Rotterdam School of Management
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How Dynamic Managerial Capabilities Effectuate Dynamic Balancing of Exploration and Exploitation

Elucidating the processes that govern ambidextrous propensity over time

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Abstract

Despite the broad and deep literature on organizational ambidexterity, little is known about how senior leaders implement shifts between exploration and exploitation over time. This is a crucial omission, because the appropriate balance between exploration and exploitation is essential for long-term success. This inductive case study on a heavy equipment manufacturing firm combines longitudinal and quantitative content analysis with qualitative grounded analysis, and provides new insights in the relationship between dynamic managerial capabilities and the shifting between exploration and exploitation over time. This research adopts the dynamic balancing construct for organizational ambidexterity, in which the ratio between exploration and exploitation is continuously managed and adjusted over time in order to cope with ever changing demands. Dynamic balancing theory is complemented by introducing the concept of dynamic managerial capabilities as an antecedent for change in ambidextrous propensity. Building on system theory, this study extends existing knowledge on how the balance between exploration and exploitation evolves over time, and exemplifies how senior leaders implement emphases shifts between the two antagonistic forces. The findings suggest that senior managers appeal to cognitive structures to detect and evaluate internal and external disturbances, and that shifts are implemented through a multifaceted set of structural- and contextual mechanisms.

Keywords:

Dynamic Balancing, Dynamic Managerial Capabilities, Exploration versus Exploitation, Organizational Ambidexterity, Shifting Ambidextrous Propensity, System Dynamics, System Theory

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1 Introduction

How do organizations excel in today's business and simultaneously prepare for tomorrows successes?

From this question, and moreover from the tension that is hidden within the activities that are considered crucial to comply, a fertile debate on organizational ambidexterity theory has emerged over the last decades. In biology, individuals capable of using both left and right hand comparably well are referred to as being "ambidextrous". In organizational science, the ambidexterity concept is linked to an organization's ability to perform well on two playing fields simultaneously (Levinthal & March, 1993; Tushman & O'Reilly, 1996). First, on the field of activities that are required to excel in today's business and are referred to as exploitation. These activities are related to efficiency, alignment, integration and focus (March, 1991). Second, ambidextrous organizations perform well on the field of activities that are compulsory to secure legitimacy in the future, and are referred to as exploration. The activities on this playing field are related to flexibility, adaptability, responsiveness and divergent thinking (Birkinshaw & Gupta, 2013; March, 1991).

Organizational ambidexterity is recognized to be important for achieving long term survival and success (Fourné et al., 2019; Simsek, 2009). The principle idea, that firms need to generate a steady cashflow by exploiting current strategies and at the same time need to explore new strategies to secure success for when the current way of working becomes obsolete, is intuitively sound. This intuition is supported by numerous studies that provide the empirical evidence to positively relate ambidexterity to organizational profitability, growth and responsiveness (Gibson & Birkinshaw, 2004; Kauppila, 2010). Besides theory, it are the appealing real-life cases of ambidextrous organizations such as Koninklijke DSM NV (Dutch State Mines), who successfully managed to transform from coal mining to petrochemicals into the fields of health, nutrition and materials (Volberda et al., 2013), that contribute to the persistent interest of both scholars and practitioners in the field of organizational ambidexterity.

With the introduction of the ambidexterity concept and the notion that it is an important state to pursue, a logical next step would be to investigate how ambidexterity is achieved. A significant part of the existing research on organizational ambidexterity is focused around this question, and it has delivered insightful descriptions of how organizations can manage exploration and exploitation through temporal or spatial separation via structural- (Tushman & O'Reilly, 1996), contextual- (Gibson & Birkinshaw, 2004), and leadership based mechanisms (Lubatkin et al., 2006). Most of these studies however work from a rather static perspective (Lavie et al., 2010) and thereby fall short in explaining how the activities that lead to ambidexterity evolve over time (Luger et al., 2018). Put differently, static approaches are not very helpful for understanding the capabilities required to align exploration and exploitation activities to internal and environmental contingencies over time (Helfat & Peteraf, 2003).

More recent studies addressed some shortcomings of the previously static approach by investigating organizational ambidexterity from new dynamical perspectives, taking time- and path dependency into account. Scholars applied the dynamic capability framework to theorize about the ongoing interaction between exploration and exploitation (O'Reilly & Tushman, 2008) and provided imperative new insights. For instance, research has demonstrated that ambidexterity is not achieved by just organizing for temporal or spatial separation as suggested by dominant static prescriptions (Jansen et al., 2017), rather it is a complex undertaking dependent on organization specific context and history, which creates the conditions for particular trajectories that support or frustrate the achievement of

ambidexterity (Heracleous et al., 2019). Additionally, Jansen et al. (2017) show that organizations respond to emergent changes by dynamically balancing exploration and exploitation, and suggest that senior leaders deliberately iterate to mitigate self-reinforcing mechanisms to ensure a balance. The term "dynamic balance" suggests that there are times in which there is an emphasis on either exploration or exploitation, and that at a certain moment the tide is turned by shifting the emphasis to retain a balance. Yet, little is known about the routines and decisions (O'Reilly & Tushman, 2008) that senior leaders adapt in realizing such shifts.

Summarized, organizational ambidexterity is a beneficial condition for organizations to pursue and the dynamic capabilities concept provides a valuable new approach to study ambidexterity from a longitudinal, process-oriented perspective (Nosella et al., 2012) and to move beyond the conventional paradoxical thinking of exploration versus exploitation as originally described by March (1991). To date however, there are only limited studies using this dynamic approach and it is as if we have just scratched the surface on understanding how exploration and exploitation efforts are managed over time and how the balance historically evolves.

1.1 Research question

This study aims to provide a systematic and process-oriented understanding of the steps that senior leaders in ambidextrous organization take to reconfigure resources to retain the adequate balance between exploration and exploitation over time.

The main research question is:

> "How do senior leaders implement transitions from exploration to exploitation (and vice versa) within ambidextrous organizations over time?"

The literature is largely constructed around three dominant antecedents for organizational ambidexterity (structural-, contextual-, and leadership processes) and both the dynamic nature and the role of dynamic capabilities are recognized. Based on this knowledge, three supporting sub-questions are formulated in order to answer the main research question:

1. How does organizational ambidexterity evolve over time?
2. What role do dynamic managerial capabilities play in the initiation of transitions between exploration and exploitation?
3. How do senior leaders initiate and embed structural- and contextual mechanisms in phases of transition between exploration and exploitation?

1.2 Relevance of the research

Prior studies have looked at the establishment of organizational ambidexterity from path dependent perspectives (Heracleous et al., 2019), have investigated the dynamic balance between exploration and exploitation (Jansen et al., 2017; Luger et al., 2018), and have linked ambidexterity with dynamic capabilities (Jansen et al., 2017; O'Reilly & Tushman, 2008).

This research makes two important contributions to prior research. First, this study focusses specifically on the role of senior leaders in phases of transition between exploration and exploitation from a dynamic managerial capability perspective. This is an important contribution because it elucidates the routines that enable leaders to adequately build and shift resources in order to overcome potential detrimental self-reinforcing tendencies (Luger et al., 2018).

Second, the dynamic balance and shifting between exploration and exploitation is studied from a system theory approach (Nickerson & Zenger, 2002). This provides a new process-oriented insight in

the evolvement of an organization's propensity towards either exploration or exploitation and relates the propensity to internal circumstances and external contingencies.

1.3 Main concepts

This paragraph briefly touches on the primary concepts and definitions that are expected to be relevant for this inductive study. An elaborate theoretical background is provided in chapter 2.

Organizational Ambidexterity

In business literature, the ambidexterity concept is built around the ability to simultaneously exploit current strategies and exploit new spaces (O'Reilly & Tushman, 2013). Ambidexterity has been positively correlated with profitability and growth, which assures an ongoing attention for the topic (He & Wong, 2004). Exploration and exploitation are generally perceived as being two opposing strategies, that potentially require different resources and processes. The notion that explorative and exploitative activities are both essential and opposing encapsulates the tension that organizations encounter, and outlines the academic conversation on ambidexterity (Raisch & Birkinshaw, 2008).

Exploitation versus Exploration

Exploitation, in short the refinement of existing competences (March, 1991), can drive efficiency and short term returns, but might lead to competency traps and obsolescence (Simsek, 2009) when market demands change. Exploration, summarized as searching for new and alternative ways of doing business (March, 1991), might secure future success but can induce wasteful practices when emphasized too much.

Antecedents for organizational ambidexterity

Three dominant approaches to enable ambidexterity are present in the literature (Papachroni et al., 2015). First structural ambidexterity, which proposes to separate exploration and exploitation activities in different units (Tushman & O'Reilly, 1996). Second contextual ambidexterity, which suggest that ambidexterity can be achieved within the same unit by means of mechanisms that empower individuals to make tradeoffs based on the applicable context (Gibson & Birkinshaw, 2004). And third leadership-based solutions, in which the senior management team is accountable for harmonizing the tension between exploration and exploitation (Raisch & Birkinshaw, 2008).

Dynamic Managerial Capabilities

Dynamic Managerial Capabilities form a sub-set of dynamic capabilities, which in its turn stem from a broader theoretical field that analyzes organizational capabilities as a potential source for competitive advantage. Adner & Helfat (2003) first introduced the concept in their study that sought to explain differences in corporate decision making, at firms in a single industry, with a comparable but altering set of external conditions. Dynamic managerial capabilities are defined as: "*capabilities with which managers build, integrate, and reconfigure organizational resources and competences*" (Adner & Helfat, 2003).

Dynamic managerial capabilities are displayed when managers decide to modify resource configurations, to act upon changing demands, in ways that are novel to the firm. The three underlying attributes that contribute to the emergence of dynamic managerial capabilities are; managerial cognition, managerial social capital, and managerial human capital. The construct offers a valuable approach to investigate and interpret how managerial actions drive strategic change (Helfat & Martin, 2015).

1.4 Research design

Little is known about how senior managers implement transitions between exploration and exploitation over time. Therefore, an inductive theory building approach in the form of a case study is executed. With this approach I seek to answer a "how" question by producing deeper understanding (Yin, 2009) and by analyzing context specific factors, processes and relationships (Yin, 1994).

For this study, empirical material is collected for a single organization in order to analyze the context and processes involved in shifting between exploration and exploitation over time. Material is gathered from archives, interviews and press publications.

Research setting

This study's empirical setting is a large incumbent firm searching for growth opportunities in new and existing markets through technological innovation. Within the target firm four separate cases are identified. The unit of analysis for three cases is at the level of the organization, one case analyzes the switching between exploration and exploitation at the business unit level.

The inductive case study is conducted at Huisman Equipment B.V., a family owned firm within the manufacturing industry. Huisman develops, manufactures and services innovative heavy industrial equipment and mainly serves the energy sector. Worldwide Huisman employs approximately 2500 employees over multiple manufacturing, sales and service locations. The head office is located in Schiedam and facilitates approximately 400 employees.

I chose to focus on a manufacturing company serving the energy sector because they face pressure due to the changing energy landscape. Decades of hydrocarbon dominance in the energy industry have led to the emergence of a dozens of major petroleum companies and thousands of related manufacturing companies, comfortably servicing them in all facets from exploration to extraction, refining, transporting and marketing. That this comfortable position cannot be taken for granted, once again became painfully clear in the form of mass redundancies and numerous bankruptcies during the latest oil crisis. Accordingly, manufacturing companies face immense challenges in orchestrating contradictions associated with assigning resources to either exploring new opportunities on one hand or further advancing current habits on the other.

Within the past three decades Huisman Equipment displayed numerous exploration- and exploitation activities. This reveals itself by the wide variety of products and technologies it developed, and by the different markets in which Huisman Equipment has played a role. After exploiting capabilities within the heavy lifting industry, Huisman Equipment explored the Oil & Gas industry. Within a few years, Huisman acquired a strong position within this new branch and many pipelay- and drilling equipment projects were successfully delivered. Besides Oil & Gas, Huisman started exploring the leisure industry, invested in a tidal energy, entered the offshore wind market, setup a new business unit to boost the geothermal energy sector, created a hub for startups, acquired a composite tubular firm, and more recently is exploring to manufacture submarines and special healthcare equipment.

Data collection

Various data sources will be consulted for this case study. First, archival data is analyzed to map a broad chronological understanding of how the organization, its products, the markets it serves and its environment have changed over time. Archival data includes issues of the company's quarterly journal, news articles from financial papers, and a product book.

Besides archival data, in-depth interviews will be conducted with key managers and board members. These interviews will be semi-structured, recorded and transcribed.

By collecting data from multiple sources, I seek to add both breadth and depth and increase the validity and credibility of the results (Flick et al., 2004) by allowing for triangulation (Bickman & Rog, 2009).

Data analysis

Empirical material is interpreted and analyzed in order to work towards an integrated data structure and process model.

Firstly, the empirical material from archival data is organized chronologically on a timeline. This timeline provides a means to identify where the exploration – exploitation shifts are present. Second, at the periods were exploration – exploitation shifts are present, I delve deeper into what happened to the organizations structure and context, and what managerial capabilities led to those shifts.

In order to investigate why potential shifts occurred, the interview data will be transcribed and interpreted. The 'codes to theory' (Saldaña, 2013) methodology will be followed to work from 1st-order codes (informant-centric) to 2nd-order categories (theory-centric) towards a data structure with overarching themes (theoretical concepts).

Lastly, a process model is developed to map how managerial capabilities lead to transitions between exploration and exploitation over time.

1.5 Thesis outline

This thesis is structured as follows.

Chapter 2 contains the theoretical background. This literature review thoroughly covers the concepts of organizational ambidexterity, dynamic managerial capabilities, and briefly introduces system dynamics theory as a premise to support the representation of this study's findings. From the vast body of work available on these topics, a selection of overarching articles is used to provide a consolidated overview of the knowledge that forms the foundation for this study.

Chapter 3 substantiates the research design. The research methodology, the approach for data gathering and the mechanisms used for analysis and coding are explained. This section also describes the case and research context that form the basis for this study.

Chapter 4 depicts the research findings. Here the results are presented in the form of a table depicting notable explorative and exploitative activities, a timeline showing the organization's ambidextrous propensity over time, a data structure, and lastly a dynamic process model.

Final chapter 5 elaborates on the discussion and conclusions. Here answers to the research questions are formulated by means of an iterative process between the problem defined, the theoretical grounding and the research findings. Lastly, after discussing the practical and theoretical implications of this study, potential avenues for future research are suggested.

2 Theoretical Background

This chapter provides an overview of the literature that is relevant for this study. The objective of this literature review is to provide a rigorous yet compact synthesized explanation of the extensive body of knowledge on ambidexterity and dynamic managerial capabilities. Hereby, producing the foundation for this study. The main concepts are elucidated using similar templates. First, a short section on the historical emergence of concepts at hand, and its main theoretical contributions, are displayed. This is followed by a critical evaluation of the literature including discussions on existing contradictions and ambiguities. Finally, it is identified how this research relates to existing work in terms of addressed gaps, contributions and confrontations.

2.1 Organizational Ambidexterity

In business literature, firms that manage to flourish in exploiting current strategies and successfully explore new areas simultaneously, are referred to as being ambidextrous (Levinthal & March, 1993).

The term organizational ambidexterity was first used by Duncan in 1976. It was however March's seminal work from 1991 that really put the concept on the map (Raisch & Birkinshaw, 2008), and propelled scholars into a lively and persisting debate on the subject of organizational ambidexterity. As a result of nearly thirty years of research, the academic world inherited a broad and deep body of knowledge, extending over multiple theoretic fields, various levels of analysis, and distinctive time perspectives. Through time, the fields of; Strategic Management, Organizational design, Leadership theory, Organizational adaption, Organizational learning, Marketing, and Technological innovation each augmented their fair share (Raisch & Birkinshaw, 2008). Levels of analysis span from the individual, to business units, firms, and interfirm networks (Lavie & Rosenkopf, 2006). Where conventional research on ambidexterity took rather static approaches (Raisch et al., 2009), we see that more recent studies are recognizing the relevance of dynamic factors (Jansen et al., 2017), leading to increased understandings on time sensitivity (Luger et al., 2018) and path dependency (Heracleous et al., 2019).

The common denominator, that connects all work on organizational ambidexterity, is the presupposition that organizations, to some extent, face contradicting forces that impose a tension on the organization, which needs to be resolved in order to achieve long-term survival and success. March (1991) most adequately describes the tension in terms of explorative versus exploitative activities, and argues that both type of activities are needed to ensure efficient execution of today's business and explore new spaces to prevent obsoleteness in the future (O'Reilly & Tushman, 2008).

An ongoing interest for organizational ambidexterity, from both scholars and practitioners, is warranted because previous studies indeed provided the empirical evidence that positively relates ambidexterity with organizational performance (Junni et al., 2013), sales growth (He & Wong, 2004), improved stakeholder satisfaction and financial performance (Gibson & Birkinshaw, 2004), the creation of breakthrough innovations (Hill & Birkinshaw, 2006), and organizational responsiveness (Kauppila, 2010).

2.1.1 The tension

The fact that exploration and exploitation are apparent contradicting activities, which as the general consensus suggests compete for the same scares resources, fuels a continuing debate on the ambidexterity concept, and in a way summarizes the paradoxical challenges that organizations face (Raisch & Birkinshaw, 2008). The most influential and overarching description of the tension, which

was at first related to organizational learning, is the one suggested by March (1991), and describes the tension in terms of exploitation versus exploration.

Exploitation is annotated in terms of; implementation, execution, selection, targets, routines, refinement of existing competences and technology, choice, production, and efficiency. Exploitation thus is essential to acquire short term returns, and it are those activities that ensure the improvement of current proceedings and potentially the profiteering of earlier explorations. March (1991) argues that too much focus on exploitation can lead to competency traps, success traps, inertia, and in the end obsolescence (Simsek, 2009). As if, an organization becomes increasingly better at traveling in a certain direction down a convergent path, which sooner or later, might turn out to have a dead end.

