Exploring Levers for Agility and their Inter-relations in the German Energy Industry via Neo-Configurational Theory

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Abstract

Organisational agility describes firms' ability to proactively and reactively handle external changes like the COVID and Ukraine crises. This thesis researches how levers like culture (in this thesis = mindset) or strategy impact agility. Existing research shows agility's outcome but neglects its origin and its levers' interactions. Since mindsets guide employees and leaders, research was requested for how organisational culture influences other levers' effects. Therefore, this thesis developed a literature-based framework of levers, tailored it to the studied context, proposing that strategy, technology, linkages, and structures, filtered through employees' and leaders' mindsets, interact to lead to agility. Neo-configurational theory (NCT) provided the theoretical underpinning for lever interrelations, basing this research in wider organisational theory. As critical realist work, the thesis recognised agility's context-specificity and examined the recently turbulent German energy industry as exemplary context. 36 semi-structured interviews in 15 purposefully sampled companies were analysed in three steps: All data were thematically analysed. Fuzzy-values were derived using the Generic Membership Evaluation Template (GMET). The concluding fuzzy set Qualitative Comparative Analysis (fsQCA) determined pathways to agility and non-agility, levers' interdependencies, and mindset's role.

The results show that agility presupposes an implemented agile strategy (i.e. strategy filtering agility) but not necessarily a very agile culture, while non-agility comes with a very non-agile employee mindset (i.e. culture filtering non-agility). Three strategy-dependent paths to agility exist for energy companies: one builds on internal and external linkages, one on lacking technological capabilities with improvement spirit, and one couples agile employee mindsets with decentralised structures. Three employee mindset-dependent paths describe non-agility: one builds on lacking linkages and supportive leadership, one on lacking technological capabilities, supportive leadership and strategy, and one on lacking technology capabilities reflecting in inadequate structures. This thesis' major methodological contributions are refining the GMET as new tool to transform qualitative data into fuzzy-values and further establishing fsQCA in management research. Academics gain a sound theoretical basis for agility in form of NCT and practitioners and academics a view on agility levers' role, especially on culture and strategy. Utilities' managers can use this to prioritise levers facing sudden changes.

Dedication:

To my parents, who stood by me during more
than two decades of education, and to my girlfriend,
who supported me in this doctoral endeavour

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Contents

List of Tables

List of Figures

List of Abbreviations

AMJ	**A**cademy of **M**anagement **J**ournal
AMR	**A**cademy of **M**anagement **R**eview
CAPEX	**Cap**ital **Ex**penditures
CEO	**C**hief **E**xecutive **O**fficer
CFO	**C**hief **F**inancial **O**fficer
CR	**C**ritical **R**ealism
CT	**C**onfigurational **T**heory
DCs	**D**ynamic **C**apabilitie**s**
DoA	**D**elegation **o**f **A**uthority
EUR	**Eur**o
fsQCA	**f**uzzy **s**et **Q**ualitative **C**omparative **A**nalysis
GDPR	**G**eneral **D**ata **P**rotection **R**egulation
GMET	**G**eneric **M**embership **E**valuation **T**emplate
IT	**I**nformation **T**echnology
JoM	**J**ournal **o**f **M**anagement
KPI	**K**ey **P**erformance **I**ndicator
LNG	**L**iquified **N**atural **G**as
MWh	**M**ega **W**att **h**our
NCT	**N**eo **C**onfigurational **T**heory
OEM	**O**riginal **E**quipment **M**anufacturer
OpCo	**Op**erating **Co**mapny
OT	**O**perational **T**echnology
P&L	**P**rofit **&** **L**oss statement
R&D	**R**esearch **&** **D**evelopment
RQ	**R**esearch **Q**uestion
SC	**S**ocial **C**onstructionism
SCT	**S**tructural **C**ontingency **T**heory
SMJ	**S**trategic **M**anagement **J**ournal
USP	**U**nique **S**elling **P**oint

Glossary

Agility capabilities — are the capabilities resulting from agile transformations and needed to manage uncertainties and changes (i.e. agility drivers).

Agility drivers — are the internal and external changes that organisations face, making organisational agility necessary.

Agility levers — are the organisational dimensions like strategy, structure, or mindset to be modified for becoming agile and hence developing agility capabilities.

Carve-out — is a company restructuring where part of an existing organisation's business is placed in a new independent legal entity and typically sold (to a certain percentage).

Critical realism — is a research paradigm assuming a reality independent of individuals, yet perceived differently. It seeks to clarify the underlying social mechanisms that generate the observable outcome.

Dispatchable power — are energy sources that can be actively steered (i.e. started and used with full capacity as desired) like coal and gas power plants, but unlike wind and solar plants.

Enabling bureaucracy — is an organiational bureaucracy type of guiding standard procedures and rules to be followed, which, however, leave enough leeway for employees to work self-sufficiently.

Generic Membership Evaluation Template (GMET) — is a template using qualitative themes, typically from coded interviews, to derive a fuzzy-value for the extent of occurrence of a condition (here: lever). This value serves as input for a QCA.

Neo Configurational Theory (NCT)	as organisational theory rejects separate analyses of organisational levers (e.g. strategy & structure) which are linked. It considers dimensions' interdependences as critical for how they impact the organisation.
Organisational agility	is organisations' ability to predict and create change proactively, and to exploit and respond to unpredictable change reactively.
Path dependencies	are the limitations to a company's strategic and decision leeway due to past strategic commitments and capital investments.
Qualitative Comparative Analysis (QCA)	as method and research strategy assumes that conditions/variables (here: levers) produce outcomes (here: agility) interactively as configuration, not additively. It uses boolean-values (csQCA) or fuzzy-values (fsQCA), e.g. from qualitative data, to determine if an object like a firm belongs to a set of objects showing a certain condition. This shows conditions' interdependence.
Spin-off	is a carve-out (see above) where the new company is not sold, but the stock of the new company is shared pro-rata among the current parent company shareholders.

Chapter 1:   Introduction

1.1   Study Focus

This research examines how certain levers enable organisations to develop organisational agility. *Organisational agility* (synonym: agility) describes organisations' capabilities to predict and create change proactively, and to exploit and respond to unpredictable change reactively. *Agility levers* (synonym: levers) are organisational dimensions adjustable to develop these agility capabilities (Zhang & Sharifi 2000, Tseng & Lin 2011). This thesis moves the debate on agility levers beyond observing their role for agility separately, towards an integrated interdependent perspective. Simultaneously, it integrates the findings from the multifaceted academic disciplines covering agility (like manufacturing strategy, strategic management, and IT research) into one framework, which is a strength of research like this thesis that investigates phenomena as configuration of different levers (Furnari et al. 2021). Agility within this thesis does not refer to methods and processes of agile project management and software development, but is a holistic, strategic concept. While Cunha & Da Cunha (2006) trace agility even back to Hayek's (1945) request for an ability to meet change immediately and Denning (2018) sees part of agility's origin in armed forces, agility was formally introduced to private sector companies by the US government-funded Iacocca Institute Lehigh Report in 1991 to determine root causes and remedies for the US manufacturing industry's stagnant economic expansion (Walter 2021). The concept of agility then spilled into the IT sector, where practitioners developed agile methods for software development like Scrum (see Cockburn & Highsmith 2001). Unfortunately, the continued popularity of these practices leads to the misperception that agility is purely a field of practice, even though agility has long left the narrow domains of manufacturing and IT behind. More recent works like Brannen & Doz (2012) and Teece et al. (2016) contribute to the aforementioned high-level, strategic definition of agility.

1.2 Why Agility Matters *Now*

Agility today matters more than ever for companies to remain successful. This is clearly demonstrated by two related research strands. First, practitioners and academics show that agility offers a general upside (Section 1.2.1). Second, other works illustrate why these upsides are especially relevant *right now* (Section 1.2.2) in this decade.

1.2.1 General Benefits from Agility

Practitioner research uses surveys to show agility's importance. The Economist Intelligence Unit finds that 88% of its survey respondents identify agility as critical for success and 40% classify it as core differentiator (Glenn 2009). McKinsey research displays that agile organisations own a 70% probability to rank among the top quartile of healthy organisations (Bazigos et al. 2015). They have a higher customer focus, accelerated time to market, greater revenue growth, lower costs, and a more motivated workforce (Aghina et al. 2017).

