree	6.9%	11
Neutral / unsure	24.5%	39
Agree	56.0%	89
Strongly agree	10.7%	17
	answered question	**159**
	skipped question	**1**



Appendix G – Regression analysis

This section is to be read in conjunction with section 5.3.9 *Regression analysis and test for mediation*. This appendix consists of the following tables:

Table G 1. Results of regression analysis for organizations with 0-20 employees

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.326			-0.069
	PPM effectiveness		0.687*	0.556	0.604
R^2		0.106	0.472	0.309	0.312
Adjusted R^2		0.017	0.406	0.223	0.115
ANOVA F		1.186	7.157*	3.583	1.586
VIF		1.000	1.000	1.000	1.895 for all

* Significance < 0.05 level ** Significance < 0.001 level

Table G 2. Results of regression analysis for organizations with 20-75 employees

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.525**			0.445*
	PPM effectiveness		0.674**	0.480*	0.545
R^2		0.276	0.454	0.231	0.284
Adjusted R^2		0.254	0.438	0.208	0.239
ANOVA F		12.559**	28.283**	10.186*	6.347*
VIF		1.000	1.000	1.000	1.774 for all

* Significance < 0.05 level ** Significance < 0.001 level

Table G 3. Results of regression analysis for organizations with 75-150 employees

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.584*			0.016
	PPM effectiveness		0.827**	0.700**	0.687*
R^2		0.341	0.684	0.490	0.490
Adjusted R^2		0.308	0.668	0.466	0.437
ANOVA F		10.361*	43.288**	20.163**	9.140*
VIF		1.000	1.000	1.000	3.164 for all

* Significance < 0.05 level ** Significance < 0.001 level

Table G 4. Results of regression analysis for organizations with 150-300 employees

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.146			0.143
	PPM effectiveness		0.588*	0.207	0.124
R^2		0.021	0.345	0.043	0.056
Adjusted R^2		-0.033	0.307	-0.013	-0.062
ANOVA F		0.392	8.964*	0.764	0.478
VIF		1.000	1.000	1.000	1.527 for all

* Significance < 0.05 level ** Significance < 0.001 level

Table G 5. Results of regression analysis for organizations with 300 and more employees

Variable		**Model 1** Dependent variable *Performance*	**Model 2** Dependent variable *Ambidexterity*	**Model 3** Dependent variable *Performance*	**Model 4** Dependent variable *Performance*
(β)	Ambidexterity	0.544**			0.205
	PPM effectiveness		0.820**	0.582**	0.413*
R^2		0.296	0.672	0.339	0.352
Adjusted R^2		0.285	0.667	0.328	0.331
ANOVA F		26.465**	128.962**	33.277**	16.830**
VIF		1.000	1.000	1.000	3.047 for all

* Significance < 0.05 level ** Significance < 0.001 level