Exploration is described in terms of; search, aspiration, variation, divergent thinking, experimentation with new alternatives, and uncertain and distant outcomes (March, 1991). By exploration thus, an organization acquires new knowledge and skills, which is crucial for the creation of novel opportunities and to act upon changing demands. Too much emphasis on exploration can lead to failure traps, indicating too few gains from developed knowledge (March, 1991). As if a firm constantly overinvests in finding new things, while never getting paid off by what has been found. From the field of organizational learning, Levinthal & March (1993) contribute that firms can be subject to positive and negative self-reinforcing mechanisms. They argue that knowledge generating activities can lead to increased organizational renewal and growth, but on the contrary firms might end up in acquiring knowledge of lesser and less added value.

Besides the overarching exploration versus exploitation classification, scholars from different theoretical fields produced various characterizations for their research on the tension (Papachroni et al., 2015). Ambidexterity was investigated in terms of old versus new (Levinthal & March, 1993), capability versus rigidity (Tushman & O'Reilly, 1996), continuity versus change , chaos versus inertia, leverage versus stretch, search versus stability (Siggelkow & Levinthal, 2003) and efficiency versus flexibility (Jansen et al., 2005).

The common underlying idea is that exploration and exploitation produce distinctive results (Uotila et al., 2009), and scholars persistently substantiate that both activities require dissimilar resources, structures, and processes (He & Wong, 2004; O'Reilly & Tushman, 2008). A second common interpretation is that explorative and exploitative activities are essential for firms to both accommodate change and to flourish in today's business (O'Reilly & Tushman, 2013). The notion that both exploration and exploitation are crucial, in combination with the previous explanation that too much of either might be harmful, provides ammunition for the quest to manage and resolve this tension, and as such to become truly ambidextrous.

2.1.2 Resolving the tension

Exploration and exploitation are frequently perceived by organizations as competing or even paradoxical activities (Smith & Lewis, 2011), and scholars have sought to solve this issue through three dominant approaches, using structural- , contextual- , and sequential solutions. A fourth, more imminent approach can be identified, that in a way harmonizes certain element of the three conventional approaches, and nurtures a multifaceted entanglement with dynamic managerial capabilities and contingency theory. In this study, this fourth approach is classified as dynamic balancing.

2.1.2.1 Structural solutions

The key characteristic of structural ambidexterity is its architectural separation of contradicting tasks (Tushman & O'Reilly, 1996). Structural ambidexterity finds its roots in organizational design literature (Duncan, 1976), and deals with the tension by simply appointing a single type of activity, either explorative or exploitative, to a single distinguishable attribute. This can be on the level of the person, a team, business unit, subsidiary, or an entire firm in a broader network. So, in essence, ambidexterity on the level of a certain system, irresectable of where the system boundary is drawn, is achieved by separating explorative from exploitative task one level lower in that system. Thereby a team can become ambidextrous by having both exploitative and explorative employees, a business unit can achieve ambidexterity by having both exploitative and explorative teams, and so on.

With the above approach to accomplish ambidexterity, the structural solution is a simultaneous yet static endeavor of exploration and exploitation, and a method to maintain varying skill sets to cope with emerging dissonant demands (Probst & Raisch, 2005). O'Reilly & Tushman (2008) argue that, abreast simultaneous pursuit via structural separation, also different "*competencies, systems, processes, incentives, and cultures*" are required in the participating people, teams, and units.

Critical notes can be placed by questioning whether, bare structural separation at a sub-level, really solves the tension at the highest level. At some point, the co-occurrence of exploration and exploitation will need to be reconciled and managed to bring added value (Eisenhardt & Martin, 2000). It is at this point where Smith & Tushman (2005) attribute great responsibility to top management teams, because eventually it is primarily their task to coordinate efforts and integrate results. Moreover, organizations need to accommodate a vision and common set of strategic intents, in order to form bridges between explorative and exploitative activities, and legitimate their coexistence (Jansen et al., 2009; Lubatkin et al., 2006).

2.1.2.2 Contextual solutions

The achievement of contextual ambidexterity is vested in attributes that shape appropriate context and practices, for individuals and teams, to determine for themselves how to best devote efforts between exploration and exploitation. This context stimulates the simultaneous pursuit of exploration and exploitation, and places the responsibility to choose which activity is best to pursue at a given situation at the level of the analyzed entity, based on own judgment (Gibson & Birkinshaw, 2004). The literature suggests that such context, in order to effectively act as a catalyst for ambidexterity, incorporates elements of social support, trust, discipline, stretch, and joint attention on superior performance (Ghoshal & Bartlett, 1994; Gibson & Birkinshaw, 2004).

Where the structural ambidexterity concept lacks time sensitivity, the contextual solution contains certain dynamic elements (Raisch et al., 2009). Scholars advocate that individual endeavors to pursue both exploration and exploitation can be concurrent and sequential (Adler et al., 1999). But especially when zooming in on the level of the individual, one can ask if it is really possible to reconcile contradicting activities simultaneously? Imagining an individual sequential approach, where an employee first spends time on exploration and subsequently on exploitation, is easier. Such conception of the contextual construct however, would better be categorized as temporal- or sequential ambidexterity (Nickerson & Zenger, 2002).

More criticism on contextual ambidexterity at the individual level can be placed when observing it through the lens of March's (1991) original intellectual heritage, which builds on the fundamentally different competencies and values that are required for both tasks. Again, the question is whether or

not it is possible to reconcile elementary contradicting beliefs and skills in one individual (Raisch et al., 2009). Raisch & Birkinshaw (2008) therefore suggest that, for the achievement of ambidexterity through contextual solutions, it is essential that managers bear profound behavioral repositories.

2.1.2.3 Sequential solutions

Sequential solutions, also referred to as temporal-, or cyclical ambidexterity, are characterized by the division of contradicting tasks through time. As such, individuals, teams or firms, go through a period in which exploration is emphasized over exploitation, followed by a period which focuses on exploitation (Heracleous et al., 2019; Siggelkow & Levinthal, 2003). The literature provides evidence that, most notably product innovation firms (Simsek et al., 2009), go through such oscillations (Gupta et al., 2006; Puranam et al., 2006), in which long periods of exploitation are punctuated by brief gusts of exploration (Birkinshaw & Gupta, 2013).

Sequential ambidexterity clearly incorporates a time dependent lens, and scholars recognized that organizations reconfigured their structures and processes, to realign for changing environmental demands, over time (Kauppila, 2010). Besides the capabilities to reconfigure resources, practices and structures, sequentially ambidextrous organizations must possess the skills to initiate and decide on whether and when to switch between exploration and exploitation (Floyd & Lane, 2000).

The literature on cyclical ambidexterity provides predominantly abstract and retrospective insight that demonstrate that some organizations successfully managed to changed and reconfigured over time. A remaining omission for the sequential concept, is that little is known about the actual mechanisms that initiate and embed the shifts between exploration and exploitation (O'Reilly & Tushman, 2013).

2.1.2.4 Dynamic balancing

The origin of the dynamic balancing concept is constructed around the premises that, becoming and remaining ambidextrous, is a dynamic rather than a static struggle (Siggelkow & Levinthal, 2003). And the notion that in reality organizational ambidexterity is more likely to emerge from a combination of both sequential- and static measures, and both structural- and contextual exertions of exploration and exploitation (Raisch et al., 2009). This renewed lens is intriguing because it opens up the door for strategy scholars to link ambidexterity to dynamic capabilities (O'Reilly & Tushman, 2008), organizational learning (Jansen et al., 2017; Luger et al., 2018), and contingency theory (Heracleous et al., 2019; Luger et al., 2018).

For instance, Jansen et al. (2017) found that product design companies dynamically balance exploration and exploitation to respond to upcoming threads and opportunities, and that senior managers deliberately temper self-reinforcing mechanisms and unlearn habits to assure a balance. This supports previous suggestions that, the appropriate balance between exploration and exploitation depends on the relative importance of each activity (Gulati & Puranam, 2009), which may alter over time (Raisch et al., 2009). Finally, a longitudinal process-oriented study at NASA elucidates how ambidexterity is achieved through a path-dependent and contingent process, which produces both favorable opportunities and inertia to change (Heracleous et al., 2019).

The dynamic balancing approach, by being conscious about the multifactored antecedents and permitting for proper time sensitive analyses, provides the opportunity to comprehensively theorize about organizational ambidexterity. Through such conceptualization we can investigate how a firm's past experience and decisions shaped its present ambidextrous propensity, and how its present

configuration might be capable to handle changing demands in the future. Importantly however, even though the dynamic balancing approach allows for the incorporation of broad sets of historic and present structural, contextual and path dependent factors, a great deal of the coordination of all these factors over time is primarily a managerial responsibility. It is at this point where dynamic balancing is intertwined with dynamic managerial capabilities. Dynamic managerial capabilities are concerned with the sensing and seizing of opportunities, and reconfiguration of resources. The topic is described in more detail later in this chapter.

Despite the insights that a balance is most likely a product of various conventional antecedents, that it is a desirable state to be in, and that mangers purposefully seek to maintain it, there is little knowledge on how this balance between exploration and exploitation is actually maintained and adapted (Fourné et al., 2019; Gupta et al., 2006).

2.1.3 Conceptualizing ambidexterity

So far, we have seen that an appropriate combination of exploration and exploitation can give birth to organizational ambidexterity. There are rich descriptions of the tensions to be resolved, and the structural- and contextual mechanisms that can be deployed. Slightly disappointing however, is that to date, the academic field did not reach consensus on how to quantify organizational ambidexterity itself. The ambiguity is based on the unclarity whether to regard exploration and exploitation as two opposites lying on a continuum or, as an orthogonal construct in which exploration and exploitation are two fundamentally distinct activities (Gupta et al., 2006; Simsek et al., 2009).

2.1.3.1 Orthogonal versus Continuum: Introducing a Veridical Paradox

In this paragraph I will demonstrate that the outlined orthogonal versus continuum polarization is based on mind projection fallacy, and that the orthogonally linked exploration and exploitation constructs (March, 1991) actually lie on the suggested continuum (Gupta et al., 2006) when observed from the rightful perspective. This implies that there is no distinction possible between the orthogonal and continuum approach as described by Gupta et al. (2006), and that in fact they are identical. This may sound absurd when observed through the lens of Gupta et al.'s (2006) suggestions, it can however be proven through logic, which indicates that we are dealing with a veridical paradox. In resolving this ambiguity, I respond to the call from Lavie et al. (2010), to "*conceptually relate the constructs back to March's (1991) original definition*" and to specify a defined domain for which scholars are "*able to draw consistent conclusions given that equivalent interpretations are possible*".

Gupta et al. (2006) build their theory for the continuum approach on March's (1991) statements that exploration and exploitation are fundamentally incompatible activities that compete for scarce resources. Subsequently, it is suggested that logic dictates that, thus exploration and exploitation should be viewed as two ends of a continuum, they present their findings in figure 2.1. The orthogonal approach, which is presented as being incommensurable, is justified because of the perceived incompatibility of the continuum approach to assimilate for multilevel domains and loosely coupled resources. Loosely coupled resources in this context are resources which are present in the environment, but over which the organization does not have full control. Alliances and public data are provided as examples. The representation of Gupta et al.'s (2006) conception of the orthogonal approach is depicted in figure 2.2.

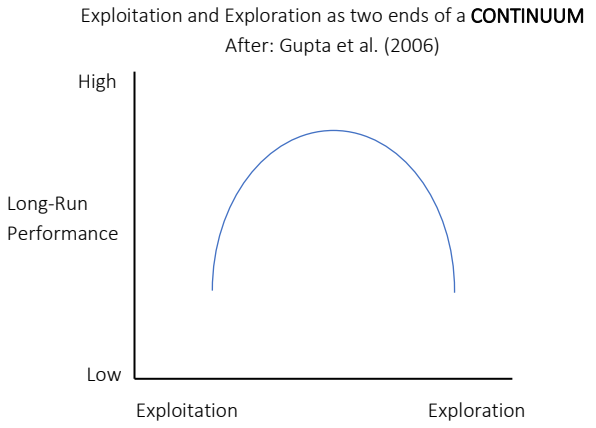


Figure 2.1 Continuum approach (Gupta et al. 2006)

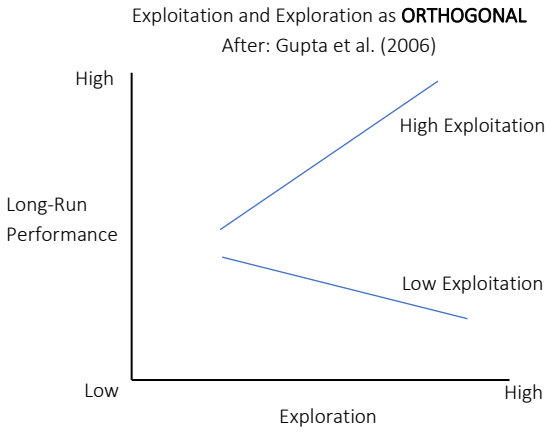


Figure 2.2 Orthogonal approach (Gupta et al. 2006)

First, when observing both figures, we see that Long-Run Performance is on the y-axis, which means it is directly related to exploitation and exploration. This, when following March (1991), is a bridge too far. A combination of exploration and exploitation produces ambidexterity, this is essential but not exhaustive for long-term success. Exploitation and exploration cause ambidexterity and thus the y-axis should depict some quantification of ambidexterity, and not a potential consecutive effect.

Second, the figure for the orthogonal approach depicts only two levels of exploitation, high and low. The exact positions of those lines in the graph cannot be traced back to numerical data and thus their relative position to one another is most likely an illustration from statistical data, potentially from different cases, therefore their relative position is irrelevant. More importantly, these lines give only two levels of exploitation. For accurate insights, multiple lines with incrementally changing levels of exploitation should be plotted. Following the logic of Gupta et al. (2006), an orthogonal figure with multiple incrementally changing exploitation lines would approximate figure 2.3. In this image the inverted U-shape from the continuum approach is starting to emerge.

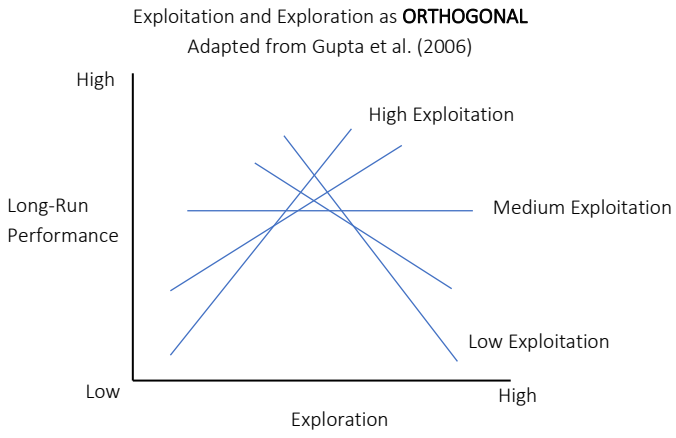


Figure 2.3 Orthogonal approach – including multiple exploitation levels

Third, the inverted U-shape in figure 2.1, which is presented as the outcome when assuming that exploration and exploitation exist as two ends of a continuum (Gupta et al., 2006), actually represents the combined dimension of exploration and exploitation when threated as orthogonal constructs. This is demonstrated in the figure 2.4 (orthogonal constructs) and figure 2.5 (combined dimension) below.

Conclusively, by addressing the omissions in the prevailing conceptualizations of orthogonal- and continuum approaches, and when being faithful to March's (1991) original conceptualization of organizational ambidexterity, exploration and exploitation are irrefutably to be treated as orthogonally linked constructs.

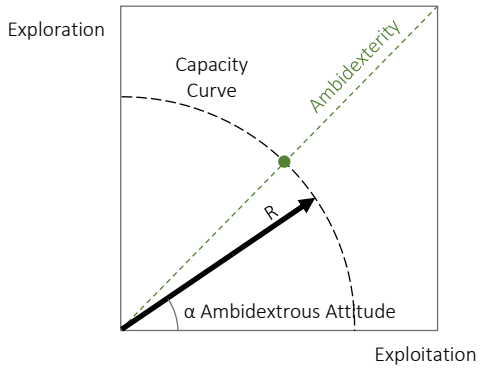


Figure 2.4 Exploration and Exploitation as Orthogonal constructs

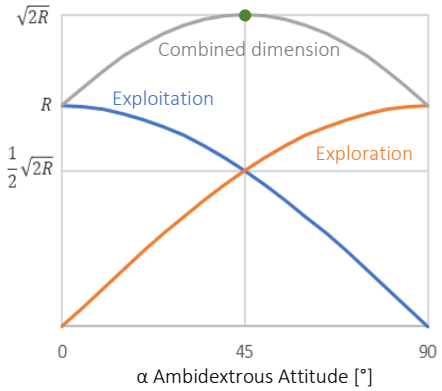


Figure 2.5 Combined magnitude of Exploration and Exploitation

This renewed conceptualization facilitates theory development and intellectual dialogue (Teece et al., 1997a), is receptible for previously perceived contradictions, and it can be parameterized to allow for further modeling and quantification of organizational ambidexterity:

- The magnitude of vector R represents the total resource endowment of the system under investigation. The level of analyses can be from the individual to an interfirm network. When resources are added to the system, the magnitude increases. When loosely coupled resource (Gupta et al., 2006) are added, the magnitude of R also increases but, with an increase relative to the ratio with which the system can control the resources that are added.
- Angle α dictates the direction of vector R, and represents the ambidextrous attitude or propensity of the system. Angle α thereby also dictates the ratio between exploration and exploitation. When the system consists solely of mutually interchangeable resources, meaning resources can produce both explorative and exploitative activities, the direction of vector R can be changed by shifting resources from explorative tasks to exploitative task and vice versa. On the contrary, when the system consists solely of fundamentally incompatible resources (March, 1991), meaning specific exploitative resources for exploitative tasks and vice versa, the direction of vector R can only be changed by acquiring or dispersing resources, thereby also changing the magnitude of the vector.
- The capacity curve indicates al possible positions at which vector R can end, provided that all resources are efficiently deployed. Birkinshaw & Gupta (2013) suggest a similar curve that includes ineffectiveness, annotated as the "*Efficiency Frontier*".
- In theory, ideal ambidexterity is achieved when exploitation and exploration are in balance, which is indicated with the dotted diagonal Ambidexterity line.
- Figure 2.5 demonstrates the combined dimension of exploration and exploitation. The numerically defined hyperbola could be observed as an inverted U-shape by statisticians. It is seen that the combined magnitude is at its maximum at the point where exploration and exploitation are in balance. This point is indicated with a green dot, its value is mathematically

limited at $\sqrt{2R}$. This representation supports previous researches, who describe exploitation and exploration as two positively interacting activities (Uotila et al., 2009).