Taking an academic perspective, there exists evidence for agility's value across multiple industries and regions. Tallon & Pinsonneault's (2011) cross-national survey of 241 firms ($\$100mn$ to $\$3bn$ sales) finds that agility enhances performance by enabling firms to quickly develop competitive actions for responding to change. These competitive options reflect in higher revenues, profitability, or market share, or in avoided cost resulting from faster innovation, market entries, or responses to changing demands (Tallon & Pinsonneault 2011). Other academics demonstrate agility's performance impact within specific regional contexts. Troise et al. (2022) develop quantitative support for a positive financial performance impact of agility in 204 Italian small and mid-size enterprises – including utilities. Vickery et al. (2010) statistically show a direct positive impact of agility on US car company suppliers' performance. Similarly, McCann et al.'s (2009) survey of 471 high-level general & HR managers from mainly large US companies reveals that agility improves competitiveness which in turn elevates profitability. Nemkova's (2017) qualitative study of small and medium-sized UK-based enterprises demonstrates that agility enhances success in international markets. Two other studies research Spanish firms: Using survey data from large manufacturers, Vázquez-Bustelo et al. (2007) find that for companies in turbulent environments, agile manufacturing elevates manufacturing strength (i.e. the ability to combine capabilities in quality, cost,

flexibility, service, environment, and delivery) which in turn improves performance. Similarly, Cegarra-Navarro et al. (2016) reveal that (1) agility improves performance and (2) agility is a prerequisite to leverage new knowledge for improving performance. Other research focuses on Asian firms. Shin et al. (2015) test agility's impact on the performance of small and medium-sized South Korean enterprises. They extract a positive effect of strategic agility on customer loyalty, but no direct or indirect mediation effect on financial performance (Shin et al. 2015). Yet, they refute the latter finding, arguing that their sample consists of suppliers that strongly depend on large conglomerates, wherefore long-term customer (i.e. conglomerates) retention takes priority over strategic agility. Yang & Liu (2012) display how agile Taiwanese glass manufacturers have superior performance. They also conclude that belonging to a strong network of external players can provide easy and fast resource access to translate agility into performance (Yang & Liu 2012). While all these works depict agility's upsides, the following section shows why agility and therefore this research is particularly relevant now.

1.2.2 Current Elevated Importance

In 2008, Taleb introduced the metaphor of black swans. These are unpredictable events with major impact and retrospective, misguided generalisations. A similar concept, wildcards, describe low-probability, major-impact events (Petersen 1999). Hence, unlike black swans, they are indeed predictable but regularly remain neglected due to their low probability. Regardless of whether COVID-19 qualifies more as wildcard or black swan (given its apparent unpredictability, the latter seems more suitable), it revealed organisations' struggle with black swans, wildcards or, less figuratively, unforeseeable changes (Lee et al. 2021, Worley & Jules 2020). The pandemic posed challenges like "redeploying talent, establishing remote workforces, building needed capabilities, propping up distressed supply chains, [...] and planning for reopening amid uncertainty" (Worley & Jules 2020, p. 279). Even more recently, the Russo-Ukranian War (probably rather a wildcard, as it was considered a possibility after past conflicts in the region, but seemed unlikely) has brought additional challenges for industry companies. Naturally, this most directly affects the energy industry, which is heavily dependent on Russia and Ukraine and which is the subject of this study. Yet, already earlier, Teece (2007) and Zhang & Sharifi (2007) noted growing uncertainty, novelty, complexity, and interrelatedness. Drawing the analogy to mixed material arts versus chess, Teece et al. (2016) argue that the 'rules' in

uncertain environments are constantly reinventing themselves or do not exist, eliminating the option of viewing business as a strategic, rule-bound chess game. Even earlier in 1999, Narasimhan & Das (1999) identified the growing impact of environmental characteristics like fast technological change, greater risk, globalisation, and the need for customisation. Simultaneously, Yusuf et al. (1999) highlighted the challenge to manage changing settings concerning customers, suppliers, competitors, infrastructure, responsiveness, speed, and flexibility. Consequently, businesses must leave the 'iron cage of bureaucracy' (Weber 1905) and continuously identify environmental changes and develop responses (Vergne & Depeyre 2016), i.e. become agile.

Therefore, Doz & Kosonen (2008, p. 96) argue figuratively that agility prevents "stagnation and painful transformation so that companies do not become elephants that need to learn to dance". Agile companies can survive evolutionary change and uncertainties, but also revolutionary black swans and wildcards (Batra 2020, Teece et al. 2016). Given the long-standing challenges for business models and companies (Felipe et al. 2016), now augmented by the massive black swans/wildcards COVID-19 and Ukraine crisis that triggered an unprecedented pace of change (Lee et al. 2021, Al Nuaimi et al. 2022), both research and practice would do well to better understand agility – a concept that facilitates responses to such new conditions and even leverages them as opportunities (Walter 2021).

1.3 Existing Literature and Research Gap

While research on agility's outcomes like responsiveness, cooperation, customers focus, and flexibility is abundant (see e.g. Sherehiy et al. 2007), "insights into the antecedents of agility are more limited despite their importance for creating the conditions necessary to survive in today's competitive environment" (Mueller & Jungwirth 2022, p. 281). Nemkova (2017) repeatedly flags this gap and Harsch & Festing (2020, p. 44) specify that "to date, it is not yet fully understood how organizational agility can be created or what can be identified as important influencing factors". Academics merely identify agility levers such as strategy or structure that require adjustments to become agile (e.g. Zhang & Sharifi 2000), ignoring the "urgent need" to consider their interrelations (Walter 2021, p. 373), which seems shortsighted (Harsch & Festing 2020). According to Fiss (2007, p. 1194), it is critical to assess "the complex ways in which causes combine to create outcomes". The existing research exhibits further deficiencies: Academics regularly overlook organisational culture as lever (and as potential filter), whereas practitioners see it

as crucial foundation of agility (Harsch & Festing 2020). Simultaneously, practitioner researchers like Aghina et al. (2017) remain opaque regarding their methodologies and hence cannot fill all academic knowledge gaps. Overall, there is a lack of empirically tested work, because most studies remain purely theoretical (Walter 2021). Finally, agility still lacks a sound basis in organisational theory which, if available, could draw even more academic attention to agility and bares the potential to explain agility levers' interplay. These issues clearly call for additional research and are further explored in the following chapters.

1.4 Rationale for Researching the German Energy Industry

The chosen research context strongly influences how satisfactorily concepts like agility can be addressed. Since agility's specifics are context-dependent (Fourné et al. 2014, Walter 2021) and since this research's critical realism (CR) perspective explains outcomes in their context (Wynn & Williams 2012), the research context must be carefully-chosen, well-understood, and closely-aligned with the research topic. Therefore, the author chose to research an industry (1) large enough that researching it 'matters', (2) which is exemplary for other volatile areas, and (3) to which he had good access: the German energy industry. This is a significant sector, generating EUR 561bn in turnover and comprising 1,069 companies with more than 20 employees (Statistisches Bundesamt 2021). It consists of so called Energieversorgungsunternehmen (energy supply companies), fulfilling different duties like energy generation, energy trading, and operating grids. Typically, however, the large players cover many areas at once.

Due to evolving environmental mentalities, but also due to black swans/wildcards like the Fukushima nuclear incident and the Russo-Ukranian War, all four of Barreto's (2010) potential volatilities that make concepts like agility necessary are shaping this industry: ongoing shifts in competition, technology, social values, and especially regulation. According to Heiligtag et al. (2015), this industry has recently been subject to extensive restructuring, regulatory changes, and continuous innovation and hence presupposes agility for survival. Simultaneously, however, Heiligtag et al. (2015) criticise incumbents' partially remaining inertia facing new agile-born competitors and other challenges. In general, the energy industry is not new to agility research. In the Dutch energy sector, which

resembles the German, van Oosterhout et al. (2006) find evidence for agility drivers using surveys and interviews. Specifically, they observe that agility drivers like decreasing customer loyalty, investment returns, customer satisfaction, along with new price wars, regulations, and increasing IT maintenance resource requirements *make agility a necessity*. While in-depth elaborations on this industry follow in the methodology, this already shows the energy industry's attractiveness for this research. For simplicity, this thesis takes the liberty of using 'energy companies' and 'utilities' as synonyms to describe companies that cover the stages from electricity generation to sales and distribution.