2.1.3.2 Operationalization of Exploitative and Explorative activities

After repeatedly writing about explorative and exploitative activities, it is now time to call a spade a spade, and break those theoretical conceptions down into observable events in the real world. Scholars applied various proxies in their search to operationalize organizational ambidexterity. Their generalizability across different fields and faithfulness to March's (1991) original explorative and exploitative constructs however are questionable (Uotila et al., 2009).

A practical yet comprehensive manner to deal with the operationalization however can be found in previous work from Luger et al. (2018) and Uotila et al. (2009). They developed methods to codify large-scale longitudinal data, with the goal to conduct content analyses through established exploration and exploitation measures. As will be explained later in chapter three, a part of this study relies heavily on this approach for the collection and analysis of historic firm data. The chosen method provides guidelines for the firm activities to analyze, and whether a certain observed event related to such activity is to be classified as either explorative or exploitative (Luger et al., 2018; Uotila et al., 2009). Table 2.1 below summarizes this approach.

Table 2.1 Operationalizations of Exploration and Exploitation (Luger et al. 2018)

Activity	Exploitative variant	Explorative variant
1. Acquisition	Intended to strengthen current core business	Intended to expand beyond current core business
2. Alliance	Intended to strengthen current core business	Intended to expand beyond current core business
3. Market – Geographical	Strengthening / withdrawing from existing markets	Expanding into new markets
4. Market – Industry	Withdraw from unrelated industry, focus on core business	Expand into new industry
5. Organization structure	Restructuring / Efficiency programs / Centralization	New business units / Ventures / Subsidiaries / decentralization
6. Products and Services	Extension / Adaption / Refinement of existing categories	Introduction of new categories
7. Sales and Distribution	Rebranding / Pricing actions / Termination of channels	Launch of new distribution channel
8. Top Management Team	Promotion of internal employee / Return of former TMT member	New TMT member from outside / Reconfiguration of TMT

2.2 Dynamic managerial capabilities

In the previous paragraph it was described that senior managers are ultimately responsible for the ambidexterity of the organization. Regardless of structural- and contextual solutions to achieve ambidexterity, path dependencies and contingencies, in the end it is still a human task to pull the strings, to make decisions, take actions, and thereby steer organizations into certain directions.

In 2008, O'Reilly & Tushman first linked organizational ambidexterity to dynamic capabilities, suggesting that ambidexterity acts as a dynamic capability. In this paragraph a brief background on capabilities, dynamic capabilities, and conclusively dynamic managerial capabilities is displayed. The importance of the latter subject, and the link with ambidexterity literature, nests in what some scholars refer to as *"the micro foundations of organizational ambidexterity"* (Eisenhardt et al., 2010).

2.2.1 Organizational Capabilities

In busines literature, a cleanse definition of what a capability is can be found in work from Helfat et al. (2007). They define it as: "*The organizations capacity to perform a specific task, function, or activity in at least a minimally acceptable manner*". Capabilities are found at the individual or organizational level, and through repetitive execution and enhancement of activities, they can be acquired and developed over time (Zollo & Winter, 2002). Further, capabilities serve an explicit goal (Martin & Bachrach, 2018) and can be categorized as eighter being operational or dynamic (Helfat & Winter, 2011).

Operational capabilities are those that facilitate the continuation and realization of the organization's current strategy (Helfat et al., 2007). Meaning, all value chain activities that a firm executes for the development and delivery of their existing products and services. Operational capabilities can become obsolete upon changing demands but, are nonetheless essential for competitive advantage (Helfat & Peteraf, 2003).

2.2.2 Dynamic Capabilities – a Competitive Advantage Paradigm

First, before delving into the details of dynamic capabilities, a swift insight on the context and its relation to other theories is provided. Dynamic capabilities can be positioned within the four main paradigms to theorize about strategy and organizational competitive advantage (Harreld et al., 2007; Teece et al., 1997b). First, Porter's (1980) competitive forces framework, second Game theory or the strategic conflict approach, and third the Recourse Based View. Table 2.2 below provides an overview of these four main paradigms and their nature for competitive advantage.

Table 2.2 Paradigms of strategy (Teece et al. 1997)

Paradigm	Notable authors	Units of analyses	Nature of competitive advantage
1. Competitive Forces	Porter (1980)	Industries, Firms, Products	Structural conditions and competitor positioning
2. Game theory	Ghemawat (1986) Shapiro (1989)	Firms, Products	Strategic interaction to outsmart competitors
3. Resource Based View	Penrose, Selznick, Christensen, Andrews	Resources	Asset scarcity and uniqueness
4. Dynamic Capabilities	Schumpeter, Nelson, Winter, Teece	Processes, Positions, Paths	Asset accumulation, replicability and inimitability

The dynamic capabilities perspective finds its intellectual roots in Schumpeter's (1934) work and introduces; processes, positions, and paths as fundamental units of analysis. Because of its dynamic nature, the approach contrasts with the famous and rather static concepts for Competitive Forces (Porter, 1980) and the Resource Based View (Harreld et al., 2007). Through the years, many different interpretations and slightly distinct definitions were provide for dynamic capabilities (Eisenhardt & Martin, 2000; Harreld et al., 2007; Helfat et al., 2007; Kor & Mesko, 2013; Martin & Bachrach, 2018; Teece, 2007; Zott, 2003). The outline from Teece (2007) however, provides a framework in which capacities to *sense*- and *seize* opportunities and to *reconfigure* resources are recognized as the key source for durable competitive advantage in changing environments. In functional terms, on the organizational level, the concept can be summarized as; best practices to create, shift, integrate and discharge resources to support competitive advantage creating activities such as strategy formulation, M&A and product development (Eisenhardt & Martin, 2000).

2.2.3 Dynamic Managerial Capabilities

Where dynamic capabilities apply to the macro level of the organization, dynamic managerial capabilities focus on the competences at the micro level of the individual (Helfat & Martin, 2015). When first introduced, Adner & Helfat (2003) defined dynamic managerial capabilities as *:"the capabilities with which managers build, integrate, and reconfigure organizational resources and competences"*. The field of dynamic managerial capabilities specifically concentrates on the strategic impact of managerial sensing- and seizing of opportunities and reconfiguration of resources (Martin & Bachrach, 2018). A managers capability to sense, seize, and reconfigure is established by three attributes that are considered the foundation for deliberate, intentional and decisive managerial action (Adner & Helfat, 2003b)

First, *Managerial human capital*. This involves the knowledge and expertise on which managers rely to sense opportunities, to choose if it is worth pursuing them, and to adequately align resources (Helfat & Martin, 2015).

Second, *Managerial cognition*, which represents the mental structures that shape managers perception of the environment. It is the combination of intellect and beliefs that enables managers to anticipate on changing environments, and to identify and valuate the different options and implications withing their own space of influence (Martin & Bachrach, 2018).

Third*, Managerial social capital*, which represents the access to information, knowledge and resources via the manager's formal and informal network. Social capital is essential for sensing and seizing new opportunities (Kor & Mesko, 2013).

2.3 System dynamics theory

One objective of this study is to work towards a process model that represent the findings and supports in answering the research question. Additionally, this research builds further upon the dynamic perspectives that were adopted in previous research, in order to move beyond conventional static approaches. To move from a static, here and now, image to a model that allows for the representation of coherence between changing variables and a specific organizational phenomenon, system dynamics theory might provide a valuable aid (Nickerson & Zenger, 2002).

The goal of this study is to build theory, using inductive methods, rather than producing exact numerical results. Nonetheless, one objective is to provide a framework that arranges theoretical dimensions in a configuration that might provide points of departure for future quantitative research. Existing literature provides evidence for the complex, time sensitive, and dynamic behavior of organizational ambidexterity. Furthermore, multiple interconnections between ambidexterity and dynamic managerial capabilities are illustrated. In the search to investigate, combine, and ultimately carve a process model of the two main theories of this study, a third theory is introduced, that of system dynamics.

2.3.1 Basic assumptions

System dynamics theory provides a perspective that applies control principles to model social systems and management problems (Lane & Oliva, 1998). Forrester introduced the concept in 1960 with the goal to learn about the behavior of organizational phenomenon (Nickerson & Zenger, 2002) and to develop policies to improve corporate performance (J.W. Forrester & Lane, 1997). The basic idea of the concept is that the behavior of a complex dynamical system can be described in terms of

elements, flows between elements, system inertia, and feedback loops (Rodriguez-Ulloa & Paucar-Caceres, 2005).

The ontological stance of the system dynamics paradigm can be traced back to technology and engineering practices, the field does however not neglect the complexity and diversity of social reality. Nonetheless, practitioners do not refrain from engaging in the modeling of such complex social phenomenon, since they prefer the value of simplistic yet systematic dynamic models above extensive maps without simulation capabilities (Sterman, 1994). Furthermore, it is assumed that it is achievable to simulate such complexity without losing relevance (Meadows, 1989; Richardson, 1991). The main assumptions are that: 1. Things in the real world are interconnected through complex patterns of rates, levels and feedback loops. 2. Information flows are by definition different from physical flows. 3. System behavior originates from system structure. 4. Non-linearities and delays are important elements in systems (Forrester, 1961).

2.3.2 Modeling approach

In system dynamics, the model starts from a problem to solve (Forrester, 1993). The second step is to acquire thorough understanding of the problem's context, followed by the identification of relevant variables that can be translated into measurable model constructs. Then, a model is formulated that is suited to track all correlations between variables and can simulate their dynamic behavior, using explicit formal modeling concepts (Lane & Oliva, 1998). For a generic case study, the approach can be summarized as follows:

Case study → Grounded analyses → System thinking → System dynamics → Model formulation

A crucial element in the modelling of dynamic systems is feedback. Feedback has been defined as the elementary foundation for learning and adaption (Sterman, 1994). A basic feedback loop is illustrated in figure 2.6.

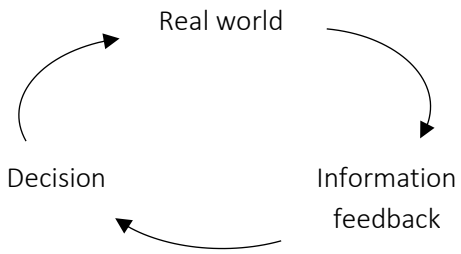


Figure 2.6 Basic feedback loop

The core idea of system dynamics theory in social sciences is that decision makers compare the status of the real world with desired conditions, that they seek to translate perceived differences into actionable measures, that actions are undertaken to try to change the world towards the desired condition, and finally that the renewed status of the real world is compared again with the desired condition.

Mental models form a fundamental aspect of system dynamics theory (Forrester, 1961), since all decisions are driven by such mental models of the real world. An individual's mental model in turn is constructed around cognitive maps of the environment, methods to assort experiences, and procedures for defining viable responses (Hogarth, 1981).

2.4 Summary and Conclusions

Organizational ambidexterity has been a fertile construct for multiple decades of academic work. It has been studied from various angles, resulting in a body of knowledge that spans numerous levels of analysis, which offers a diverse set of antecedents, and that has become receptive to dynamic perspectives. The conceptualization of the construct has been a point for debate. This literature review proposes a renewed conceptualization, that refutes and subsequently synergizes previous approaches, and that is loyal to March's (1991) original ambidexterity concept. An animated concern in the ambidexterity field is observed regarding the gaps encompassing the focal position of the manager, who ultimately has to direct the firm's explorative and exploitative activities.

The dynamic managerial capabilities framework has proven to be a valuable lens for observing organizational strategic change in transforming environments. Managers possess specific attributes, that are obtained and advanced through personal history, which enable them to adequately sense and seize opportunities and reconfigure resource. To address the micro foundations of organizational ambidexterity, this study seeks to coherently link changes in ambidextrous propensity with dynamic managerial capabilities.

This study builds further upon literature that presents dynamic balancing as an imperative avenue to manage ambidexterity in a multifaceted and time sensitive way. To spur the move beyond static delineations, to describe the dynamic balancing of an ambidexterity parameter to internal and external contingencies, and to find the interconnectedness of dynamic managerial capabilities, this research deploys system theory practices to try to produce a heuristic model that incorporates aspects of both theoretical constructs.

After portraying this study's theoretical underpinnings in this chapter, the research question can be framed and visualized as depicted in figure 2.7. This figure displays that dynamic managerial capabilities potentially drive the shifts, between periods with an emphasis on either exploration or exploitation, over time. How dynamic managerial capabilities are explicitly intertwined with the dynamic balancing for ambidexterity is not yet defined, hence the question mark.

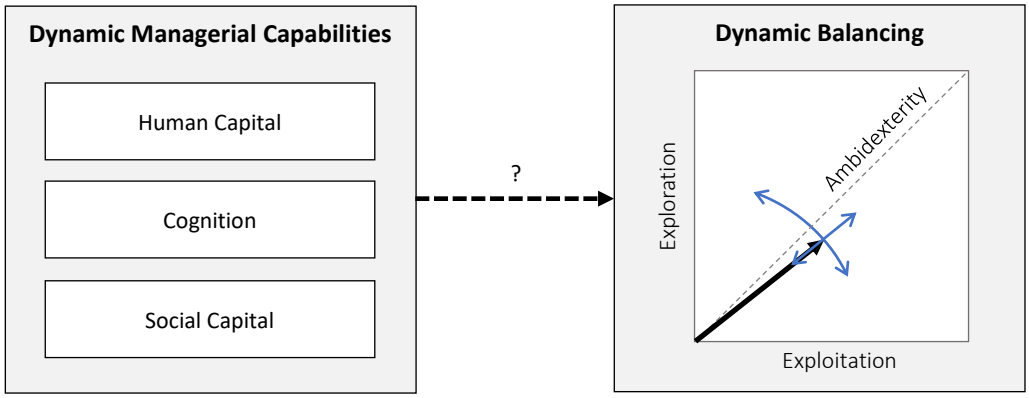


Figure 2.7 Focal question: Dynamic Managerial Capabilities and Balancing Exploration and Exploitation over time

3 Methodology

Since there is little empirical evidence on how executives implement transitions between exploration and exploitation, an inductive case study method is employed. Case studies have the ability to offer context and deeper understanding (Yin, 2009) and make it possible to identify essential factors and relationships (Yin, 1994). Therefore, case studies are better suited to answer 'how' questions than quantitative deductive studies. Furthermore, in order to understand processes of change over time, thus incorporating a dynamic perspective, it is imperative to follow a longitudinal design approach (Easterby-Smith et al., 2018). The longitudinal perspective aids to the analysis of how key events shape the firms continuing pursuit for exploration and exploitation (Heracleous et al., 2019).

The predominant part of this study adopts qualitative research methods. There is however a quantitative part to this research, making it a mixed method design. First, qualitative archival data is analyzed in a quantitative way by frequency counts of specific events. The relation between the quantitative and qualitative parts is that of the master-servant type, in which the outcomes of the quantitative part provides embarkations for the qualitative analysis. In the final stage, quantitative and qualitative results are synthesized in a process model. Figure 3.1 below summarizes the methodological outline and depicts descriptions of used techniques.

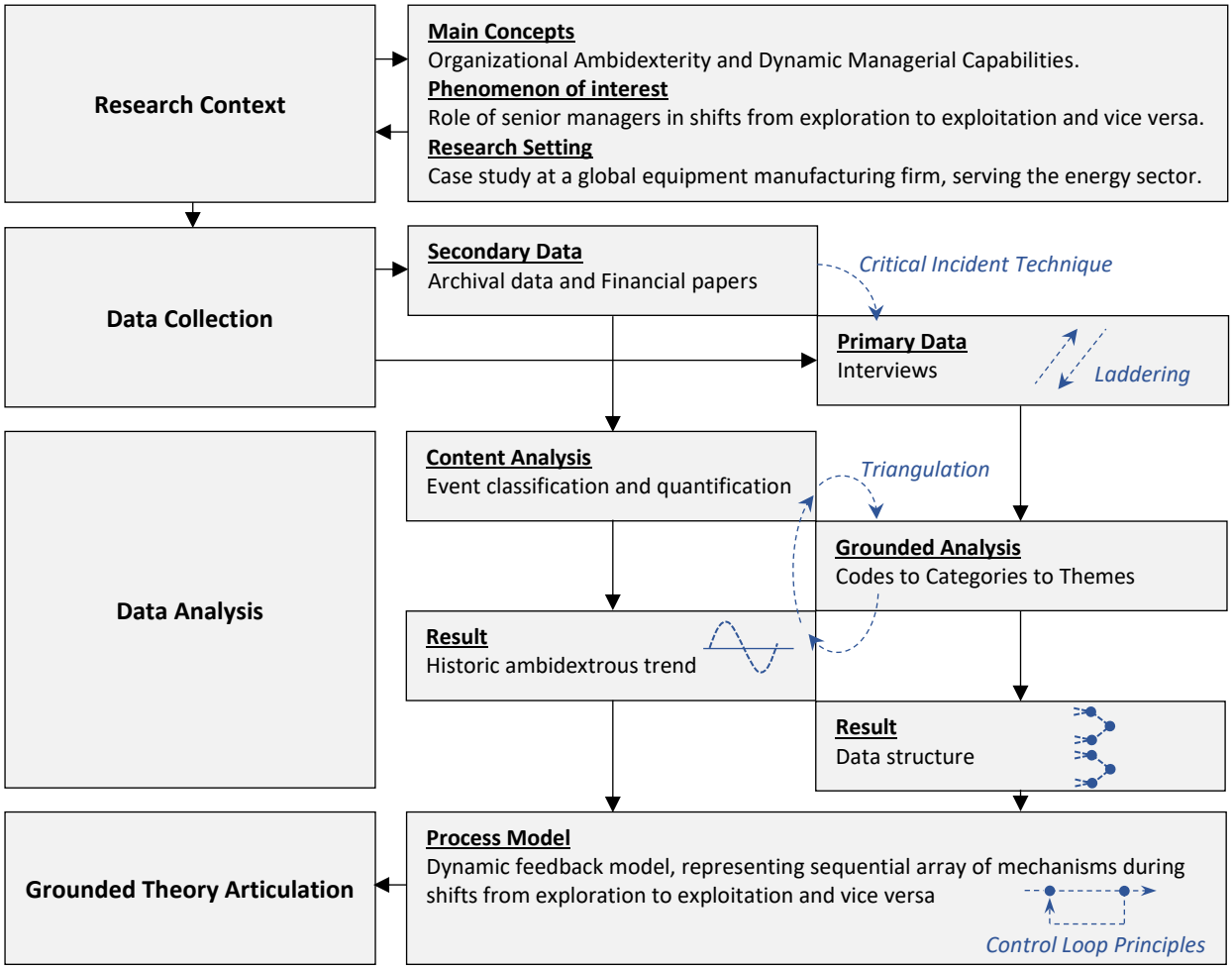


Figure 3.1 Overview of Research Design

3.1 Research Context

To investigate how senior managers shift between phases of exploration and exploitation over time, a longitudinal inductive case study is conducted at Huisman Equipment B.V. (Huisman). Hereby this study's empirical setting is large firms within the equipment manufacturing industry. Huisman is a globally operating heavy equipment manufacturing firm, mainly serving the energy sector. The global energy landscape is changing and the competition, regarding established products, gained ground. As a result, Huisman's organizational environment changed, thereby imposing ambidextrous strains onto the firm. Huisman's innovation contributions to support the energy transition have become increasingly important for its long-run legitimacy.