1.5   Study Objectives and Purpose

The overarching aims of this thesis are to understand how (non-)agility can be achieved in energy companies and to identify a therefor applicable organisational theory. To achieve this, the thesis uses the German energy industry to explore how agility levers are interdependent in their contribution to agility and how organisational culture filters this interdependent contribution. Through interviewing and subsequent analyses, it reveals both what levers make organisations agile and non-agile. Understanding the latter also matters, since agility is no panacea and could even be fatal for some business aspects (Walter 2021). Preparatory interviews with experts prior to piloting and the actual study confirmed this for the energy industry. The study's theoretical framework leverages existing agility research that introduced various levers (Figure 3.4). To delineate the research aim, three research questions empirically research agility and non-agility in the German energy industry:

1. *What* levers contribute to (non-)agility in the German energy industry?
2. *How* do these levers interdependently contribute to (non-)agility?
3. *How* does organisational culture affect these levers' contribution to (non-)agility?

These questions provide a meaningful focus by recognising agility's context-specificity and identifying, for this chosen context, what alternative subsets of levers do result in agility respectively non-agility. Building on agility's lacking foundation in organisational theory, the questions and this thesis in general anchor agility in modern organisational theory via neo-configurational theory (NCT) (Vergne & Depeyre 2016) – a theory firmly recommended in top-tier journals for this type of research questions (e.g. Misangyi et al. 2017, Fiss 2011, Vergne & Depeyre 2016, Greckhamer 2016). As per NCT, organisational

levers generate organisational outcomes (like agility) jointly or synergistically rather than additively (Misangyi et al. 2017). Thus, this research focus, reflecting in NCT, demonstrates that agility levers substitute and complement each other, which has two implications. First, given how different firms are and how unstable their environments became (Misangyi et al. 2017), the chosen NCT-focus rejects classical organisational theory which argues that there exists 'one best way of acting' and that companies should blindly strive for optimisations (Taylor 1911). Second, it rejects the 'quantitative thinking' that a lever's absence has simply the opposite effect of its presence in complex organisations (Furnari et al. 2021). To incorporate this assumption in his empirical research, the author turned to fuzzy set qualitative comparative analysis (fsQCA) which is "well suited to analyze relationships between different types of causal conditions" when conditions exert their impact in interaction (Vergne & Depeyre 2016, p. 1657). Indeed, Lin et al. (2006) call to investigate the continuously changing agility via a fuzzy-logic. Compared to traditional qualitative research, this fsQCA research strategy requires more cases but a lower depth of knowledge per case – the latter since the ultimate focus is rather on the levers and their interrelations than on the cases. Consequently, the idea that factors generate organisational outcomes interdependently reflects in this thesis' fsQCA (Misangyi et al. 2017) and the adopted CR paradigm (Bhaskar 1978). Both, NCT and fsQCA agree with CR that research participants' reporting of a phenomenon is 'fuzzy' – i.e. participants report their *own perception* of the given reality (Bhaskar 1978). Further, CR agrees that aspects lead to an outcome conjunctionally (Bhaskar 1978). Thus, this research explores agility levers as agility's 'generative mechanisms' from a CR perspective (Edwards et al. 2014). It builds on Strode et al. (2022), who show that agile transformations can build on alternative core elements like focusing mainly on culture or strategy while acknowledging that multiple elements require adjustment.

1.6   Study Contributions

Practically, this thesis helps firms to steer their strategic decisions and to dedicate their limited management, cash, and time resources in efforts to become agile to the most critical levers. By providing alternative configurations for agility, this thesis enables firms to choose the most appropriate for them. Likewise, by providing alternative configurations for non-agility, it offers companies alternative explanations for their current non-agility

and thus a good understanding of where they start their efforts to become agile. Academically, as described, this work elaborates on existing theory by introducing NCT to agility research. This marks an early effort to systematically examine agility levers' interplay and rejects the simplistic assumption that every company's agility depends on the same levers. It also contributes to academia by introducing existing practitioner research into the academic field. Although this requires caution due to various limitations in practitioner literature, it allows access to practitioners' real-life experience, especially regarding culture as lever. Besides all practical and academic contributions, this thesis also contributes methodologically by further establishing fsQCA in organisational research, following in the footsteps of Vergne & Depeyre (2016), Misangyi et al. (2017), and Furnari et al. (2021). It is also an early work to empirically apply and refine the newly developed Generic Membership Evaluation Template (GMET) by Tóth et al. (2017) for deriving fuzzy-values from interview data.

1.7   Thesis Structure

This thesis continues as follows: Chapter 2 defines agility and introduces its key concepts. Chapter 3 provides the Literature Review to seek a theoretical 'home' for this research, and to develop the theoretical framework, research gap, and research questions. Chapter 4 then outlines the methodology. Chapter 5 describes the upstream interviews to tailor the theoretical framework to the industry and then the subsequent pilot study, while Chapter 6 provides the analysis and findings from the main study. Chapter 7 discusses these findings in the context of existing research. Finally, Chapter 8 concludes with contributions and limitations.

Chapter 2: Agility's Context

This chapter provides the context for the remaining thesis. Section 2.1 discusses the transition from firms' traditional strive for efficiency towards recent ambitions for agility. Section 2.2 derives an agility definition for this thesis and Section 2.3 introduces agility's underlying concepts as well as this thesis' focus on agility levers.

2.1   Agility's Precursors

Business activities are subject to ongoing change. From the 1970s, Vokurka & Fliedner (1998) identify a strategic shift away from economies of scale towards quality. In the 1980s, dependability (i.e. reliability) established as objective to create an equilibrium with cost and quality (Yusuf & Adeleye 2002). During the mid 1980s and early 1990s – in response to increasing instability and overspecialisation in operating areas (Baker 1996) – flexibility manifested as new factor to be balanced with cost, quality, and dependability (Vokurka & Fliedner 1998).

Originally, flexibility developed as manufacturing flexibility – i.e. as having a set of pre-determined options to adjust manufacturing facing change (Gerwin 1993); yet, flexibility soon spread into non-manufacturing sectors. Flexibility is "the capability of an organization to move from one task to another quickly and as a routine procedure, with each situation defined ahead of time so that the procedures needed to manage it are in place" (Vokurka & Fliedner 1998, p. 166). Companies can be flexible regarding their volume, products (Hayes & Wheelwright 1979), operational resources such as work and capital (Baker 1996), and processes (Vokurka & Fliedner 1998). At the beginning of the 1990s, however, flexibility with its pre-defined reactions was no longer enough, as uncertainty and change continued to increase. As a reaction, agility was introduced to organisations as next stage by the aforementioned Lehigh Report (Iacocca Institute 1991). This report has been criticised for lacking a base in management theory and neglecting cross-company differences (Yusuf et al. 1999). Still, it triggered further agility research.

9

Since the COVID-crisis has accelerated change to unprecedented levels, agility becomes ever more important (Lee et al. 2021). Subsequently, agility is further specified, which leads to the literature review (Chapter 3).

2.2 Defining Agility

To respond to agility drivers and thereby generate a positive "temporary disequilibrium" versus competitors (Volberda 1996, p. 360), companies must become internally nimble and partner with external suppliers, customers, and other stakeholders (Fourné et al. 2014). This continuous process requires new organisation types that identify and seize opportunities and adjust strategies, norms, and values – i.e. agile organisations. Aiming to solve these requirements, *manufacturing agility* developed in the 1990s from the narrower field of flexible manufacturing (Ganguly et al. 2009). Then, agility stepwise spread into supply chains and software development and finally evolved into the more comprehensive *organisational agility* (Holbeche 2018, Teece et al. 2016). Unfortunately, agility's definition remains contentious (Walter 2021). Conforto et al. (2016) conducted a systematic literature review of existing agility definitions, but surprisingly offer no crisp concluding definition themselves. Therefore, the author undertook another review, broadly finding two agility perspectives – a distinction supported by Zhang & Sharifi (2007) and Walter (2021):

(1) The *reactive change-view* (adaptive agility) concerns responding defensively to dynamics and volatilities (Chakravarty et al. 2013, Walter 2021) or, more positively, to opening opportunities (Gunasekaran 1998, Tallon & Pinsonneault 2011). Tallon & Pinsonneault (2011, p. 464), for instance, define organisational agility as "ability to detect and respond to opportunities and threats with ease, speed, and dexterity". Similarly, Lin et al. (2006, p. 353) define agility as capability to "change and adapt quickly to changing circumstances". Dove (1999) and Batra (2020) identify adaptive agility as less of a tactic or objective, but rather as necessity to survive unanticipated and disruptive instances like COVID. Ganguly et al. (2009) add that change-savvy agile corporations can adjust without sacrificing their product or service quality.

(2) The *proactive change-view* (entrepreneurial agility) concerns offensively triggering, leveraging, and anticipating change and business opportunities for competitive

advantage (Chakravarty et al. 2013, Nemkova 2017, Teece et al. 2016). Accordingly, agility is the ability to initiate effective, timely, and sustainable change (Worley et al. 2014), respectively the purposeful creation of market volatility (Nemkova 2017).

This section has shown that "the main driving force behind agility is change" (Yusuf et al. 1999, p. 34). Tallon & Pinsonneault's (2011) quantitative study more specifically reveals that market volatility moderates agility's impact on performance. Therefore, agility is especially positively related to firm performance in volatile, changing environments, whereas having agile options to react to change is less meaningful in stable environments. Continuous organisational adjustments can be reactively responding to changing conditions, or proactively leveraging opportunities and shaping the conditions for other players (Cunha et al. 2020, Nemkova 2017). Combining these views, **this study defines agility as organisations' ability to predict and create change proactively, and to exploit and respond to unpredictable change reactively**. Agility therefore demands speedy reactions to *unforeseen changes* (i.e. unknown unknowns), whereas the aforementioned flexibility concept deals with predicted or predictable changes (i.e. known unknowns) (Jackson & Johansson 2003, Teece et al. 2016). Thus, agility is a "competitive weapon beyond flexibility" (Vokurka & Fliedner 1998, p. 166), making flexibility a necessary but not sufficient sub-element of agility (Vokurka & Fliedner 1998, Yusuf et al. 1999).

2.3 Key Concepts

Before discussing how firms become agile through levers, agility's key concepts must be understood. Those seem unanimously accepted and were shaped especially by Zhang & Sharifi (1999, 2000, 2007) and later synthesised by Walter (2021) based on agility research published until 2020:

(1) Agility drivers are internal and external changes as well as uncertainties that make agility necessary and thereby flexibility insufficient (Zhang & Sharifi 2007). Zhang & Sharifi (2000, 2007) identify five drivers: Changing *marketplaces*, *competitive settings*, and *customer requirements* are developing from unsteady environments and demand patterns, nimble competitors, and aggressive hypercompetitive markets – all due

to uncertainty, dynamism, and complexity emerging from globalisation, and outsourcing (Chakravarty et al. 2013, Kroll 2017, Zhang & Sharifi 2007). *Technology and science* drive digitisation, automation, and pressure for continuous innovation and shorter product life-cycles (Zhang & Sharifi 2000, 2007) and make entire business models and industries redundant (Aghina et al. 2017). *Social factors* like environmental legislation and expectations, the war for talents, an ageing workforce, and increasing demands to employees' creative knowledge- and learning-based capabilities mark further challenges (Aghina et al. 2017, Zhang & Sharifi 2000). To those five drivers, one might add black swans like natural disasters (e.g. hurricane Katrina), terrorist attacks (e.g. 9/11), and pandemics (e.g. COVID) (Vergne & Depeyre 2016, Worley & Jules 2020).

(2) Agility capabilities result from agility and deal with agility drivers (Walter 2021, Zhang & Sharifi 2007). It seems pivotal to distinguish between what identifies an agile organisation (i.e. these capabilities) and what allows making an organisation agile (i.e. levers – see next paragraph). Extensive literature covers agility capabilities. Given the aforementioned agility definition, agile firms' main capability seems to be their adaptability (see also Section 3.1.2). Since "evolutionary theory does not just apply to biological organisms" (Brown & Bessant 2003, p. 111) and since "enterprises may be more like biological organisms than some economists, managers, and strategy scholars are willing to admit" (Teece 2007, p. 1341), Megginson's (1963, p. 4) famous conclusion of Darwin's evolution theory can also be quoted here: "It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself". Thus, organisations can persist only when able to adapt to their ever-changing ecosystem (Teece 2007).

By consolidating existing works, one can extract five further high-level capabilities: Agile companies are *responsive* and *proactive*. Zhang & Sharifi (2000, p. 506) define responsiveness as "the ability to identify changes, respond rapidly to changes [...] and recover from changes". Therefore, responsiveness allows companies reacting to change, while proactiveness allows driving change (Nemkova 2017). Moreover, agile firms approach changes and leverage resources *flexibly* and act *quickly* as well as *creatively*. Flexibility enables firms to follow multiple strategies and to switch processes, strategies, and

production in an agile manner (Sherehiy et al. 2007, Vokurka & Fliedner 1998). Quick decision processes and learning cycles (Nemkova 2017) enable agile organisations to "complete requirements of all other agile characteristics in shortest possible time" (Sherehiy et al. 2007, p. 457). Specifically, they can respond fast (Meade & Sarkis 1999) without neglecting productivity and cost-efficiency (Kroll 2017). Being creative, firms can solve novel problems by developing new ideas and rearranging existing ideas (Ambituuni et al. 2021, Nemkova 2017). Agility capabilities serve as means to conceptualise agility in the empirical analysis.

Possessing these capabilities, agile organisations become ambidextrous: They can simultaneously *exploit* (and refine) existing resources, capabilities, and knowledge and *explore* (and develop) new markets, opportunities, and knowledge (March 1991, Stettner & Lavie 2014), or, as per O'Reilly & Tushman (2013), innovate incrementally and discontinuously in parallel. Exploitation requires routines and mindsets of consistency and control, while exploration thrives from risk taking and flexibility (Stettner & Lavie 2014). Therefore, they are hard to reconcile (March 1996). Nonetheless, within unsteady markets, both must reflect in organisations' capabilities (O'Reilly & Tushman 2013, Teece 2007). Hence, Teece (2007) recommends separate business units for exploration and exploitation. Alternatively, Stettner & Lavie's (2014) quantitative study in the software industry recommends developing new knowledge externally via partnerships and acquisitions (exploring) and refining knowledge internally (exploiting). Both alternatives demonstrate that agile firms are better off developing synergistic key capabilities and routines as described in this section (Stettner & Lavie 2014). Future research could further explore ambidexterity in the context of agile organisations.

(3) Agility levers are firms' dimensions/levers to modify for developing agility capabilities and thereby becoming agile. Synonyms are *agility enablers* (e.g. Nejatian et al. 2019) and *agility providers* (e.g. Zhang & Sharifi 2000). Walter (2021) somewhat differently distinguishes *agility providers* like tools (e.g. monthly strategy review) from high-level *agility dimensions* (e.g. corporate strategy). Others like Gunasekaran (1999) reject this classification and consider generic dimensions like corporate strategy as providers. Since there seems no agreed terminology, this thesis introduces the precise notion of *agility levers* – precise in the sense that this notion reflects this key concept's 'role' as lever.
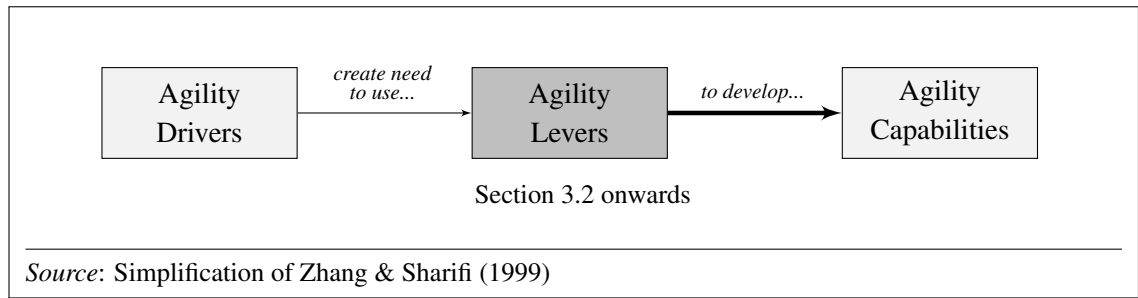
FIGURE 2.1: Concepts of Agility

To fully understand these three concepts, they must be considered in their joint context. Manufacturing researchers do so via complex methodologies (see Appendix Table B.1). More simplistically, Zhang & Sharifi (1999) and Walter's (2021) systematic literature reviews show that the concepts are often understood as process with levers as centre. Accordingly, Figure 2.1 illustrates agility's concepts. This thesis addresses levers – the means to achieve agility and the concept that has been studied least systematically.

Chapter 3:   Literature Review

This research focuses on agility levers, for which mostly fragmented research exists (Nejatian et al. 2019). The purpose is not *stipulating* what companies must do; rather, in line with CR (critical realism), *understanding* how firms can adjust levers for agility. As the subsequent review will show, recurring patterns of shortcomings permeate existing research on levers. Tseng & Lin (2011) indicate that most existing frameworks either overemphasise capabilities compared to levers or falsely confuse capabilities with levers. Hence, levers as means for agility demand attention.