I chose Huisman because the company offers a unique setting to investigate the explorative and exploitative challenges it is facing and managing for more than 90 years. The firm recently changed its slogan from "*Worldwide lifting, Drilling and Subsea Solutions*" to "*Equipped for Impact*", thereby emphasizing a renewed identity with a vision to deliver step changing technical solutions, rather than solely maintaining focus on established products and markets. The longitudinal case study employed in this research explores how key events shaped Huisman's ambidextrous attitude over time, and elucidates the role of senior managers in changing direction between exploration and exploitation.

The chronological story kicks off from 1980 when Huisman and engineering firm ITREC joined forces and delivered their first floating crane. Subsequently, the period from 2009 to 2020 is sifted through in detail since the available data allows for thorough recapitulation of the course of events in that period. Then, the period between 2009 and 2020 is further interrogated by conducting lengthy interviews with key managers who directed and implemented changes in that period.

There are practical and theoretical needs to understand the micro foundations of organizational ambidexterity (Jansen et al., 2017; Raisch et al., 2009; Simsek et al., 2009). Thereby I have distinguished four theoretical representative cases to investigate the role of senior managers in the shifting between exploration and exploitation. The level of analysis for three cases is at the firm level, one case investigates how senior managers pursue ambidexterity at the business unit level.

3.2 Data Collection

This research is built upon multiple data sources, including company archives, financial papers and primary interviews. Data collection objectives are multifaceted. The first objective is to collect data that enables the reconstruction of a historic trend of the firm's ambidextrous propensity over time. This supports the identification of periods of shifts between exploration and exploitation. Second, the extraction and mapping of historic events from archival data serves as guidance for the identification of relevant cases. Third, the relevant cases provide convergence for extracting primary data via interviews, following a non-probabilistic sampling strategy and critical incident techniques (Flanagan, 1954). Finally, the objective of the primary data collection is to interrogate details and managerial motives behind the executed shifts between exploration and exploitation.

3.2.1 Secondary Sources – Archival Data

Non responsive data provides the necessary information to sketch the holistic picture of the firm's history, market circumstances, customers and products. Secondary data opened up an authentic and historic perspective, which might be difficult to reproduce through primary responsive data. The quarterly company journal, which is composed by employees and is open to the public, proved to be a

valuable source for the mapping of historic events. Credibility of company published data was verified by comparing critical events with press releases from an established financial paper.

Table 3.1 depicts the secondary data sources and their analytical use for this study.

Table 3.1 Secondary Data Sources

Secondary data sources	Analytical use
Company documents - Quarterly company journal (40 issues, 1560 pages) - Onboarding handout (30 pages) - Product book (180 pages)	Identify explorative and exploitative activities through context analysis. Reconstruction of the company's ambidextrous propensity over time. Identify events to focus on during interviews. Triangulation with interview transcripts.
Financial papers - 71 articles	*Identify explorative and exploitative activities.* *Reconstruction of the company's ambidextrous propensity over time.* Identify market circumstances and trends.

3.2.2 Primary Sources – Interviews

Secondary data sources provided exceptional preparatory opportunities for the sampling strategy of potential participant, and for the crafting of personalized event-based interview questions. Primary data aids to discover visions, impressions and opinions of individuals, and its extraction is more explorative and open-ended in nature (Tracy, 2013).

Potential participants were approached based on their roles during the identified relevant cases from secondary data, thus following a non-probabilistic approach to assure purposefulness of the queried samples. The sample of interviewees comprises of top management team (TMT) members and middle-managers, thereby representing reasonable instances of the larger phenomenon under investigation (Luker, 2008). Collection of interview data continued until new interviews proved to add less and less unique insights, indicating the advancement towards theoretical wholeness.

Interview settings varied between face-to-face and video calls, assuring synchronous mediation to reduce over-anticipated answers, and the preservation of non-verbal communication. A semi-structured approach was followed, using a topic guide with the main issues to cover (see: Appendix II), but leaving plenty of room for discussion and examination of emerging topics and themes. During the interviews the critical incident technique (Flanagan, 1954) was utilized to get quickly to the core of events. Managers were asked about specific explorative or exploitative events, and subsequently encouraged to explain their actions and perspectives related to the emergence and evolvement of such events. Furthermore, to get the most out of the answers and to query respondent motives, a combination of simple yet effective interview techniques was used (see: Appendix IV) to repeatedly descend from general statements to specific examples, and to ascend from the specifics to underlying rationalities (Wansink, 2003). Frequent probing was used to avoid researchers bias and building on false assumptions. Interviews are recorded and fully transcribed, providing an accurate foundation for grounded analysis.

To maintain anonymity, interviewees are not referred to with their real name. Pseudonyms are used in the form of their current position, or the position the interviewee held during the in the interview discussed event. Table 3.2 provides an overview of the primary data sources and their analytical use for this study.

Table 3.2 Primary Data Sources

Primary data sources	Analytical use
Interviews - 245 minutes, 76 transcript pages - Functions represented o Chief Executive Officer (CEO) o Chief Financial Officer (CFO) o Chief Technology Officer (CTO) o Managing Director Busines Unit GEO (MD G) o Managing Director Services (MD S) o Business Development Manager (BDM) o Manager of Hydraulic, Electrical, Software & Commissioning department (HESC)	Motives behind exploitative and explorative activities. The context in which exploitative and explorative activities took place. Course of events prior to and during the execution of exploitative and explorative activities.

3.3 Data Analysis

Data analysis for this study is conducted in three parts. In part 1, content analysis is executed on secondary data. In part 2, grounded analysis is done on primary data. In part 3, the results of both previous parts are synergized in an overarching process model. This paragraph explains and justifies the decisions made during analysis.

To assure systematic storing, analysis and extraction, this studies data management is executed using Atlas.ti software. The quantitative part of this research is prepared using Excel, results are subsequently merged into the Atlas.ti project.

3.3.1 Part 1: Content analyses on Secondary Data

The objective of the analysis of secondary data is to quantify the level of exploration and exploitation over time, and to identify shifts in emphasis between exploration and exploitation. To do so, archival data is interrogated on the presence of concepts derived from the pre-existing framework from Luger et al. (2018), which identifies firm activities and their related explorative and exploitative typologies.

This interpretative qualitative method enables the introduction of a quantitative element by counting the frequencies of certain events. The first reason to choose for this method is its loyalty to March's (1991) original construct of exploration and exploitation. The second argument for this method is that it is the only established means to classify ambidextrous business activities on large-scale, in a generalizable way, while incorporating a longitudinal perspective (Luger et al., 2018). As a result, the annual amounts of explorative and exploitative events are found, which subsequently can be transformed in a year-on-year ratio between explorative and exploitative events. Table 3.3 depicts the results of the content analysis on archival data.

Table 3.3 Content analysis of archival data

Year	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Total
Total Relevant Events	27	25	14	23	29	28	25	36	40	90	46	9	445
Exploration Events	9	7	8	10	13	10	17	20	25	57	18	7	239
Exploitation Events	18	18	6	13	16	18	8	16	15	33	28	2	206
Acquisition	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*1*	*9*
Alliance	*2*	*0*	*0*	*3*	*0*	*3*	*4*	*4*	*0*	*6*	*2*	*2*	*27*
Markets - Geographical	*2*	*3*	*2*	*2*	*4*	*1*	*1*	*2*	*4*	*7*	*1*	*0*	*33*
Markets - Industries	*4*	*6*	*1*	*4*	*6*	*5*	*6*	*11*	*7*	*19*	*12*	*2*	*99*
Organization structure	*13*	*9*	*5*	*9*	*9*	*9*	*4*	*7*	*11*	*17*	*13*	*1*	*116*
Products and services	*4*	*4*	*0*	*3*	*7*	*4*	*4*	*4*	*13*	*19*	*12*	*1*	*93*
Sales and distribution	*1*	*2*	*3*	*0*	*2*	*2*	*1*	*2*	*3*	*13*	*4*	*1*	*36*
Top management team	*1*	*0*	*3*	*1*	*1*	*4*	*5*	*4*	*2*	*8*	*2*	*1*	*32*

3.3.2 Part 2: Grounded analyses on Primary Data

Grounded analysis engages into theory building through categories that are grounded in the data. This method is more open and intuitive than content analysis, because the latter mainly aims to test existing theory. The analysis steps in Part 2 aimed to find structure and new theoretical insights in the primary data through a repetitive process of comparing data chunks. In doing so, understanding was created on the meaning of certain data portions in their specific context (Flick, 2015). Internal validity of the analysis was augmented by conducting triangulation with secondary data sources (Eisenhardt, 1989). In this study, the grounded analysis process followed four stages.

First, after all data was collected, a familiarizations step was done in which all data was sifted through. In this step I focused on capturing broad understanding on what the data suggests, whose opinions are expressed and how respondents relate to investigated topics and events. Besides familiarization, this first step resulted in the identification of fragments that are interesting and enrich existing theory. After familiarization was finished, the first coding step started.

Codes (1st order) First cycle coding consisted of the identification, highlighting and annotation of relevant passages in the data. The code annotation is chosen to be informant centric, meaning it remains close to the integrity of the interviewee's response. This was done either with in-vivo coding, which produces a quote of the original data, or by providing an annotation that summarizes the respondents answer in a short phrase. I started searching for phrases that matched the constructs under investigation. For alluring phrases that could not directly be matched with existing literature, new categories were added. The created first order codes constructed the required ties to move from the mind-boggling data mass to more systematic categories.

Categories (2nd order) With second cycle coding, the goal is to ascend from informant centric annotations to more descriptive categories. This was done through finding patterns in the 1st order codes, for example; similarities, differences, frequencies, sequences, and causalities (Saldaña, 2013). In this highly iterative process, the research question was continuously kept in mind in order to focus these first framework building efforts. For some categories short memos were written that capture the essence, providing rules for in- or exclusion of 1st order codes. When categories emerged, relations between those categories were mapped in networks, and adjacent categories were color-coded based on theory centric constructs. Categories that could not immediately be linked to theoretic constructs were also color-coded and grouped in separate but linked networks. Appendix IV provides an overview of representative quotes that comprise the 2nd order Categories.

Themes (Aggregation of Categories) In this last coding stage, associated categories were merged into aggregated themes. It is at this stage where the data structure became apparent. Themes were annotated by capturing the accumulated content of 2nd order categories at a high level of abstraction. The Theme annotations themselves comprise of combinations of existing theoretical constructs from system dynamics- and dynamic managerial capabilities literature.

3.3.3 Part 3: Process Model

The objective of the Process Model is to arrange the theoretical Themes of the data structure in such a way that it captures the dynamic interrelationships between the Themes. This is done by showing how the phenomenon of interest – the shifting between exploration and exploitation – evolves through the grounded Categories and Themes (Gioia et al., 2012).

The construction of the Process Model, moreover the relative positions and interconnectedness of blocks and arrows, was accommodated by two main analyzing steps. First, I cycled through the findings of the identified cases, thereby finding a sequential pattern in the course of events prior to and during shifts between exploration and exploitation. For instance, here I found that shifts between exploration and exploitation are always initiated by a disturbance that sets everything in motion. Second, by reflecting on system theory and dynamic managerial capabilities literature, I developed a proposition on the dynamic evolvement of explorative and exploitative propensity over time, incorporating; system properties, managerial detection practices, error evaluation methods, and control mechanisms. This analysis, by combining the actual course of events as found in the data with control loop principles, is what led to the formulation of the Process Model as depicted in the findings section. The template of the findings section is based on this outline.

4 Findings

This section consists of three parts. Part 1 provides an overview of noteworthy explorative and exploitative activities of the case firm. Subsequently, it presents how the ratio between exploitation and exploration events developed over time, in the period from January 2009 to April 2020. Part 2 displays the findings obtained from interview transcripts, and elaborates on the emergence of the data structure via categories and themes. This part is buildup on the basis of four specific cases, following a chronological logic for each individual case. It is here were motivations and context behind events are illustrated. Part 2 completes with the depiction of the data structure. Finally, part 3 displays the process model.

4.1 Part 1: Content analyses – Noteworthy activities

Huisman was established in 1929 and started as a manufacturer of steel constructions. In 1945, Huisman produced their first hoisting equipment for cargo vessels. When Huisman teamed up with engineering firm ITREC in 1980, a new area had dawned. The combination of expertise's of both steel manufacturing and engineering turned out to be a golden step and Huisman was soon recognized for the development of custom heavy lifting constructions. In the 90's, a certain discontent on the implementation of drive systems by third parties led to the decision to acquire the knowledge and skills for the drive and automation of those heavy steel constructions. From that point onwards, Huisman was able to develop highly automated and custom equipment, from first concept to commissioning and testing, on a turnkey basis. Around '94 the firm counted approximately 80 employees and operated from Rotterdam. Huisman would grow exponentially to a globally operating company, which at its maximum, employed approximately 4.500 people in 2013. A changing market environment, with volatility of fossil fuels and growing competition for the less specialized products of the spectrum, led to reductions and eventually thorough restructuring in the period between 2016 to 2018. Now, Huisman counts approximately 2.500 employees, is achieving great successes for the offshore wind installation business and has structured its organizational processes for the future.

Explorative events	Exploitative events
1980 Steel construction firm Huisman teams up with engineering firm ITREC to deliver their first 1.600mt floating crane. *1984* Development of the first Heavy Lift Mast Crane. This unique concept is at the very heart of Huismans' legacy in heavy offshore lifting and provided the '84 Entrepreneurs Award. *1985* Pioneering in the development of Active Heave Compensation, a technological bedrock for automated offshore equipment. *1986* Entry of the leisure market with the delivery of an earthquake simulator. *1990* Entry of the civil construction market with the development of transport systems for the Storebælt bridge.	*1987* Huisman and ITREC officially merge. This facilitates the integration of both engineering and manufacturing capabilities in one single company. *1997* Opening a new production facility in Czech Republic to increase manufacturing and engineering capacity. *1998* Moving the head office from Rotterdam to Schiedam for expansion purposes. *1998* Opening an office in the United States. *2001* Acquisition of Vekoma, a leisure market oriented engineering company. Partly explorative in nature because the acquisition realizes a strong position in the leisure market.

1994 Entry of the market for subsea rock dumping with the development and delivery of a rock dumping system.

1996 Entering the market for pipelay systems. A foundation for nearly two decades of market leadership in this industry.

2001 Entry of the offshore drilling market with the delivery of the unique Multi-Purpose Tower concept. The groundwork for the highly innovative Dual-Multi-Purpose Tower, a concept that would win the '12 Maritime Innovation Award and contribute to two drill ships obtaining Shell's prestigious Floating Rig of the year Award.

2002 Development of specialized equipment for salvaging of submarine Kursk.

2005 Entry of the onshore drilling market with the development of a highly automated and containerized rig concept.

2008 Pioneering in the development of Fiber Rope Systems. A technological development that would receive the OSJ innovation award in 2018.

2009 Founding of InnoDrill. A drilling contractor subsidiary in Houston Texas.

2010 First activity withing the geothermal energy sector, drilling of a geothermal doublet in The Hague.

2012 Investment and cooperation for the realization of a tidal energy plant.

2012 Founding of Huisman Well Technology, a Joint Venture with a well engineering firm. With this activity, Huisman entered into the development of downhole drilling tools and drilling fluid control systems.

2015 Investing (and becoming major shareholder in 2016) and co-development for the development of innovative pile drive technology, with the purpose to silently install offshore windfarms.

2015 Development of a revolutionary new crane type. The Hybrid Boom Crane, which would win the OSJ Innovation of the year Award.

2007 Opening a new production facility in Zhangzhou China to increase manufacturing capacity.

2008 Investment in an automated warehouse system to secure transparency and efficiency.

2008 Acquisition of Bodewes Winches.

2009 Setting up a professional global service organization to support the servicing of the tremendously increased installed base. Opening facilities in Singapore and Houston.

2009 Setting up an office in Twente, The Netherlands, to expand engineering capacity.

2010 Setting up an office in Slovakia to expand engineering capacity.

2010 Acquisition of SEC, an engineering firm based in Breda, The Netherlands.

2011 Setting up the Huisman Academy to train clients and new employees. Partly explorative in nature since there is an overlap with the initiation of the development of simulators and simulator training.

2012 Setting up a new production facility in Brazil to expand manufacturing capacity. Partly explorative in nature because it serves to obtain access to a new geographical market.

2012 Realization of an Improvement Program to address; product data management, resource planning, project management, procurement, safety and quality. This included the definition of End-to-End business processes.