Review structure and literature choice: The upcoming sections lead from the general to the specific as per Figure 3.1. Initially, Section 3.1 puts agility into the context of adjacent – more traditional – management research fields and thereby acquires their learnings for this research on the agility domain. The review's remainder then follows recommendations outlined by two *AMR* publications: Whetten's (1989) seminal article on what identifies theoretical contributions argues that configurational models, like here for agility, become empirically meaningful by first asking '*what* factors/levers' and then '*how* are these related': "Operationally this involves using arrows to connect the boxes. Such a step adds order to the conceptualisation by explicitly delineating patterns", which is needed to make models meaningful for empirical research (Whetten 1989, p. 491). A recent publication by Furnari et al. (2021) – the who-is-who of researchers advocating neo-configurational theory (NCT) as this research's underpinning theory – specifies this theorising process for deriving interdependent perspectives: Initially, 'scoping' should identify the attributes theory suggests to generate a phenomenon. 'Linking' should explore interrelations among these attributes (i.e. identify configurations) and 'naming' should articulate the underlying themes of each configuration and develop narratives (Furnari et al. 2021). The subsequent literature review (and also the empirical analysis) applies this logic and thereby develops the theoretical framework stepwise: Section 3.2 holistically reviews academic and practitioner frameworks on becoming agile to identify lever clusters/categories. It reveals

patterns of shortcomings and a development of agility research over time. Section 3.3 extracts levers from these frameworks but also from research dedicated to one agility lever – the latter literature not being in scope of the former review section – to derive a longlist of levers populating the defined clusters. Section 3.4 then finds a theoretical home in organisational theory for agility in general and lever interrelations in particular. This section also discusses the possibly unique role of organisational culture.

Source: Own contribution
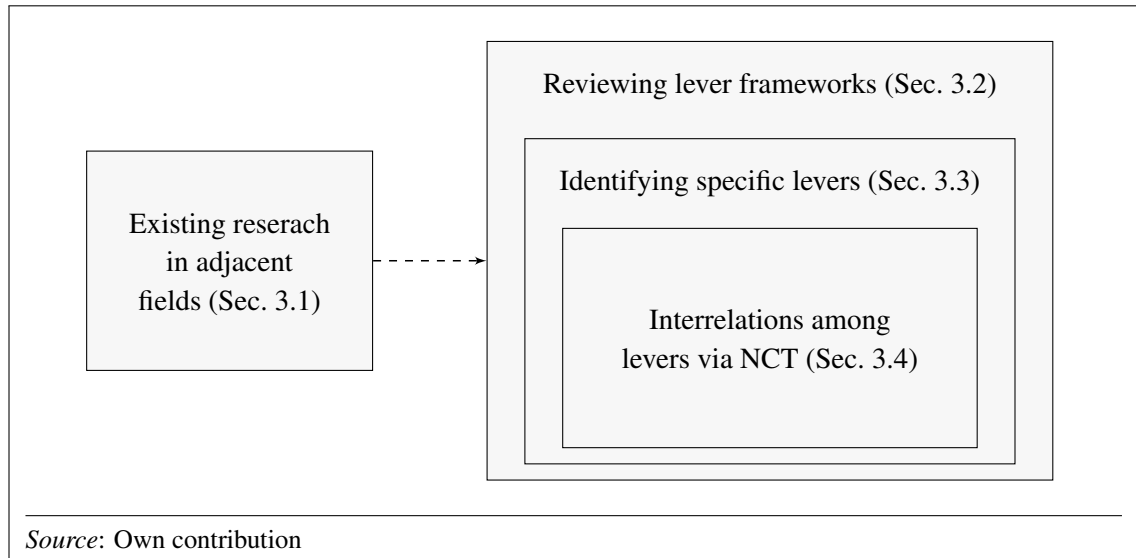
FIGURE 3.1: Structure of Literature Review

Given this study's practice-oriented DBA-character, some empirical, experience-based publications (i.e. practitioner books along with consultancy studies and reports) supplement the review of academic-scientific literature. While partially lacking academic rigour, this practitioner research adds invaluable practice insights. Also, diverse academic subfields of agility are included in the review (e.g. manufacturing business, strategic management, HR management, and IT). Given this work's configurational perspective (Section 3.4), incorporating works from different disciplines presents no lacking focus, but is strongly encouraged by Furnari et al. (2021). In parts, the review may seem overly detailed to merely develop the theoretical framework. However, this detailed review facilitates the empirical study.

3.1 Delineating Agility from Adjacent Fields

As a reviewer of an early outline of this work rightfully remarked, agility has a more empirical foundation, while other related concepts have stronger academic roots. Three

of these, organisational foresight, adaptability, and dynamic capabilities (DCs), are discussed subsequently. It shall be shown that this DBA's focus on agility is justified, but also that agility research can learn especially from DCs research.

3.1.1   Organisational Foresight

Organisational foresight (subsequently: foresight) differs from the more macro-level strategic foresight for policy making. Foresight enables leaders to understand and act facing uncertainty around their organisation's future (Fergnani 2022). Rohrbeck et al. (2015, p. 2) specifically define foresight as "identifying, observing and interpreting factors that induce change, determining possible organization-specific implications, and triggering appropriate organizational responses", which "creates value through providing access to critical resources ahead of competition, preparing the organization for change, and permitting the organization to steer proactively towards a desired future". This means that foresight senses strong and weak signals to identify change, its implications, and develops alternative responses to take a change-ready, proactive role. Thereby, organisations access resources to generate a competitive edge as per Barney's (1991) resource-based view (Ahuja et al. 2005, Rohrbeck et al. 2015).

Although foresight's ambition sounds similar to agility's, foresight and agility are not congruent. While Hines & Gold (2015) indeed indicate that foresight requires internal cultural embedding, foresight still focuses mostly on the interaction with the external environment and its changes, whereas agility extends this focus with a strong emphasis on the internal organisation (e.g. its internal linkages, structure, etc. as shown later). Foresight's outward focus becomes even clearer in Fergnani's (2022) definition of foresight as DC of interpreting external change, developing alternative futures based on that, and from that deriving organisational reactions. An often cited and used tool to develop foresight and abandon historical data-based linear forecasting is scenario planning with its origin in Shell's famous scenario programme (Fergnani 2022). Based on this, the nowadays continuous foresight development process could be even considered an outcome of agility (Vecchiato 2015). Building on Vecchiato (2015), future research could therefore further explore the relationship between agility and foresight. While it is out of this thesis' scope, this enquiry seems relevant considering Fergnani's (2022) recent call for attention from general management literature to foresight and his classification of foresight as part of the agility-related concepts of DCs (Section 3.1.3) and organisational learning through

absorptive capacity (Section 3.3.1). Despite this research gap, foresight research offers a major insight for this agility thesis: organisations' futures are complex and alternative outcomes must not be described by simplistic probabilities derived from linear statistical models (Fergnani 2022).

3.1.2 Adaptability

Unlike agility, adaptability received broad attention by top-tier management journals. Vergne & Depeyre (2016, p. 1657) define adaptability as a firm's ability to refocus after major environmental changes to remain "congruent with its current environment". Contrary to foresight with its strong outward focus, adaptability seems more focused on internal adjustments to external changes. Diverse aspects influence this adaptability, like the ability to identify and process environmental stimuli (Chakravarthy 1982) respectively managers paying attention and predicting environmental change (Nadkarni & Barr 2008) as part of foresight and a firm's leeway to make strategic changes (Hrebiniak & Joyce 1985). Another sub-research strand focuses on the ability to reconfigure assets in response to change – the field of DCs (e.g. Moliterno & Wiersema 2007). Eggers & Kaplan (2009) connect adaptability and DCs, arguing that managerial attention is critical for the DC of speedy asset reconfigurations when facing change. Similarly, when researching how defence businesses responded to 9/11, Vergne & Depeyre (2016) strive for such an integrated approach. Taking a neo-configurational perspective (Section 3.4) and performing fsQCAs (Section 4.5.3), they extract from existing adaptability research the two DCs of managerial sensing of change and asset reconfigurations when facing change. Vergne & Depeyre (2016) show that these two are sufficient but non-necessary for adaptability.

However, despite their strong theoretical foundation, adaptability findings require caution when being transferred to agility research. Section 2.3 identified adaptability as one sub-outcome of agility, which shows that those two are not identical. Even more, there are three clear differences between agility and adaptability: First, as outlined above, agility focuses on dealing with continuous *and* major changes (Teece et al. 2016) while adaptability traditionally focuses on fundamental one-off changes (for the latter see e.g. Vergne & Depeyre (2016) focusing on 9/11). Yet, as per Reeves & Deimler's (2011) adaptability understanding, this difference seems to diminish. This convergence also mirrors in the traditional adaptability understanding from an evolution theory perspective (see Megginson 1963). Second, as visible from the concentration of adaptability research in strategic

management journals, adaptability seems to be narrowly aiming "to renew firm strategy" via strategic asset reconfigurations (Vergne & Depeyre 2016, p. 1657), whereas agility more holistically also considers factors beyond strategy such as culture or cooperation – details will follow. Third, and most severely, adaptability's linguistic meaning contradicts one of agility's key aspects: adaptability indicates *reactive* adaption to external change, while agility adds the idea of *proactively* leveraging and even triggering change (Janssen & van der Voort 2020). For instance, Batra (2020) traces failures in the COVID-crisis to passive adaptiveness rather than agile responses. This strengthens the view of adaptability as an agility sub-element. Therefore, as one amongst different agility capabilities, adaptability is a sub-factor to determine firms' agility in the empirical analysis. Next, the aforementioned adaptability-related concept of DCs is reviewed.

3.1.3 Dynamic Capabilities

DCs take one step back by focusing on what is required for becoming e.g. adaptable. They extend the resource-based view on competitive advantages (see Barney 1991) with the notion of dynamism (Wang & Ahmed 2007). Therefore, firm-specific DCs rather than external market forces delineate a firm's competitive position (Teece et al. 1997). Instead of 'playing strategic games' with/against other market forces (cf. Porter 1980), firms should generate a competitive edge by developing benefits (i.e. DCs) respectively dynamic routines that competitors cannot quickly acquire on the market or copy internally (Teece et al. 1997). Optimally, dynamic routines are easily replicable but not imitable (Teece et al. 1997). Replication means the firm itself codifying and transferring competences from one context to another, whereas imitation means competitors doing so (Teece et al. 1997). Thus, one might conclude that firms can increase their economic rent by raising replicability and lowering imitability – which is difficult, as the two often go hand-in-hand. Since DCs have many alternative definitions (Wang & Ahmed 2007), this research closely follows the works of Teece, who, by raising "the fundamental question in the field of strategic management [of] how firms achieve and sustain competitive advantage" (Teece et al. 1997, p. 509), introduced the concept of DCs and later connected it to agility (see Teece et al. 2016).

Definition and Criticism

Zero-level capabilities "permit a firm to 'make a living' in the short term" (Winter 2003, p. 991) – at an energy company that would be for instance constructing and operating power plants and grids. In contrast, higher-level capabilities (DCs) are the ability to acquire external, and integrate as well as reconfigure existing internal resources and capabilities to maintain a competitive advantage in unsteady markets (Teece et al. 1997). Elaborate organisational routines (i.e. processes and patterns of capability/resource coordination, learning, reconfiguration, and interaction) describe a firm's DCs and hence competitiveness (Teece et al. 1997). Routines are shaped by positions (i.e. assets like technology, customers, external links, reputation, structures, institutions) and paths (i.e. resulting strategic alternatives). The future strategic leeway is constrained by existent routines and positions, leading to so-called path dependencies (Teece et al. 1997).

Yet, the DCs concept is not free of criticism. Barreto (2010) highlights that existing DCs research is often tautological: it concludes that DCs improve performance but also takes superior performance as indicative of DCs. Wang & Ahmed (2007) defuse this by proposing DCs as enablers of other capabilities which influence performance. However, one could challenge this by concluding that if these capabilities were only developed from DCs, they could be considered DCs themselves. Since agility has similar goals to DCs (Section 3.1.3), it seems also susceptible to this trap. However, as this thesis focuses on agility's prerequisites rather than agility's impacts, this seems less problematic here. Barreto (2010) also notes that DCs are sometimes misperceived as dichotomous while, like agility, DCs exist in varying degrees. Therefore, following Walter (2021), this thesis acknowledges that agility is not a yes-no decision. Most substantively, however, Wang & Ahmed (2007) criticise that Teece et al.'s (1997) seminal DCs work identifies strategically important core capabilities but hardly distinguishes between capabilities and *dynamic* capabilities. Therefore, Wang & Ahmed (2007) define three DCs types/features. Yet, also Teece (2007) himself addressed Wang & Ahmed's (2007) criticism. He specified DCs as 'orchestration capacities' to innovate and capture value and introduced three DCs which follow a logical order. What ensues is a mapping of Teece's (2007) resulting sensing-seizing-transforming DCs to Wang & Ahmed's (2007) DCs and to agility:

(1) Teece's (2007) *sensing* is closely related to the aforementioned organisational foresight and means identifying threats and opportunities by scanning, interpreting, and learning from markets, technologies, partners, and R&D. Very similarly, Wang

& Ahmed's (2007) ***absorptive capability*** (see also Section 3.3.1) concerns external knowledge acquisition and subsequent assimilation with internal knowledge to create new knowledge and capabilities. While this seems to relate mostly to agility's reactive aspect, Teece (2007) notes that 'sensing' firms can shape the industry, which indicates agility's proactive aspect. Based on the 'sensed' insights, top managers must make conclusions and predictions while considering limiting path dependencies (Teece 2007). This feeds into the second DC.

(2) ***Seizing*** then addresses opportunities by "investing heavily in [...] particular technologies and designs" (Teece 2007, p. 1326). Similarly, Wang & Ahmed's (2007) ***innovative capability*** means being able to leverage resources to develop new markets and products when needed. Teece (2007) stresses the right timing for committing resources to a particular solution and the necessity to take into account interplays with other commitments, which change observed risks versus stand-alone commitments. Teece et al. (2016) indicate culture and values as critical for DCs. If DCs are seen as agility's neighbouring concept, two insights emerge: Agility levers should be considered with their interactive impact and a certain organisational mindset/culture is needed (Teece 2007, Teece et al. 2016). However, it should be noted that Teece et al.'s (2016) DCs levers (e.g. scenario planning, flexible sourcing, slack) are very specific 'best practices' – exactly what Teece (2007) warns against considering DCs' context-specificity.

(3) Like agile organisations, organisations with DCs are in an evolutionary state (Teece 2007). This is achieved through ***transforming***, which means redesigning routines by recombining and reconfiguring assets, structures, and business models and thus enabling 'seizing' and breaking path dependencies (Teece 2007). Wang & Ahmed's (2007) equivalent is the ***adaptive capability***, referring to the strategic flexibility to align internal resources (e.g. in production) with external changes. As mentioned, adaption also results from agility, but it does not fully cover agility, as it neglects its proactiveness (Section 3.1.2). However, Eisenhardt & Martin (2000) additionally see an entrepreneurial, market-shaping element of DCs, wherefore 'transforming' indeed entails agility's proactiveness. Overall, 'transforming' provides the aforementioned agility capabilities flexibility and responsiveness (Teece 2007).

Further elaborations on these three elements will follow in Section 3.3.1 as part of discussing the strategy lever.

Dynamic Capabilities and Agility

The previous mapping shows that DCs and agility do not conflict. However, as shown subsequently, they are not congruent. While agility's origins lie in the manufacturing context, the roots of DCs lie with academics who sought new options for competitive advantages within highly competitive technology industries like semiconductors or software (Iacocca Institute 1991, Teece et al. 1997). Therefore, DCs came from theory, while agility originated with a stronger practitioner focus. DCs focus on often technology/innovation-related capabilities (Teece 2007), whereas agility today more holistically aims to describe an agile kind of organisation. While the two concepts have similar objectives, DCs, by focusing on abstract dimensions like sensing or seizing, seem more abstract than agility with its strong focus on levers to become agile (Section 3.2 ff.) and its broader set of outcomes – i.e. agility capabilities. These differences become even clearer in Wang & Ahmed (2007), who, as this thesis did for agility (Figure 2.1), define an $antecedent \rightarrow outcome$ perspective for their three DCs. The antecedent, which Figure 2.1 describes as agility drivers, is in Wang & Ahmed's (2007) DCs model the more holistic yet content-wise similar *market dynamism*. As outcome of DCs, Wang & Ahmed (2007) define *capability development* mediated by strategy, which means that DCs allow developing other capabilities (e.g. technical) to succeed in dynamic markets. Given this view, one might consider DCs as mere enabling capabilities for developing other capabilities (see also Winter 2003). In this regard, DCs are not congruent with agility, for which Sharifi & Zhang (2001) and Yang & Liu (2012) suggest a direct link between agility capabilities and firm performance.