2013 Opening a new branch office in Norway. Partly explorative in nature because it serves to obtain access to a new geographical market.

2013 Opening a new branch office in Perth, Australia. Partly explorative in nature because it serves to obtain access to a new geographical market.

2014 Kickoff of improvement program HuisOne which includes a culture and leadership program.

2016 Start of research and development on 3D printing of steel. The development of this new production technology resulted in world's first 3D printed ramshorn lifting hook in 2018. *2018* Pioneering and collaborating in the development of equipment for grid stabilization via gravity-based energy storage systems. *2018* Emergence of Focus Groups for the identification and channeling of potential new areas for product- and market development. Amongst others for Geothermal energy, Offshore wind, Servitization and Decommissioning of industrial heritage. *2018* Introducing a new range of cutting-edge wind turbine installation and maintenance tools to the market. Amongst others the Motion Compensate Pile Gripper, Universal Lifting Tool and Foldable Offshore Crane. *2018* Establishing business unit Huisman GEO. A unit to accelerate the development of geothermal energy in Europe. Amongst others via public private participation in heat delivery projects for municipalities. *2019* Investing in engineering and production of submarine elements.	*2016* Kickoff of improvement program BigMoves. After mixed results of previous improvements programs, the BigMoves were initiated as part of an extensive reorganization and structural modification program. *2018* Effectuation of the matrix organization. A new way of working within a completely restructured organizational model and a new board of directors. The firm is managed along three lines. First projects, second disciplines, and third locations. Successfully bringing transparency, efficiency and cost reduction.

4.1.1 Ambidextrous propensity over time

Huisman engaged in numerous exploitative and explorative activities, on various levels of analyses, over the course of its existence. New business units were setup for services (exploitative), drilling (explorative) and geothermal energy (explorative). Explorative alliances and acquisitions were executed for the development of new technology and to gain market access. Exploitative alliances and acquisitions were made to increase capacity.

In figure 4.1 it is seen that the ambidextrous propensity of the firm is changing over time, and that there are shifts between periods dominated by exploration to periods dominated by exploitation. However, this trend says little about the actual balance in the total explorative- and exploitative efforts of the firm, the exercise does provide meaningful insights in the historical evolution and how Huisman managed to evolved from a small steel construction company to a globally operating heavy equipment manufacturer.

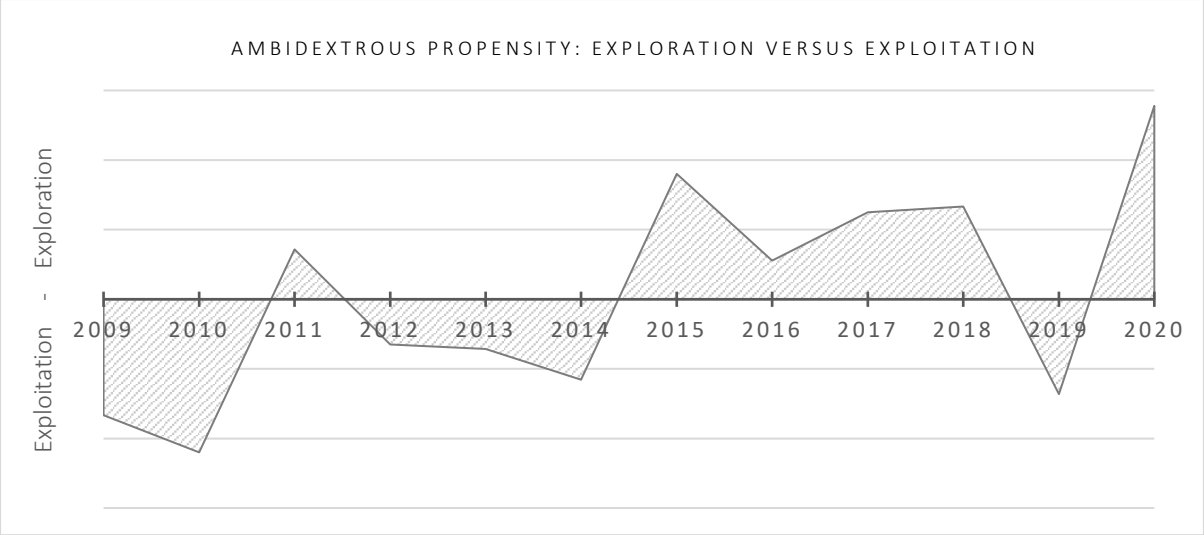


Figure 4.1 Graph indicating ambidextrous propensity over time

4.2 Part 2: Grounded analysis

This research's particular interest is in elucidating how senior managers engage in turning the tide from exploration to exploitation, and vice versa. To investigate this, specific exploitative and explorative events are analyzed in depth. What led to those events? In which context did they take place? How did managers know that something had to change? Which mechanisms were used to effectuate a rebalance? This paragraph depicts the findings, following four specific cases.

4.2.1 CASE I: Service organization – firm level - steering towards EXPLOITATION

Strong sales of numerous types of product in various markets continuously expanded the installed base of Huisman products around the globe. One of Huisman's key selling points is that they provide innovative and highly automated heavy machinery.

Initiation of imbalance. Equipment requires maintenance and deteriorates over time. With the ever-increasing installed base also the service demand strongly rose. Additionally, some delivered machinery was so technologically advanced that it required dedicated training and a different mindset for operators. This increase in service and training demands triggered 'internal disturbances' in the organization. In the early 2000's, the service team consisted of only a few employees, responding reactively to incoming client requests (155:1). Moreover, these employees were part of the Hydraulic, Electrical, Software & Commissioning department (HESC), and thereby were also appointed to newbuild projects. More and more people were pulled ad hoc from project engineering tasks to perform service jobs, leading to gaps and thus major 'inefficiencies' in the newbuild projects (155:4).

Managerial detection of disturbance. The former manager of the HESC department indicated: "Sometime when I arrived at the office in the morning, all of a sudden I found out that one of my guys was send to the other side of the world for a service job. And when would he come back…? it could be days… it could be weeks. This was no longer a workable situation. Services needed to be taken seriously now"

Besides the above 'reactive reception' of a problem, the HESC manager was also well aware of a potentially positive 'external disturbance', namely the 'global trend' driving a focus towards proactive services. The former HESC manager argues: by proactively contacting our clients we can unburden them and it provides opportunities for up sales and potential healthy margins. Moreover, Huisman can create opportunities to keep an eye on the status of equipment and to mitigate the chances of

unexpected failures and subsequent hazard, keeping up our good reputation for quality and safety (155:1).

Evaluating disturbance. With the clear notion that "Services needed to be taken seriously now" the HESC manager started crafting a plan to further exploit Huisman's service activities. The lack of a dedicated service team, consisting of members specifically and solely for the performance of service jobs, was an 'inescapable event'. This had to be handled or else services, newbuild or maybe even both, would be unable to deliver.

For the potential upside of this shift towards proactive services, the manager engaged in 'strategic conception' through the crafting of a business plan titled: "Closing the circle". Three main pillars can be distinguished in the process of managerial evaluation of the encountered disturbances. First there was a focus on the business case, moreover on 'long term return'. There was a significant pool of equipment floating around all across the globe, this provided many entry points for the service organization for continuous sales (155:10). Second, the 'urgency' of the lack of proficient client training and proactive maintenance contact was interpreted through the lens of 'potential impact on the forthgoing of the current strategy'. In other words, management asked itself: "what might happen if we don't act?"(155:11). It was concluded that Huisman has a reputation to deliver top-end and sophisticated equipment. This sophistication however is worth very little when the equipment is not operated as designed and thereby might be perceived as underperforming and thus too expensive. Furthermore, Huisman did not receive any status update from various machines for many years. A positive sign but, again a reputation for 'quality' and 'safety' that Huisman was looking to keep upright for many years to come (155:10). Third, management 'envisioned a desired situation' and 'determined how devious the new strategy would be' from the current way of working. The former HESC manager debates: Services is a completely different story than newbuild. It is a 24/7 business so Huisman needs global presence to cover different time zones. It requires quick response because one day of downtime might cost a client $1Mln. It demands a flexible mindset from employees; they can be called to a job today, be on a helicopter in a few hours, and not return home for weeks.

Although exploitative in nature, the envisioned service organization had a fundamentally different way of working than the mother organization. For this reason, the HESC manager decided to pursuit a separate business unit for services. Moreover, he sought to ease budget control and decrease IT system dependency. From 2009 onward the service organization would operate independently, reporting its own P&L statements.

Effectuating change. First, the former HESC manager sought to 'gain traction' in his internal network to get the TMT behind the plans to invest in exploitative activities to setup the professional service organization (155:24). Shortly after, Huisman opened two service locations in geographically tactical areas. One in Houston Texas, and on in Singapore. For both locations there was a form of 'interfirm collaboration' to get things started.

In Houston a 'Joint Venture' was established with Intrepid, a small service firm of which Huisman found out that it could get along with very well during various earlier service visits in the region. Besides servicing equipment origination from Huisman, the JV immediately provided 'market access' to other clients. Eventually Intrepid was bought out of the JV (155:7). For the Singapore office, one of Huisman's TMT members utilized his 'managerial network' to team up with a local relation (155:5).

Consecutively, the locations were manned with Huisman service employees. Here again the former HESC manager used his internal network 'to gain traction' and recruit personnel (155:24 & 155:24).

Organizational response properties. The dataset on CASE I provides evidence for both 'change impeding'- or 'inertia' properties and change enacting- or 'momentum' properties of the firm. Findings on 'inertia' were especially found when analyzing managers' biggest challenges during the effectuation of change. Findings on 'momentum' were especially found during the interpretation of relations between and sequences amongst events.

Most difficult in setting up the service organization was to convince the rest of the organization that services was important. The focus really was on newbuild projects. This was due to a strong 'organizational culture' geared towards engineering perfection, aiming for optimal solutions but not necessarily with a serviceability mindset (155:18). The latter significantly improved these days (155:18).

The pursuit of the former HESC manager to setup a completely separate business unit for services was not realized until 2020. This was due to various shift in TMT and accompanying changes in 'managerial preferences' (155:12). Therefore, it would take the service organization eleven years to come officially lose as a business unit (156:21).

The previously described Joint Venture with Intrepid in Houston brought new customers to Huisman. This was due to the 'market access' to other clients. These new 'market entry points' would later cause a 'momentum' for Huisman's newbuild organization since these service clients also became customers for new equipment (155:7).

One of the goals of the service organization is to train customers to optimally utilize equipment. In part this activity initiated a 'momentum' for explorative activities in the development of simulators (155:3) and the establishment of the Huisman Academy. The simulator branch would later be discontinued due to 'organizational inertia'. "A too strong focus on technology and the impossibility to open up data interfaces due to intellectual property reasons, resulted in us trying to reinvent the wheel in the simulator business. Clients found other parties that could do what we did, only better and quicker. It is just another business." (155:22).

Another good example of 'momentum' can be found in how Huisman got involved in the pipelay market through servicing offshore cranes. During these visits Huisman employees came onboard pipelay vessels that were equipped with Huisman cranes. "The pipelay equipment we saw onboard those vessels…dramatic equipment! Really, we knew right away, we can do this much better". Within five years Huisman became the most dominant player in the pipelay sector, this while ten years earlier they never thought of pipelay at all. "You just come across such things on your path" (155:49).

4.2.2 CASE II: Business unit GEO – firm level - steering towards EXPLORATION

This case depicts the emergence and establishment of the Business Unit GEO (BU GEO), a branch that focusses on the development of geothermal energy in Europe. Its origin is rooted in a path dependent history that deserves explanation. For this reason, CASE II starts with a short background on the events that caused the 'organizational momentum' out of which the BU GEO emerged.

Background

In 2002, Huisman's president came in contact with a potential 'customer' for land rigs, who sought specific technological needs to bring a new drilling technology to market. This, in combination with the president's 'vision' to develop highly automated rigs in order to drastically improve operational

safety, led to the construction of Huisman's first land rig in 2004. In the years following, five more rigs were built of which some were sold. In the meantime, Huisman teamed up with other companies and established a drilling contractor firm in Texas, of which Huisman owned 33%. A few years and several adventures later Huisman established its own drilling contracting firm in Houston, all of which provided a significant 'knowledge repertoire' on the execution of drilling operations. Shortly after, the land drilling market in the USA collapsed and Huisman's unemployed drilling 'assets' were stored (155:31).

For the last five years or so, the Dutch government demonstrates increasing support for the harvesting of geothermal energy as an important contribution to the energy transition. In 2016 Huisman's current CEO 'envisioned' that Huisman should play a role in the quest for this form of renewable energy and soon a geothermal operator was invited for a chat. This meeting did not materialize into a contract but, the contact provided a 'market entry point' and things started snowballing. This led to other connections, a contract for one of the stored rigs, and finally a successful geothermal doubled drilled in 2017 (155:31).

Initiation of imbalance. From Huisman's customer base in the mid-10's, the predominant part relied heavily on the market for fossil fuel extraction. Due to the crisis and consistent low oil price 'market circumstances' were poor. Investments in new machinery were hold off and Huisman's orderbooks dried up (153:15). "It was born from necessity that we had to look for other markets, we had to diversify" (153:15).

Managerial detection of disturbance. Both the changing energy landscape and the lack of incoming orders were, self-evidently, obvious to Huisman's TMT. The TMT however did not sit on their laurels and by appealing to 'knowledge and expertise' obtained from the earlier drilling endeavors and the recently successfully drilled doubled in the Netherlands, the decision was made to give geothermal energy a serious try. "Let's take a serious look, with a dedicated team, and see what we can do for the geothermal energy sector" (155:36). This really put geothermal on the map and the strategy formulation, to investigate Huisman's potential position in the value chain, started.

Evaluating disturbance. Two new 'roles were created'. First, a 'mentor' was appointed with experience in the drilling industry through the US based drilling contracting subsidiary. Second, a business development manager was recruited to take up a 'pioneering role' for geothermal energy within Huisman. In doing so, the initiation of the 'evaluation' step went hand in hand with the first measures that 'effectuated change'.

The BDM then setup a 'focus group' by recruiting employees from inside the organization, a multidisciplinary team of seven members was formed. The focus group's task was to formulate a strategy. First broad 'market research' was conducted, followed by 'business cases' for various 'positionings' in the value chain of the new market (153:16). The focus group presented and discussed their findings with the TMT on a monthly basis. Three main alleys of 'vision perpetration' are identified in this process. The approach was to; 'match knowledge with opportunities', 'match assets with opportunities' and 'find omissions in the new market' (153:15 & 153:17 & 153:19). As seen earlier, Huisman had built both knowledge and assets for land drilling but, neither were effectively exploited at that time. Omissions were identified on financial aspects (how geothermal projects are funded) and technological aspects (how risk and cost can be reduced through innovation).

The evaluation, which was conducted over a period of six months, resulted in a multifaceted yet cohesive plan. On the highest level, Huisman sought to 'diversify' in the renewable energy market and wanted to 'shape a renewed identity'. The new strategy therefore was not to propagate the drilling of geothermal wells, instead it was chosen that Huisman would start building on a reputation as trustworthy long-term partner for the realization and exploitation of renewable energy projects (155:40). This led to a, for Huisman new business model, in which Huisman co-invests in heat projects through public-private collaboration.

Effectuating change. For the effectuation of the plan, the focus group advised and the TMT choose to go for a 'structural modification' and to setup a 'separate business unit'. This choice found its origin in the outcome of the 'evaluation' step, there it was defined that the new strategy would be too 'deviating' from the core business and that it was best to reduce the risk exposure of the mother organization in an unknown new industry (153:22 & 153:22 & 153:23). "It is a completely different way of working. When we started it, we acted as contractors, that is not our core business and it should not be. But it offered an opportunity to enter the market. For our intended strategy, in which we participate and co-invest, it is functionally and fiscally more efficient to setup a separate unit" (156:22).

TMT in an early stage recognized that a different business model requires a different way of working (153:28). Therefore, TMT effectively engaged in 'people management' right from the start. The previously described 'mentor' and 'pioneering' roles proved valuable during the 'evaluation' phase. Moreover the 'focus group' provided a means of 'participatory process shaping' which prepared some of the participant for the inauguration into the newly established business unit.

Organizational response properties. In CASE II, I also find elements of 'inertia' and 'momentum'. This CASE's introduction already elaborated on how Huisman got involved in the geothermal market via path dependency. From the land drilling adventure in the USA, Huisman inherited a number of highly automated drilling rigs, a 'repertoire of knowledge', and an early experience of drilling for geothermal energy on Dutch soil in a JV construction (155:34). This combination provided the 'momentum' to seize opportunities in the geothermal market.

The 'availability and flexibility of workforce' from the mother organization is another important factor that keeps the BU GEO going. The business development manager argues "The mother organization provides a flexible shell; we can borrow people when needed. This is important because this new business does not immediately provide constant and full-time jobs for a complete team. But we can quickly scale up and down when needed" (153:28).

Inflexibility of 'IT systems', of which the BU is largely dependent on the mother organization, was perceived as the larges hurdle to swiftly support the effectuation of new explorative activities (153:26).

4.2.3 CASE III: Business unit GEO – BU level – EXPLOITATION and EXPLORATION

During the analyses of CASE II, rich information was found to provide evidence for the existence of a high-level primary process, that on the firm level, and subsequent lower-level secondary processes, those on the business unit level. Both processes follow similar managerial mechanisms.

This section presents the findings on how managers seek to implement shifts, from exploration to exploitation and from exploitation to exploration, on the business unit level. It provides especially

valuable insights on how managers perceive change, how they purposefully craft pathways for contingencies, and how they handle contradictions.

The conducted interviews on CASE III fostered opportunities to comprehensively query managerial perception of the tension between exploration and exploitation, hereby elucidating the micro foundations of ambidexterity on the business unit level. This was possible since the ambidexterity matter at hand was so close to the current action, that it caused a lively dialogues which emerged around some actual challenges that the business unit is facing just now.

Initiation of imbalance. The BU GEO was setup only two years ago with the strategy to participate in the realization of geothermal energy projects. This means not just drilling, but rather co-investing and long-term return for the delivery of heat. Such projects however are not widely available since the 'market' is much slower than envisioned in the Dutch Master Plan for the development of geothermal energy. This disturbance led to concessions to the original strategy of the BU, since it now also takes jobs as contractor (155:38).