Teece et al. (2016) more formally put agility in the context of DCs. Their theory-building paper criticises that being permanently agile carries significant costs. Therefore, Teece et al. (2016) recommend firms to leverage DCs to decide when to be agile. They and Felipe et al. (2016) conclude their articles proclaiming DCs as superset of agility. Here, however, the author respectfully disagrees and rather joins Lee et al. (2021) who insinuate DCs as one lever to become agile. DCs seem more narrowly-focused than agility. By focusing on "the most critical capabilities *management* needs" and "integrat[ing] the strategy and innovation literature" (Teece 2007, p. 1322), DCs are key to agile strategies (Section 3.3.1), innovation, and leadership (Section 3.3.2), but unable to capture the comprehensive, organisation-level agility concept, which amongst many others contains DCs' key dimensions strategy and leadership:

DCs' strategy focus: DCs' high concentration in strategic management journals, compared to agility's broad spread across fields, already suggests DC's proximity to strategy. While Teece et al.'s (1997) seminal conceptual work indicates that DCs also incorporate other functional, technical, and organisational skills, DCs research mainly focuses on strategy. Teece et al. (2016) veil this difference to agility by redefining agility as *strategic* capacity to redeploy resources in changing environments, which is indeed close to Teece's (2007) conceptualisation of DCs. Teece et al. (2016) therefore misleadingly label what Weber & Tarba (2014) and this thesis call *strategic* agility (Section 3.3.1) as *organisational* agility, the latter being really a superset of strategic agility. Indeed, as will be shown in the remainder of this thesis, what lets agile firms respond to change extends far beyond strategic agility or adjustments.

DCs' managerial focus: Further, Teece et al. (2016) argue that DCs via managerial decisions steer and govern resource redeployment. Teece (2007, p. 1346) adds that DCs "reside in large measure with the enterprise's top management team". Therefore, under the umbrella of sensing, seizing, and transforming as holistic means, Teece et al. (2016, p. 26) bundle "levers that can be employed *by managers*". This illustrates DCs' focus on managers, whereas agility permits no confining focus on one particular group.

In summary, while agility's and DCs' implications (and outcome-focused definitions) are similar, the perspectives on achieving them – this thesis' focus – differ strongly: Agility relies on a comprehensive and accessible range of levers which is to be defined subsequently and is hence not confined to leadership and strategy (Walter 2021). Since DCs have primarily academic roots, while agility has both prominence in practitioner literature and an admittedly improvable academic base, this DBA's focus on agility seems justified. Nonetheless, given its proximity, DCs research is exploitable for agility. DCs' sensing-seizing-transforming perspective could explain how agility levers are adjusted for agility (Teece et al. 2016). However, adjustments to individual levers are not the focus of this research, as they already received attention (Section 3.3). Therefore, sensing-seizing-transforming becomes not part of the theoretical framework. Yet, the author will use this triad as basis for the strategy agility lever – one theoretical framework subelement (Figure 3.4) – and to discuss his empirical findings in the broader context of adjacent research. The next section starts reviewing dedicated agility lever research.

3.2 Review 1: Agility Lever Frameworks

This section briefly reviews academics' and practitioners' frameworks for 'becoming agile'. Its main aim is identifying joint strengths and shortcomings rather than integrating existing research into a new framework. The one-by-one review of frameworks makes evident that 'types' of literature share patterns of shortcomings – e.g. academics tend to ignore organisational culture while practitioners often lack systematic methodologies. A dedicated review of individual levers by juxtaposing different publications to develop a new framework follows then in Section 3.3. While established frameworks like Teece (2007) exist for DCs, such clarity does not yet exist for agility. This is why the following section might seem partly fragmentary.

3.2.1 Academics' Frameworks

The subsequent sections review academics' frameworks. It becomes clear that most authors develop frameworks that capture agility via levers (e.g. strategy). Thence, they adopt a resource-based perspective to achieve agility (Barney 1991).

Manufacturing-oriented Frameworks

Agility's aforementioned origin in manufacturing reflects in frameworks of agility levers. Goldman et al.'s (1995) seminal theoretical work extended the Iacocca Institute's (1991) agility introduction with agility levers by arguing that agile manufacturing develops from four dimensions: enriching customers, cooperation, organising to manage change, and deploying people and information. This framework served as baseline for later works. For instance, Jackson & Johansson (2003) and Zhang & Sharifi (2000) focus on manufacturing by referring to Goldman et al. (1995). While Jackson & Johansson (2003) develop no own lever framework, Zhang & Sharifi (2000) identify relatively generic levers (people, innovation, technology, and organisation). However, the remainders of both works focus mostly on agility drivers and capabilities. Taking a stronger HR-perspective, Monplaisir (2002) identifies workforce, management, and technology as manufacturing firms' agility levers by referring to Goldman et al. (1995). Mann (2014) offers a tool to measure firms' agility level and therefor redefines Goldman et al.'s (1995) narrowly specified levers into four more generic levers: customer, cooperation, structure, and people. He tests his framework in six service companies and finds the greatest agility impact from

structure, followed by people (i.e. employees), cooperation, and customers. Unfortunately, despite trying, Mann (2014) cannot fully justify adopting Goldman et al.'s (1995) two-decades-older framework. Another example referring to Goldman et al. (1995) is Gunasekaran (1998), whose theory-building work focuses on cooperation, pricing, people, and structures and defines manufacturing sub-levers (e.g. just-in-time production). In 1999, Gunasekaran revised this framework with a study reviewing 60 agile manufacturing articles – but there he leaves the criteria for selecting these articles opaque and does not refer to Goldman et al. (1995). He redefines his levers as people, technologies, systems, and strategies with partnering/alliances as sub-strategy. Yet, his systems lever seems inconsistent, as he allocates software tools to it, which he also allocates to technology. Gunasekaran (1999) indicates interdependencies among his levers, arguing that strategies must integrate technologies and systems, and that information technologies and flexible structures are required to integrate agile people and manufacturing technologies. However, as he conducts no empirical study but reviews existing literature, which does not elaborate on interrelations, he cannot specify them.

Some researchers maintained the early manufacturing focus for longer. Brown & Bessant's (2003) longitudinal case study of six manufacturing firms reveals agility's role for successful mass customisation. It introduces the manufacturing agility levers of strategy, processes, linkages, and people – yet, it mislabels them as agility capabilities. This surprises as Sharifi et al. (2001) had earlier shown what qualifies as agility lever by introducing five 'real' levers (organisation, people, technology, innovation, and miscellaneous). Then, however, Sharifi et al. (2001) seemingly ignore these levers in the agility assessment tool they develop.

With the specific purpose of developing a scoring tool for manufacturing organisations to *quantitatively measure* their agility, Vinodh et al. (2008) identify four levers: organisational structure, manufacturing management and strategy, employees, and technology. Lin et al. (2006) recommend integrating the levers business processes, people, facilities, and information system/technologies to measure manufacturing agility via fuzzy-logic analyses. With a stronger explorative, theory-driven motivation, Bottani (2010) seeks empirical evidence for agility dimensions in manufacturing by analysing data patterns in 190 companies via quantitative inductive survey research. She first identifies the agile companies among all respondents and then – using this subset – determines the drivers motivating them to become agile, what they excel in (i.e. agility capabilities; 'attributes'

in her work), and their levers to become agile ('enablers' in her work). To identify patterns (i.e. drivers, capabilities, and levers), Bottani (2010) conducts a principal component analysis, which identifies employees and manufacturing technology as critical. While she finds little cross-industry difference for capabilities, levers differ among industries – an important finding for this thesis as it exhibits that the researched context must be considered. Unfortunately, Bottani's (2010) levers seem biased, comprising only tools and IT solutions for manufacturing and entirely ignoring other possible levers (e.g. strategy). Further, her list of capabilities seems to contain levers rather than capabilities.

A publication showing that despite authors' manufacturing background their levers could apply also outside manufacturing since having a predominantly non-technical nature, is Zhang & Sharifi (2007). Their research on agile strategies (namely: quick, responsive, and proactive) uses multiple statistical tools and offers six levers to master these strategies: organisation, technology, people, innovation, relationships (with suppliers, competitors, and customers), and integration. These generic levers could extend beyond manufacturing. Overall, manufacturing-oriented agility research appears dominant in the early years. It offers many lever frameworks, but reaches no consensus. Nor has any single research reached the dominant position (what could be termed a pseudo-consensus) of Teece's work for DCs.

Frameworks Beyond Manufacturing

Other researchers even more explicitly examine levers beyond manufacturing. For instance, van Oosterhout et al. (2006) use mixed-methods (expert workshops, interviews, and online surveys) to measure the gap between the current and optimal agility level in a cross-industry sample. They list business network governance and architecture, IT, organisation governance and architecture, and culture and people as potential levers, but then focus on the IT lever, falling short of even defining the others.