Other disturbances are found in the continuous evolvements of 'technologies'. Technologies that might change the way in which geothermal energy is exploited, that might decrease the value of inhouse innovations, or that might create new opportunities.

Managerial detection of disturbance. The BDM explains that, in order to sense if the BU is on the right path, he engages with 'internal sparring partners' (TMT members of the mother organization) on a frequent basis, and is 'actively' looking outside to see and feel what is happening in both his own and other industries (153:35). "Therefore, I surround myself with people with different visions" (153:49). Furthermore, constant 'change is accepted as a given' and within the BU managers embrace that the original strategy is merely a guideline, which needs constant testing and reevaluation to find the right fit (153:30 & 153:31). Managers also rely on 'gut feeling' and prior 'experience' to judge whether a disturbance should be seriously evaluated and potentially be handled with. "Sometimes new strategy just needs some extra time to take off" (153:32).

For the detection and proper evaluation of potential impactful new technologies the BDM argues that it is important to 'recognize the existence of own bias'. "You have to be aware of your biases. They will not disappear and don't need to. But being conscious about them, that they exist, helps to prevent premature closure." (153:49).

Evaluating disturbance. The disturbance of the slow market was evaluated through various lenses. Although convinced that purely looking at P&L statements is a weak proxy in early stages of market development, the BDM and MD Geo recognized that a shift towards exploitation was needed to seek short term returns (153:36). For the 'strategic conception', priority was given to 'take a position in the value chain to learn for the future' and to build 'brand awareness' (155:38). This meant staying busy by taking contracting work to maintain skills, keep assets running, and take a smaller portion of the cake (153:29). The MD Geo immediately added to his statements: "The danger of making concessions on the strategy for too long, is that we stick to it, and keep doing what we are doing" (155:39), indicating managers are watchful for the competency trap.

On the topic of emergent technologies, I found that managers foremost evaluate 'to what extend the disturbance effects their current way of working' in order to decide whether to take action or not (152:37). In this case an upcoming technology, of which I will not go into further technical detail, was identified with potential high impact. For the 'evaluation of disturbance' management engaged in

'vision perpetration' by 'envisioning a desired situation' in which the alien technology could be beneficial for both the inventors and for Huisman.

In CASE III, I find that strategy was changed to favor short term exploitation on one hand while an 'interorganizational cooperation', to spur exploration, was established on the other. In first, when pushing for answers to explain why to seize some threads and opportunity and reject others, it was as if there is not really a tension felt between exploration and exploitation. The MD GEO argues: "Change is the only constant. We decided to participate in geothermal energy and focus our expertise to contribute to the energy transition. Since we walk on this path, we will face ups and downs and run into many opportunities along the way. If something pops-up for which we might need to change our tactics… we'll deal with it when it occurs. The only thing you cannot do, is do nothing, then nothing will ever change and eventually everything will come to a stop" (155:42 & 155:45).

When really put onto the spot however, by referencing to explorative and exploitative opportunities which were earlier discussed during the interview, and again pushing for: "Why seize some and reject others?", the answers were constructed on 'resource related boundaries' and 'visionary' ideas. Recently two projects, one explorative- and one exploitative in nature, were discontinued. "There are plenty of opportunities for new technology development and several for keeping assets busy but, we only have so many people to work on them" (155:47). For these occasions it is found that resources are focused on activities with the highest expected 'long-term value' in terms of 'building a reputation', gaining 'market share' and potentially opening doors to new opportunities. Whether the activity is explorative- or exploitative in nature, as scholars might want to categorized it following business literature, is subordinate in the decision. One senior manager added that 'intuition' and sometimes 'personal preference' might play a role (156:24).

Effectuating change. The effectuation of the shift towards short term exploitation triggered a simple 'process modification', namely that only a part of the originally intended workflow was to be executed. The BDM adds that he defines different levels of change. "Since it is a fairly new business unit, adjustment on low level, for example to working processes, are made frequently. A flexible approach helps to facilitate this. The higher the level, the less volatile the environment and the fewer constant adjustments are required" (153:29 & 153:40 & 153:43).

To take action on the topic of the upcoming technology, the MD GEO effectuated an 'interfirm collaboration' with the inventors. "We are now looking to develop custom equipment for their technology, specific for their intended way of working. Besides potential equipment sales for Huisman, this might be the start of a partnership to bring their technology to Europe." (155:43 & 155:42).

Organizational response properties. On the new technology the MD GEO continues: "Yes we invest in this on our own account now but, the worst thing that can happen is that it is not going to fly. In that case we will have gained knowledge and a have built a network, which might lead to new entries in the renewable energy sector." (155:43). This indicates that managers purposefully craft 'organizational momentum' to deliberately spur contingencies from happening (155:41 & 155:48).

4.2.4 CASE IV: Shift to Matrix organization – firm level – steering towards EXPLOITATION

Initiation of imbalance. In the early 2000's Huisman grew almost exponentially, there were lots of opportunities and good profits were made. The company was led by a pioneering spirit and the culture was heavily geared towards engineering perfection. There was however a poor project

organization and there were few functional hierarchical lines “Everybody just did what they thought was best. It was a fantastic time though and we had a lot of luck to!” (155:15). One senior manager recalls how late project deliveries used to be more rule than exception. This however did not bother the customers, because back in those days there was a huge under capacity at the shipyards, meaning that the vessels on which the equipment needed to be installed, arrived even later. “We never faced penalties. The clients were actually very happy with the capabilities and build quality of our equipment, they kept coming back for more” (155:15).

Due to the enormous growth, Huisman expanded from a firm with only a few concurrent projects at hand, of which every employee knew all ins and outs, to a multinational with many coexisting complex projects. Throughout the years, a functional structure became apparent which divided the organization in departments, each with its own expertise. There were departments for Mechanical-, Hydraulic-, Electrical- and Control System engineering, there was Production and there was Staff. Sales was mainly done by the visionary owners of the firm. Later, Purchase, Logistics and Project Management was setup in order to take this workload off the shoulders of the engineers. There were some gaps that needed to be filled, resulting in departments for; Naval Architecture, System Analyst Group, Work Preparation, Commissioning & Testing, Document Control, Technical Documentation, Planning, Research & Development, Estimation, Sales & Concepts, Sales Newbuild, Aftersales, HVAC, Routing and a Project Management Office. Finally, Legal, Finance, ICT, PR, Travel and HR added their share to the department streak. For many years, this intertwined medley of engineers, craftsmen and entrepreneurs, achieved great successes and build a reputation as heavy equipment manufacturer.

When around 2014 the market started to become slower, investments in heavy equipment for the energy sector decreased. On top of this, competition from other manufacturers rose, putting margins under pressure. It was not new to the TMT that Huisman assimilated inefficiencies and that effective operational governance was strenuous due to elements of projects being distributed over different departments. But it was only now that these little-translucent and inefficient patterns became predicament for the continuity of the firm.

Managerial detection of disturbance. Managerial detection of the above disturbances was multifaceted. The former manager engineering illustrates how the realization that something needed to change really sank in when trying to explain the internal working process to the former CTO. “I thought by myself, what a long and rather complex story to explain our process” (158:2). This same manager, who would later become the CTO himself, was moreover pondering about a better process for quite some time, and had picked up a potential useful framework from an IT consultant in his ‘network’. This process, the “V-model”, would later be modified and adopted for engineering (158:6).

Another important proxy for disturbance is the ‘active and reactive reception’ of ‘employee behavior’. The CTO noticed that some good people felt as if they could not get the mandate to make things happen. Between all those departments it was difficult for ambitious employees to find a position to help the company further, to utilize their potential and to spur personal development. This contributed to the idea to setup another way of collaboration, in which people can be stretched more, and which brings more responsibilities lower in the hierarchy (158:3).

Finally, a newly appointed CFO played a significant role in the detection of the disturbance that would lead to the complete restructuring of the firm. From business economics perspective the company grew somewhat muddled over time. Functional relations between locations were ill-fitted and reporting alignment nonexistent (156:15).

Evaluating disturbance. The CFO continues: "First I took a step back and asked: what kind of company are we actually?" This triggered the process of reforming the company around its functional structure. The company was to be managed along three lines. First projects, which are leading. Second functions, and third locations (156:15). This evaluation approach incorporated elements of both 'strategic conception', to position the firm in the new market, and of 'performance criteria', to increase efficiency and lower cost (3:4). The measures were 'urgent' and seen as 'inescapable' as the CFO anticipated that the firm would unambiguously face challenges if no measures were taken in the prevailing circumstances at that time.

For the new working process the CTO 'envisioned' transparent practices, that could immediately visualize the status of projects. Moreover, an emphasize on the illumination of the interfaces and feedback loops between various disciplines and stages was essential (158:7). A workgroup, consisting of forward-thinking employees with backgrounds in quality assurance, process analytics and engineers, was setup to identify how working procedures should be shaped. The workgroup regularly engaged in brainstorming sessions with middle management (158:1), thereby preparing personnel for the 'effectuation of change' via 'participatory process shaping'. The output was a rough framework, intentionally keeping certain aspects blank, so that employees could fill them out during actual implementation into their daily work. Again, a form of 'participatory process shaping' to get people behind the plans (158:10).

Effectuating change. "Yes, strategy and such… that is never the problem. Coming up with a good strategy is a month's work at most. It is all about the execution" (CEO). Four major topics would be addressed; efficiency, transparency, quality and people development. To effectuate this, both 'process modifications' and 'structural modifications' were realized to make the organization project focused (158:9).

In the shift from a functional- to a matrix organization, the departments were dissolved into disciplines. The former separate Electrical-, Hydraulic- and Control System departments merged into a discipline for Drive and Automation. From now on, project teams are formed, consisting of employees from the different disciplines. When a project starts, the team is physically positioned in a project room (158:11). The transformation from departments to disciplines also effectuated the 'shift of cognitive barriers' of employees, thereby extinguishing 'island thinking'. The CTO argues: "in the past there was one department here and one there, those were per definition islands". Those employees however worked on the same project and their output needed to merge into one machine at some point. Arranging people in discipline fields improved collaboration on projects and strengthened a worldwide feeling of collectiveness. Collogues across the globe in a certain discipline now share a common denominator (158:14). Finally, a 'new hierarchical role' was created, that of the Technical Project Manager. This function is held by employees with both broad and deep technical knowledge, who assure complete alignment of the technical project scope. Especially in the beginning, the Technical Project Managers had the extra tasks to take up the 'pioneering role' for embedding the new way of working, and to 'actively' look for potential process improvements and communicate those with the TMT (158:13 & 158:18).

To further improve quality and efficiency, knowledge management obtained a dominant position within the new way of working. The CTO realized that for continuous improvement, not making the same mistake twice, enhancing modularity and mitigating unprofitable exploration, proficient knowledge transfer is key (158:9 & 158:22). This is amongst other effectuated through the

implementation of a Product Lifecycle Management package and the constitution of a new corporate knowledge portal.

All in all, the restructuring enabled Huisman to achieve higher quality and efficiency against lower cost. The CEO summarizes that this was his main task, to lead the company through a difficult time. Major changes have been made, Huisman is ahead of schedule and the orderbooks are filled again.

Organizational response properties. The TMT members recognizes that changing structures and processes is only the hardware side of the story, and that there is also a cultural side, which takes much longer (158:16). These finding support the concept of 'change impeding human factors' causing 'organizational inertia'. Especially the engineering focus was found to be deeply rooted in the organization. Departmental 'habits' and a 'culture' to arrange affairs via old accustomed internal networks were sometimes difficult to liquidate (153:8 & 158:17).

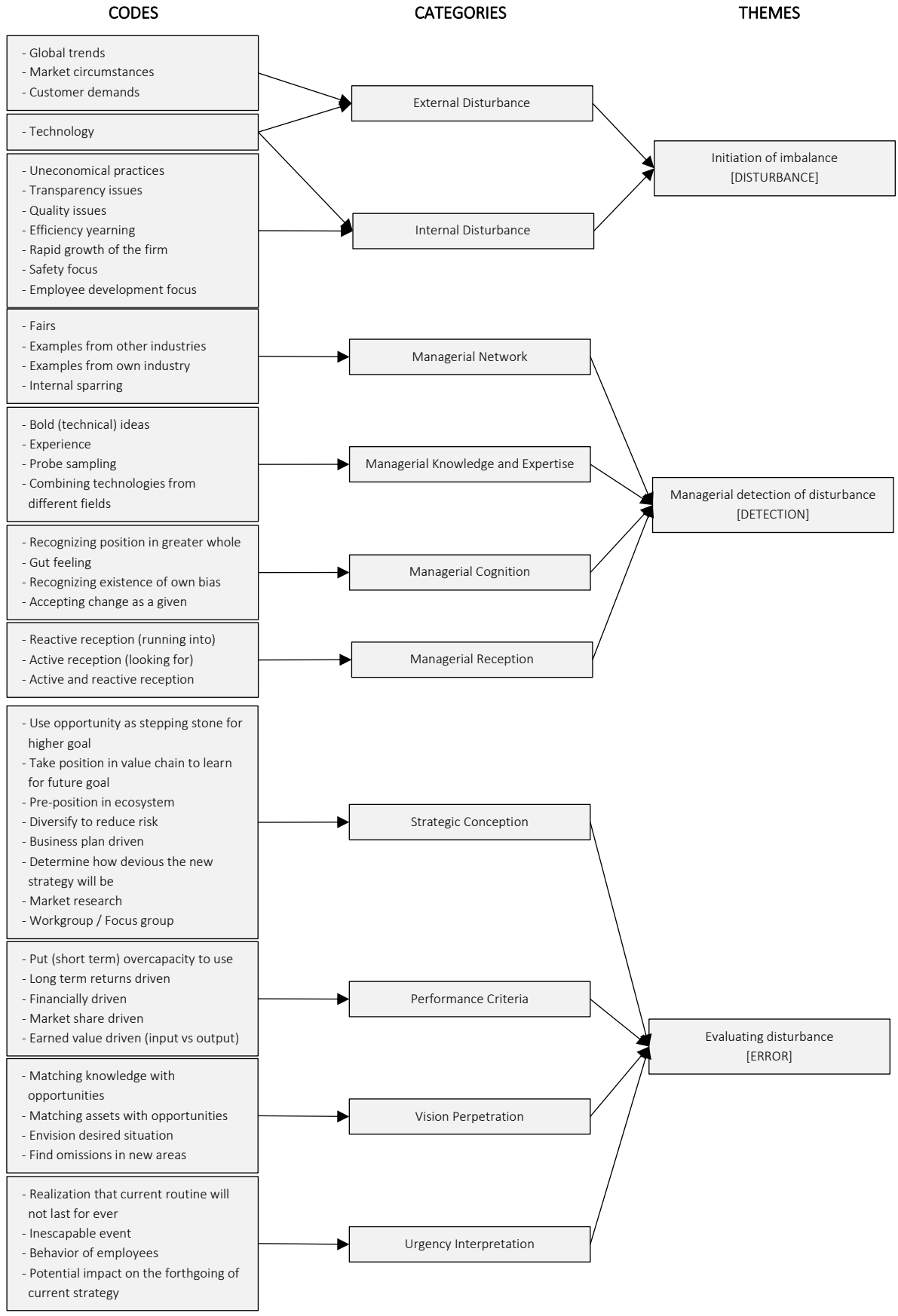
During the interviews with various executives on this case, I questioned them on their point of view, related to potential extermination of exploration in all the efforts in favor of efficiency and cost reduction. Furthermore, I examined managerial perceival of the tension between exploration and exploitation, if it exists, and if so how this is managed. The findings convolute partly with 'managerial detection' and 'effectuation of change' but, for this CASE I found it most appropriately to depict the results in this subsection of 'organizational response properties'.

Again, I find support for the notion that managers purposefully induce 'organizational momentum'. It is observed that managers recognize that one cannot predict when 'Market entry points' become valuable, but that they are consciously cherished. From 'experience' and 'examples from own industry' managers know that riding the wave of change – both enacting and reactive – might bring beneficial contingencies in the future (155:41 & 155:4). The CFO summarizes: "You never know how a blind man may catch the hare. Sometimes you start something without knowing where it ends, and that is fine" (156:29). What has changed these days is that there is a firmer control on the financial side of things. The CFO continues: "I always used to ask: "When will I get my return on investment?" A simple question but is was not asked in the old days… back then things just happened" (156:29). Adding: "And don't get me wrong, overall good decisions have been made because a fantastic company has been built, but we cannot afford such behavior anymore these days, times have changed" 156:1).

The distribution of resources over exploitative and explorative activities is primarily governed by projects. Whenever there are people in surplus, they are intentionally assigned to explorative activities, indicating that the 'flexibility of the workforce' contributes to 'organizational momentum'. Furthermore, there are employees dedicated on exploration (156:25).

On the question whether the shift to the new project organization could be detrimental for exploration, the answers were negative. These days Huisman is clearly busy with looking into the future, finding new marketspaces to explore (156:30 & 156:27). "We are looking to setup routines for continuously reviewing opportunities for the future. So, people working fulltime on that. This is needed because otherwise the danger is that you are overtaken by the issues of the day" (158:31). This indicates that Huisman is seeking to channel exploration in a more formal way, through structural solutions (158:31 & 156:7).

4.2.5 Data structure



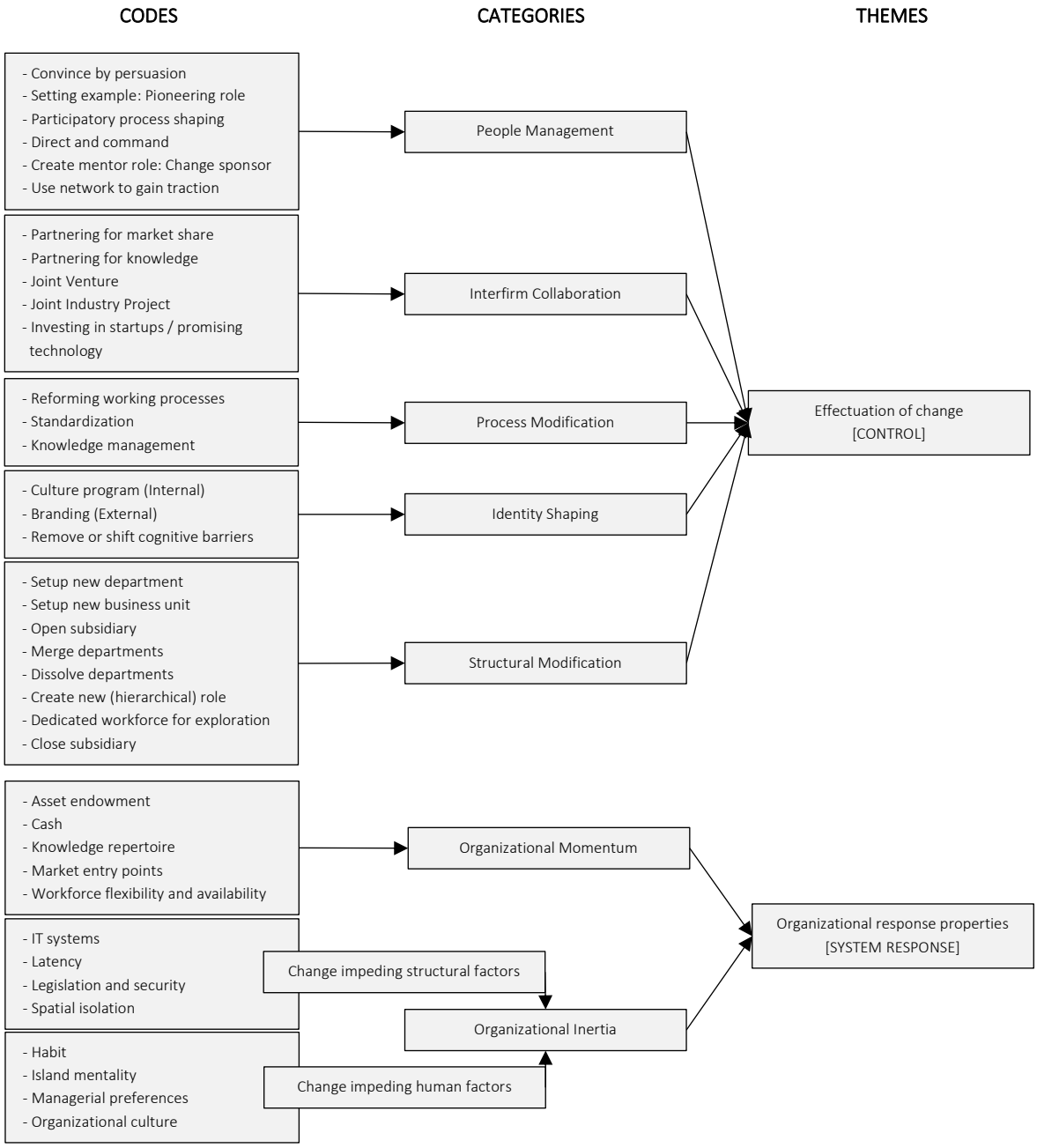


Figure 4.2 Data Structure

4.3 Part 3: Process model

The process model (Figure 4.3) is constructed by arranging the identified themes from the data structure in an order that represents the sequential array of occurrences, during shifts from exploration to exploitation and vice versa. The model exemplifies a perpetuate dynamic system, aiming to govern organizational ambidexterity via a feedback control loop. The loop includes five blocks, describing; error definition, control mechanisms, system response properties, disturbances, and detection methods. Blocks are connected with arrows, indicating the direction of travel through the loop. Below, descriptions are provided for each individual block and arrow.

Desired for continuation and profitability {Setpoint}

As found, managers of the organization aspire continuation and long-term profitability within the comprehensive framework in which the organization desires to operate. In a certain way a desire to be ambidextrous. Practically speaking, managers strive to achieve the beneficial consequences that the theoretical construct of ambidexterity has proven to be able to induce.

Evaluating disturbance

This is the process of comparing the desired situation with incoming identified mismatches. It can be a lengthy and methodological exercise (e.g. focus groups producing business plans) but, also a short managerial glimpse and swift judgment.

Qualified (and quantified) Mismatch {Error}

The output of [ERROR] is a qualified, and potentially quantified, mismatch. It describes which stance the organization will take and dictates which actions are appropriate to handle the Identified mismatch. Practically speaking, what actions are we going to take to seize an opportunity or mitigate a thread.

Effectuating change

These are the control mechanisms, the strings on which managers can pull, to achieve a change in course from exploration to exploitation and vice versa. This includes structural and contextual components, in reality changes are effectuated by a combination of those instruments. Thereby, managing for organizational ambidexterity is a multifaceted and potentially multilevel consolidation of measures.

Explorative / Exploitative Attitude {Actuating signal}

As a result from the actions taken to effectuate change, the ratio between exploration and exploitation changes. In other words, the output of [CONTROL] is that more resources are steered towards either explorative- or exploitative activities.

Organizational response properties

The adjusted explorative/exploitative attitude is imposed on the current situations. The current situation comprises of an accumulation of past events, that combined contribute to an understanding of how the organization will respond to the newly dictated attitude. Organizational Momentum acts as a catalyst for change, following the imposed attitude. Organizational Inertia acts as a deterrent for change, impeding the imposed attitude.

Resource Distribution {Output}

The actual output, meaning the distribution between explorative and exploitative activities, is a result of managerial steering efforts [CONTROL] and receptivity of the organization [SYSTEM RESPONSE].

Initiation of imbalance

For the investigated events, the data indicates that there is always some form of disturbance imposed on the organization, either from internal or external, that antecedents strategic change. This can be a positive disturbance in the form of opportunities or a negative disturbance in the form of threads.

Organizational Ambidexterity {Appropriateness of output}

Organizational Ambidexterity is the appropriateness, or fit, between the organizational resource distribution - between exploration and exploitation - and the demands resulting from external- and internal disturbances. Assuming that the world is not static, so excluding the possibility that there are no disturbances working on the comprehensive framework in which the organization operates, the process model suggests that the adequate distribution between exploration and exploitation is inherently a dynamic proceeding.

Managerial Reception {Feedback}

Managerial reception is what provides the feedback loop between the desired status and the actual status. Reception is either active, in which managers deliberately monitor the appropriateness of the output related to disturbances, or reactive, in which managers run into inadequacies of the resource distribution.

Managerial detection of disturbance

Managerial detection encompasses both the means with which managers obtain feedback and the cognitive proficiencies with which managers ingest anomalies. This includes elements of dynamic managerial capabilities; cognitive capabilities, social capital and human capital. Managerial detection is imperative for the proper functioning of the control loop. Without managerial detection, the output signal (resource distribution) will start to run out of pace, and the actual exploration versus exploitation ratio will drift off from the appropriate distribution to achieve Organizational Ambidexterity. The process model suggests that insensitive managerial detection hinders the swift exposure of inappropriate resource distribution, leading to periodic rigorous changes in attitude or potentially to failure.

Qualified Mismatch {Sensor signal}

The control loop is closed, from managerial detection of disturbance to evaluation of disturbance, via an arrow representing the identified mismatch. Identified mismatch expresses the notion that the ingested feedback needs to be evaluated against the firm's desired condition.

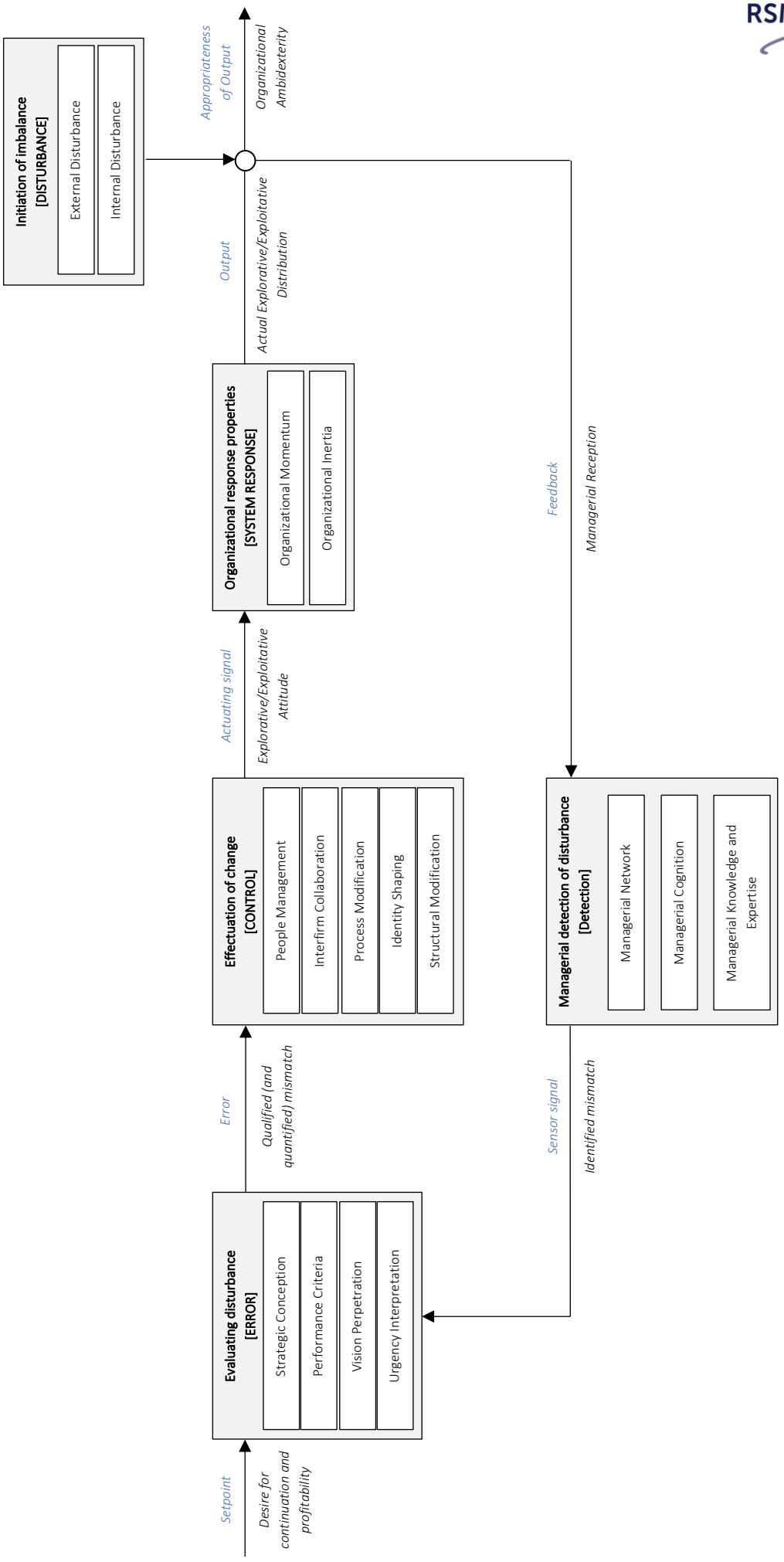


Figure 4.3 Process Model

5 Discussion and Conclusion

This research aimed to identify how senior leaders implement transitions, from exploration to exploitation (and vice versa), within ambidextrous organizations over time. This case study, in which both longitudinal event related data and primary interview data are analyzed, indicates that changes in the distribution between exploration and exploitation are driven by dynamic managerial capabilities, and that senior managers purposefully create organizational momentum to spur contingencies.

5.1 Theoretical implications

This study provides important contributions to the field of organizational ambidexterity because it provides new insights in the relationship between dynamic managerial capabilities and the dynamic balancing of exploration and exploitation over time. Hereby, this research addresses the gap in empirical evidence on how, and through which practices, the ongoing tension between exploration and exploitation is managed by individuals (Papachroni et al., 2015).

First, the results indicate that dynamic managerial capabilities are closely intertwined with the ability to dynamically balance activities between exploration and exploitation, thereby extending previous research that contributed such ambidextrous performance to managerial micro foundations (Eisenhardt et al., 2010). Importantly, this study shows how the dynamic managerial attributes of cognition, human capital, and social capital (Adner & Helfat, 2003) empower managers to detect disturbances, and how this leads to evaluation and formulation of ambidextrous propensity shifting strategies. For instance, when the decrease in oil & gas related orders emanated, the flexible and change accepting mental structure of senior managers accommodated the search for alternative, non-oil & gas related, products and business models. Furthermore, the data illustrates that during such searches for change, and moreover for the adequate evaluation of disturbances, senior managers tap from their network which they consciously build and compose to assimilate opposing views.

Second, this study shows that senior managers effectuate the shifting between exploration and exploitation in various occasions through a multifaceted set of mechanisms. This incorporating structural- (Tushman & O'Reilly, 1996), contextual- (Gibson & Birkinshaw, 2004), and sequential solutions (Siggelkow & Levinthal, 2003). It embraces multilevel perspectives (Raisch et al., 2009), and incorporates both top-down and bottom-up approaches (Zimmermann et al., 2015). For instance, when the service organization was established, a structural modification in the form of dedicated subsidiaries for the exploitation of services was chosen. This shift was initiated via a bottom-up approach of a department manager, because he was the first to notice the detrimental effects of the former way of working. For the shift to the matrix organization it was found that besides procedural changes also the effectuation of a renewed context was key to empower employees to make project specific tradeoffs. An example on how ambidexterity is achieved through multilevel interaction is found for the busines unit (BU) GEO case. The BU GEO shifts the total ambidextrous propensity of the firm toward exploration because it introduces a for Huisman new business model in a new market. Within the BU itself however, senior managers temporarily shifted the emphasis between exploitation and exploration. The notion that the practical achievement of ambidexterity is a multifaceted endeavor further supports the importance of more recent research avenue, that stresses out the relevance of dynamic perspectives over conventional static approaches.

Third, this work complements recent literature that describes the ability to be ambidextrous as a path-dependent and contingent process (Heracleous et al., 2019). The results indicate that, besides the managerial capabilities to detect disturbance, evaluate disturbance, and effectuate change, there are organizational response properties which attribute to the firm's receptiveness to a newly imposed ambidextrous emphasis. In the process model, these organizational properties are described as inertia and momentum. For the emergence of the BU GEO, the availability of knowledge obtained from experiences in the oil & gas industry worked as a catalyst to come into contact with potential customers for the development of renewable geothermal energy. Moreover, the access to specific drilling assets via a subsidiary facilitated quick response to realize the newly developed explorative strategy. Interestingly, this study shows that senior managers purposefully create and nurture organizational momentum to spur potential future diversifications.

Finally, this study makes several contributions to the conceptualization of the exploration versus exploitation paradox, and the dynamic balancing construct. First, former approaches, to view exploration and exploitation as being either orthogonally linked or as being connected via a continuum (Gupta et al., 2006), are synthesized into an overarching orthogonal theory. Second, dynamic balancing theory is augmented by suggesting that the actual exploration versus exploitation distribution is a function of managerial control actions and organizational response properties. The appropriateness of the exploration versus exploitation distribution itself, and thus whether a firm is truly ambidextrous, depends on internal and external disturbances. The later complements findings from earlier studies, describing the pursuit of ambidexterity in dynamic environments as: "chasing a moving target" (Posen & Levinthal, 2012), and stressing out the importance of frequent realigning practices besides long-term focus in order to cope with environmental disturbances (Luger et al., 2018). The two abovementioned conceptual contributions, in combination with the introduction of system theory, led to the emergence of this studies proposition as depicted in the process model. Importantly, this studies proposition might generate testable hypothesis for the guidance of consecutive quantitative researchers (Gioia et al., 2012), who seek to inquire into the mechanisms of dynamically balancing exploration and exploitation to environmental changes.

5.2 Practical implications

The energy landscape faces further advancement towards renewables, this undeniably leads to added disturbances on the conventional ways of working for equipment manufactures serving the energy sector. This study shows how managerial capabilities can detect- and evaluate disturbances, and how they effectuate change. Detection happens either passively or actively, and the process model suggest that inadequate detection of disturbances might lead to an increasing mismatch in ambidextrous propensity. The capability to evaluate disturbances against a desired state is key to determine which actions are to be taken to work towards that goal. Finally, the capability to effectuate change is essential to adjust course and actually shift the emphasis to either exploration or exploitation.

Based on these results, practitioners should consider to implement habits that induce the sensitivity of detection mechanisms. Improving the capability to detect involves deliberate actions to embrace conflicting information, to go out and find opposing views, and to vigorously try to imply existing knowledge onto new areas and contrarily signify new experiences onto extant operations. This study shows how senior managers surround themselves with people from other industries, to test out their ideas and to find challenges that they might be able to solve for others. For example, a method from

the ICT sector was picked up, modified and implemented to spur exploitation of current operations. Another manager was able to detect the opportunity to setup a novel business model in a new sector, by combining experiences from the oil & gas industry with access to knowledge on public private cooperation through his network.

The capability to evaluate disturbances manifests itself in many forms. In rudimentary occasions it is best described as 'gut feeling', based on knowledge and experience, and it is hardly distinguishable from detection. For other examples, the evaluation is a conscious step for which managers use specific KPI's, cultivate their personal probing moments, or establish multidisciplinary focus groups. This study provides two examples of such focus groups, one anteceded exploitation the other introduced exploration. A reoccurring capacity during evaluation is the ability to determine what effect the disturbance will have on the own span of control. Practitioners can consider those mechanisms, and can recognize that the evaluation of extensive disturbances might require collective and ongoing action.

Additionally, to capably effectuate shifts, and ultimately to balance exploration and exploitation over time, practitioners should understand that there are principle methods to shape structure and context. Importantly, this study shows that it is a crucial managerial capability to get people behind the needed shift in emphasis. Dependent on the situation, this is done by giving clear directions, or via more subtle participatory process-shaping approaches. This study shows that both of these approaches were successfully used for shifts towards explorations as well as for shifts towards exploitation.

Finally, executive leaders can be aware that dynamic managerial capabilities are important for the pursuit of organizational ambidexterity, and thereby for long-term success. This calls for the identification and appointing of managers that possess such capabilities on decisive positions in the organization.

5.3 Limitations and future research

This study is based on a combination of longitudinal data and cross-sectional data, and focusses on a single case firm. However valuable insights are obtained that can extend the bodies of knowledge on dynamic managerial capabilities and organizational ambidexterity, this study is also limited to some extends. These acknowledged constraints open up opportunities for future research.

This case study focusses on the shifting between exploration and exploitation in an equipment manufacturing firm with a strong focus on technological innovation. Simsek et al. (2009) suggest that units with a strong technological orientation, that are involved with product development, will more naturally follow sequential cycles of exploration and exploitation, because this is inherently associated with product development and commercialization. Although the results show that senior managers at Huisman engage in various mechanisms to achieve shifts, not perse sequential cycling, it might be that a culture which is geared towards technological progress readily self-contains the capabilities required to effectuate such shifts. Notwithstanding the fact that Morgeson & Hofmann (1999) argue that constructionist frameworks have the ability to be transferable across domains when observed in terms of their structure and function, it might be interesting to investigate the transferability of this study's findings within a different context.

Furthermore, this research clearly indicates that dynamic managerial capabilities are closely intertwined with shifts between exploration and exploitation over time, but it also raises the question

how changes in dynamic managerial capabilities lead to adjustments in such approaches to shift the emphasis. Practically speaking, this research incorporates longitudinal methods for contextual data, it does however only provide a cross-sectional analysis on primary data. This implies that potential changes in dynamic managerial capabilities, for example the growth of knowledge and experience over time, are unknown. Therefore, from this study it remains undiscovered whether a manager's personal history might expand or decline the capabilities to adequately detect disturbances and implement shifts.

5.4 Conclusions

In this study it is investigated how senior leaders effectuate shifts between exploration and exploitation in order to preserve ongoing organizational ambidexterity. Three supporting research questions were defined. Conclusively, the findings produce the following answers to these questions.

1. Over time, organizational ambidexterity evolves through a trend in which the emphasis shifts between periods dominated by exploration and periods dominated by exploitation.

2. Dynamic managerial capabilities play a crucial role in the initiation of shifts between exploration and exploitation. Managerial cognition allows for the acceptance of change as a given, thereby preventing mental blockage of disturbances and enabling detection. Managerial knowledge and experience facilitate the evaluation of anomalies, and spurs the creation of ambidextrous propensity shifting strategies.

3. Senior leaders embed structural- and contextual solutions through a multifaceted set of mechanisms. This involves both directive and supportive people management, multilevel and interfirm collaborations, process modification, and the shaping of a renewed collaborate identity.

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Appendix I – Reference list of Secondary data

Date published	Source	Document Group	Link
2009 December	Huisjournaal	Archival Data	
2009 May	Huisjournaal	Archival Data	
2009 September	Huisjournaal	Archival Data	
2010 April	Huisjournaal	Archival Data	
2010 December	Huisjournaal	Archival Data	
2010 July	Huisjournaal	Archival Data	
2010 October	Huisjournaal	Archival Data	
2011 August	Huisjournaal	Archival Data	
2011 December	Huisjournaal	Archival Data	
2011 May	Huisjournaal	Archival Data	
2012 April	Huisjournaal	Archival Data	
2012 December	Huisjournaal	Archival Data	
2012 July	Huisjournaal	Archival Data	
2012 September	Huisjournaal	Archival Data	
2013 December	Huisjournaal	Archival Data	
2013 June	Huisjournaal	Archival Data	
2013 March	Huisjournaal	Archival Data	
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2014 April	Huisjournaal	Archival Data	
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2014 June	Huisjournaal	Archival Data	
2015 August	Huisjournaal	Archival Data	
2015 December	Huisjournaal	Archival Data	
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2016 March	Huisjournaal	Archival Data	
2016 September	Huisjournaal	Archival Data	
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2017 June	Huisjournaal	Archival Data	
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2017 September	Huisjournaal	Archival Data	
2018 December	Huisjournaal	Archival Data	
2018 June	Huisjournaal	Archival Data	
2018 March	Huisjournaal	Archival Data	
2018 September	Huisjournaal	Archival Data	
2019 DECEMBER	Huisjournaal	Archival Data	
2019 JULY	Huisjournaal	Archival Data	
2019 MARCH	Huisjournaal	Archival Data	
2019 October	Huisjournaal	Archival Data	
2020 April	Huisjournaal	Archival Data	
20-May-97	Financieel Dagblad	News Article	https://fd.nl/frontpage/Print/krant/Pagina/binnenland/231336/europees-geld-voor-terrein-van-wilton
15-Jul-97	Financieel Dagblad	News Article	https://fd.nl/frontpage/Print/krant/Pagina/binnenland/228434/huisman-itrec-koos-op-valreep-toch-nog-voor-schiedam
22-Feb-01	Financieel Dagblad	News Article	https://fd.nl/frontpage/Print/krant/Pagina/Ondernemen/283984/grootste-mobiele-kranen-ter-wereld
8-Sep-01	Financieel Dagblad	News Article	https://fd.nl/frontpage/Print/krant/Pagina/Ondernemen/295477/achtbaanbouwer-vekoma-maakt-doorstart
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27-Nov-19	Financieel Dagblad	News Article	https://fd.nl/ondernemen/1326159/maritieme-dienstverlener-huisman-ziet-ook-brood-in-nieuwe-onderzeeboten
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20-Apr-20	Financieel Dagblad	News Article	https://fd.nl/ondernemen/1341970/scheepsbouwer-ihc-verwacht-snel-akkoord-over-kapitaalversterking
30-Apr-20	Financieel Dagblad	News Article	https://fd.nl/economie-politiek/1343220/kabinet-redt-ihc-met-bijna-400-mln
1-May-20	Financieel Dagblad	News Article	https://fd.nl/ondernemen/1343353/royal-ihc-is-een-systeemwerf-die-niet-mag-omvallen

Appendix II – Topic guide

Topic	Type of question
Intro 1. My role as researcher, mutual expectations, format of this interview, data management and confidentiality. 2. Motivation for this interview. Why you… 3. Create common ground on basic terminology for this discussion. Exploration and Exploitation in business context.	
EXPERIENCE – Enforce current and/or change course 1. Do you have experience with implementing / directing changes regarding?: a. Exploitation: Standardizing, improvement programs, cost reductions, efficiency, scaling up of e.g. products/services/processes? b. Exploration: Setting up new business unit, building new competencies, entering new markets, investing in new technologies/concepts?	CIT method
EXPERIENCE – Why 2. What was the reason for this change? a. How did the idea, that something could / had to change, emerge? b. Which approach was followed to determine what exactly needed to happen? c. Did this approach lead to a clear outcome? If so, how was this outcome formulated?	CIT method
EXPERIENCE – How (Reconfiguration of resources) 3. How was the change implemented? - *Suggestions: Structure (external/internal, teams, units, roles, phases)?* - *Suggestions: Context (behaviors, influencing mental structures of employees/managers, processes, believes)?* a. What was the source of knowledge and expertise during this phase of implementation?	CIT method
EXPERIENCE – Challenges 4. What were the (biggest challenges)? How were they addressed?	CIT method
Dynamics and Paradox - Sensing 5. How do you know that you are on the right track? Meaning, is the chosen strategy (the implemented change) the correct one? a. How do you determine this for the short and long term? b. What do you look for in determining if you are on the right track or not? c. How do you cope with a mismatch?	Explorative
Dynamics and Paradox – Sensing to Evaluation to Seizing 6. In the broader sense, during daily work, are you concerned with the question: *"Is there a correct balance between improving what we already do or trying out new things?"* a. Do you use any methods / processes / KPI's / rituals? Does it just emerge from the course of events? b. When is something a thread or opportunity (sensing), and when do you know you have to act (seizing)?	Explorative
Dynamics and Paradox – Seizing 7. What motivates you to assign resources to explore (experiment, investigate, develop new products / strategies)? 8. What motivates you to assign resources to exploit (improving your current way of business, investing in efficiency, increasing market share of current portfolio)?	Explorative
Closure	

Appendix III – Interview Techniques

From Easterby-Smith et al. (2018).

1. CIT Critical Incident Technique – Get right to the heart

1. Ask for - or provide - an incident (event, activity, problem, challenge).
2. Encourage to explain the problem in more detail.
3. Ask to illustrate how the problem was solved / overcome.

3. Laddering – Getting more out of a question

- Ladder up: from a statement → value and motives – "WHY?"
- Ladder down: explore respondents understanding of something → illustrations / examples

2. Finding motives

Often people are not aware of their own motives.

"People cannot be trusted to say exactly what their own motives are, as they often get ideas about these from commonly accepted half-truths" (McClelland, 1965).

1. Don't project own opinions or feeling onto the situation.
2. Listen to what the respondent WANTS and DOES NOT WANT to say without helping.
3. Test out – Don't assume understanding.

4. Avoiding bias – Probing (improve, sharpen responses)

Focus on discovering responses to specific alternatives. But, probes should never lead!

1. Repeating:
   Respondent wanders off → Repeat initial question
2. Explanatory:
   Respondent builds on vague statement → What do you mean by that?
3. Focus (obtain specific info)
   General description → What sort of…. ?
4. Silent
   Reluctant or slow → Let them break the silence.
5. Drawing out technique
   Halted or dried up → Tell me more about that?
6. Giving suggestions
   … → Have you thought about…? Have you tried…? Did you know that…?
7. Mirror or reflect
   Need to clarify answer → What you seem to be saying is…?

Appendix IV – Representative Quotes

The below table depicts representative quotes for the defined categories in the data structure. Specific examples, names, employees, clients, and projects are anonymized. Quotes are translated from Dutch. In multiple occasions a concise display of the interviewee's speech is depicted to increase readability.

Category	Grounded	Representative quotes
External Disturbance	41	About 4 years ago, the O&G market was really low, and most of our customers were heavily dependent on that….. That is marked driven. O&G was downturn and we knew Offshore wind would eventually takeoff….. Huisman is really innovative, innovative and problem driven, so we do well when we have clients with such problems to solve….. A trend back then was to make self-commissioned products….. You must diversify to not be dependable on only one market or product category, to reduce risk….. Users were used to old-fashioned equipment. If we want them to appreciate our automated equipment, we hade to train them as well…..
Internal Disturbance	40	It was when "anonymized" came in. His task was to go through it with a dull ax and to make sure everything was organized towards the future. Actually, that worked quite well for some time….. Processes had to be imitable, traceable and understandable. Also, for example, to transfer knowledge to new employees….. Mostly based on efficiency improvements and transparency. Before that, things were documented, but not in a uniform way….. Those were real heydays, we didn't know whether to look left or right, there was so much work and we made real good money. The firm grew enormously in a short time, but the project governance part was not yet furnished for that….. The organization of projects was a bit cumbersome with coordinators from a project perspective, and lead engineers and group leaders from a line perspective….. Knowledge transfer and the prevention of making the same mistake twice. Improving the quality was really the drive….. When implementing a new structure, you consider the happy flow. But after a while, you find out that things are not completely functioning as planned. You notice this from the behavior of people, and of course just because of the output…..
Managerial Network	18	See what is happening around you, not only what you are busy with, but also what others do….. I came across that idea through an acquaintance in software….. Yes sparring, internally with the board but also with external experts from other industries…..

		"anonymized" talked with "potential client". That didn't work out but via via he got into contact with "actual client" ….. Then I started looking for to convince "senior managers" internally that we had to setup a new unit. I had to find personnel to man "the new unit" so I gathered some employees I thought would fit. Also, the board backed me up on that, that I could scout people….
Managerial Knowledge and Expertise	17	We knew, we can make those drilling systems fully automated and everything, so we knew we could bring the offshore industry to another level….. "anonymized" came into contact with "client" who wanted to solve "x". "anonymized" said right away, we can setup "systems" to do that….. We know, to convince clients that new stuff is actually working, we need believers. We build "showcase", others thought we had become mad, but it is the only way to show the world that it actually works….. It of course started because we had a background with "x" and knowledge on "x" …. On "topic" everything has been invented for 20 times already. I don't have to invent is myself, it is already there. Most difficult is the execution…..
Managerial Cognition	28	I saw withing one month, this didn't make any sense…. Why are some things changing and others not, I'm thinking about that a lot. And what is the foundation for that? That has to do with the development of the market. But there is also some sort of expectation about how it might go. Now we do things "such" but eventually it might be done "so". How the route will be you don't know, but you imagine that it will be somewhere between those lines….. How it will go exactly you don't know. Along the route we might find things that are interesting for us. If we walk on that road, we come across these things….. Do we need to hold course, and will the moment that the technology picks ups come, or will it just not work anymore? That can be difficult to determine….. Sometimes it might just be personal preference, sometimes intuition, sometimes belief….. And that is a line of thought that you need to try to breach with, in order to challenge the status quo….. To be conscious about the existence of your own bias, that it exists, that might help a bit….. You know per definition that it is not the right one for the coming 5 to 10 years. But you try to get some feeling and find a fit…..
Managerial Reception	21	It just occurs during operations, you run into those issues and you will receive feedback right away….. We imagined to do things in a certain way, but in doing so, we found out it didn't work like that for many clients, so we had to change our approach…..

		Slowly but surely, I got the feeling that the structure had to change because it did not work for everybody….. One of the methods we used were surveys, so just asking customers what they thought about our services….. Operation wise you need to perform on an annual basis….. We are professionalizing our routines to actively look for future opportunities….. Yes, I have a few probing moments, beside official reporting, on which I know for myself whether or not we are on track…..
Strategic Conception	32	Competitors, potential customers, suppliers. Basically we've talked to all stakeholders to gather information and discuss our ideas….. First, we looked at how big the potential market would be. So, what do we have floating around basically. What kind of contracts do they have, where are they situated…. We proposed a business case to the board, indicating our best position in the value chain….. In the end we said, lets focus on that geographical area. And then learn about "operation" and "industry" so that we know what we are talking about, and find out how to design better equipment for that in the future….. The idea was to build brand awareness….. In Europe "x" is an industry, so that provided a demarcation. We looked what current players were doing, what their business models are, what we could improve, and what our role could be….. Because I think that for that kind of business a different type of organization is required, it is too far from our core business….. I gathered a group of people, with different backgrounds, and we started from a blank sheet. Let's see what we can do in this industry…..
Performance Criteria	25	Those projects were not at hand. So in the mean time we generated cashflow with "x"…. It has to do with the availability of personnel. Now we are really busy and I can see if we work efficient right away in the numbers….. Many developments, developments also costs money, so we have to focus…. That made us setup the business unit. To support customers but of course also because we could make healthy profits…. We purely looked at the revenue, and at what kind of margins we could make there. We can proceed for some time with "strategy". But in the end you will not get any wiser, maybe we might earn a dime, but that is of no use for Huisman…. For "choice" we thought, there we can also invest something. And if "strategy" happens, we are right at the top of "industry", which can lead to many years of work.

		I look at the earned value. Progress versus output….
Vision Perpetration	26	So I started to take a look, what kind of diversification can we do with the knowledge and assets that we have….. We had some experience with drilling for resources – we had "company" years before. So from that idea we took off….. "senior manager" wanted to do something in "that industry" really bad…… If we look ahead, we know "market" will be there for some time but, we have to channel potential new markets, and "this" is one of them…… We had "assets" from earlier experience and imagined that we could use them for "new market" …… "senior manager" had the idea to conquer the world with "bold technological idea" The direct cause was that "senior manager" had the vision to make the whole conventional way of working automated and much safer. He wanted to get rid of those accidents in the drilling industry…… We made a business plan and everything. But mainly we imagined how we wanted it and just set it up, started working, that is how it grew…… At some point I saw so many opportunities for Huisman in that area…… I look at what is needed for the company, and work from that perspective….. I thought I need something in which I can stretch people more…..
Urgency Interpretation	25	Maybe it was more born from necessity….. We cannot think about all "potential effects of competing innovation" now. If you follow that line, all work would seize, it doesn't work like that. Let's worry about it when it gets there….. Change is market driven. You know you have to do new things but you can also be too early, we had that with "product"….. Extreme events with a clear cause, or when there is really no escaping from it….. It happened more and more frequently, this was no way of working anymore, something had to change….. "client" wanted to market "new technology" and "senior manager" had the idea to build "new product group" for that at the right time…. I look whether it impacts the current strategy, if it does, we might need to adjust…..
People Management	17	"anonymized" were convinced about my ideas easily… We appointed group leaders to set the example, they were responsible for the process…. "anonymized" had experience and knowledge on "that field" so he was involved as a sort of consultant for the rest…..

		The implementation consisted of a few steps. I think it was really helpful and important that we involved middle management in the process….. We made a plan, but is was more some guidance for the people that had to work with it. It was left largely blank intentionally, so they could fill it out along the way…… I made my point very clear, and told them: this is how we will do it from now on….
Interfirm Collaboration	7	For example “startup company”, we invest in them now….. We invest in “startup” and “startup”….. When we started it, we did so in a Joint Venture….. We collaborated with them, they had clients in that region already….. Then we build “equipment” and setup a joint venture with “company” and “company” and realized our first project in that “industry”.
Process Modification	13	The project organization in its core is working. We are improving a kind of supporting safety net processes around it now….. For further professionalization we’ve implemented “process” and “software”. So we have a uniform line throughout…… Processes were basically consolidated, now it is done in one package…..
Identity Shaping	9	A changing market asks for a review of our positioning, that we communicate….. Besides that, also that products are well presented and that that identity of quality remains…. We will become a bigger player in the renewable sector, that has consequences for our name…. With this approach we communicate that we are one team one company across the globe….. They were perceived as dependent subsidiaries, by restructuring it, it also feels for people that they are on the same team, that they are more a part of one….
Structural Modification	19	Best displayed in content analyses
Organizational Momentum	37	Best displayed in background and introduction of cases
Organizational Inertia	41	I sometimes got the feeling that, especially “employees” were most difficult to move along with the change…. There were other processes and systems that didn’t match with the new entity…. It had to be a loose unit to be able to move quicker, that wouldn’t fit with IT systems and such…. That “former department” was a bit of a blackbox we had to crack open to fit in the renewed way of working. That took some time….. There is also a culture thing, we see that takes much longer……