Another non-manufacturing framework is Worley & Lawler's (2010, p. 194) 'built-to-change model', which defines four adaptable design features: "a robust strategy, an adaptable organization design, shared leadership and identity, and value-creating capabilities". By outlining sub-requirements, this work goes beyond listing generic levers: First, as traditional competitive advantages become rare, strategies must nimbly foster short-term opportunities by leveraging a future-focus, flexible product and service ranges, as well as differentiating features. Second, adaptable organisational designs shall maximise

the 'surface area' with external parties. This presupposes transparent information systems, empowering decisions-making processes, and nimble talent management designs to employ the best talents and offer tailored reward systems. Third, firms need shared leadership and identities – the former supporting fast, informed, non-bureaucratic decisions, the latter providing guidance (Worley & Lawler 2010). Fourth, value-creating capabilities allow *staying* agile. Specifically, change, learning and implementation expertise give "the ability to shift from one [emerging] advantage to another" (Worley & Lawler 2010, p. 197). Unfortunately, despite diligently analysing some factors like strategy, this framework mixes capabilities/outcomes (e.g. value-creating capabilities) and levers (e.g. robust strategy) under the umbrella of levers. This issue mirrors in Sherehiy et al.'s (2007) literature review paper, which, despite being published in a manufacturing journal, shows no manufacturing focus. By defining the levers flexibility, responsiveness, change culture, integration and low complexity, core competency mobilisation, qualitative and customised products, and speed, this work partially confuses capabilities for levers.

Like Worley & Lawler (2010), Meredith & Francis (2000) define sub-requirements for their *agility wheel's* four levers: strategy, processes, people, and external linkages. They develop and validate this model through action research in ten companies. Yet, their detailed methodology remains opaque. Appelbaum et al. (2017) resume Meredith & Francis' (2000) agility wheel by reviewing existing literature. Compared to the original, they deemphasise organisational linkages and add leadership and sustainability. Unfortunately, they provide no structured overview of their framework. Similarly, Nemkova's (2017) framework resulting from qualitative case study research on agility's role for internationally active small organisations seems fuzzy. Her central argument is that, given these firms' lacking resources to prepare for all conceivable developments, they require agile processes for fast decision-making. Moreover, they are dependent on employees' ambiguity tolerance and zest for knowledge (Nemkova 2017). Linkages with various other stakeholders provide organisations with the inspiration for being creative, and the agile adaptation of mission and goals provides flexibility. Ultimately, Nemkova's (2017) lever framework graph (p. 262) does not cover all these aspects, introduces others, and thus seems fragmentary.

Finally, Sambamurthy et al.'s (2003) theory-building work describes levers indirectly as types of agility: customer agility (cooperating with customers for gaining market intelligence), partnering agility (leveraging other partners' capabilities and learning from

them), and operational agility (quickly redesigning existing and developing new processes). Unfortunately, since this work was published by the MIS Quarterly, Sambamurthy et al. (2003) merely replace other authors' manufacturing bias with a bias towards IT and how these three agility types are developed via IT. Hence, also this work provides no holistic, organisational perspective. Therefore, also the frameworks beyond manufacturing could provide no consensus on the relevant levers.

Culture in Academic Frameworks

Noticeably, all these frameworks ignore organisational culture (synonym in this thesis: mindset) – a 'soft' (i.e. difficult to capture) lever emphasised by practitioners like Denning (2018). Crocitto & Youssef (2003, p. 388) criticise that research "neglected [...] organizational contextual factors such as culture". Therefore, they add organisational and leadership mindsets to formally definable agility levers by specifying seven relatively granular levers: The (1) organisational mindset must become agile by promoting empowerment and communication. Organisations need (2) leadership mindsets that commit to an agile vision and mission, and that create acceptance for change and continuous learning. (3) Reward systems should promote continuous improvement. (4) IT systems should support cooperation with external partners. Those four factors support organisational members managing relationships with external parties. Consequently, (5) organisational members shall closely engage with external parties, wherefore (6) suppliers are included to develop agile supply chains (Crocitto & Youssef 2003). Moreover, this requires internal collaboration (Crocitto & Youssef 2003). Aside, the company must (7) become customer-centric. Closing their article, Crocitto & Youssef (2003) again stress managers' role in developing a culture/mindset of innovation, information, and teamwork.

While subsequently both Sambamurthy et al. (2003) and Holsapple & Li (2008) indicated that agility capabilities must become part of how organisations think (i.e. firms' mindset/culture), they do not explicitly name organisational culture as lever. In contrast, Nijssen & Paauwe (2012) explicitly consider the role of a shared agile mindset in their literature review. They argue that firms should focus on three aspects: workforce scalability, knowledge creation, and organisational infrastructure. Workforce scalability means both dynamically aligning HR panning with business needs and developing a shared mindset (Nijssen & Paauwe 2012). Knowledge creation relates to what Teece et al. (2016) define

as sensing; i.e. gaining recent information on external dynamics. The third aspect, organisational infrastructure, stands out from the other two HR-related levers. Nijssen & Paauwe (2012) argue that firms must be nimble by, amongst others, a flat structure and internal linkages. Therefore, a potential downside of this model is that it aims to develop a model for organisational agility, but limits agility levers to mostly HR-related aspects.

More recently, Harsch & Festing (2020) considered agility even primarily as mindset. Analysing semi-structured interviews via grounded theory, they find that agile mindsets, as culture's embodiment, must develop from visible "firm-internal agility-differentiating factors" like structures, strategies, methods, or processes (p. 50). Yet, just as Nijssen & Paauwe (2012), they maintain a strong HR-focus.

Despite these exceptions, most academics continue neglecting cultural levers. Recently, Shams et al. (2021) reviewed existing literature and then listed only IT, supply chain, and production as levers, without justifying the limitation to these tangible/hard dimensions. This issue mirrors in Mueller & Jungwirth (2022), who show via surveying and interaction term analyses that the positive impact of cooperative linkages on agility is stronger for firms in agglomerated than in peripheral locations. They argue that such linkages provide particularly smaller firms the knowledge and resources to make agile strategic decisions when facing agility drivers. Unfortunately, Mueller & Jungwirth (2022) retain this narrow focus on linkages as lever, mentioning only in passing that these support the appropriate use of levers like technology and strategy and process adjustments, while not even considering culture. More positively, they indeed show the importance to focus on one firm type and regional context to separate levers' impact from that of the context (Mueller & Jungwirth 2022) .

Another example is Battistella et al. (2017), who claim to research strategic agility; however, what they call strategic agility seems closer to this work's definition of broader organisational agility. They research agile business model renewal via four case studies and cross-case analyses, and identify three relatively tangible levers: (1) Strategy innovation describes identifying required strategic adjustments and the ability to implement them. (2) Resource capitalisation concerns the ability to acquire, develop, and use resources facing change – here, they at least indicate that culture might have some influence, without specifying it. (3) Networking and linkages enable to implement changes within the broader network (Battistella et al. 2017). In that work, culture is therefore only hinted at.

In general, academic lever frameworks' sparse attention to culture/mindsets remains

a conundrum, considering evidence for agile mindsets' importance from both practitioner research (see next) and academic one-lever research (Section 3.3.2). Academics tend to make statements like "much research and work is left to be done in finding out how to prepare for the realization of the agile mindset" (van Hoek et al. 2001, p. 143), without elaborating.

3.2.2 Practitioners' Frameworks

Different from academics' theory- and methodology-driven approach, practitioners leverage own experience – often from consulting – to develop lever frameworks. For instance, Kroll (2017) identifies four levers, or incubators in his terminology, building on his consulting experience and a cross-industry survey (without statistical analyses): firm culture, leadership and governance, organisational structure and processes, and agile tools and technology. In his work, he also exemplifies a shortcoming of practitioner literature: it often ignores existing academic peer-reviewed sources.

Also two McKinsey research papers illustrate this issue: Without cross-referencing, Aghina et al. (2017) propose 'agile trademarks' as levers: (1) strategy as north star in form of a shared vision and purpose to align value creation; (2) structure as network of aligned empowered teams and flat hierarchies; (3) processes of fast change-focused learning and decision cycles; (4) people in a dynamic and passionate people developing model; and (5) cutting-edge enabling-technology. Ahlbaeck et al. (2017) validate these levers at least empirically with an online survey asking participants about the importance of 18 agility practices that constitute the levers. They received 2546 responses across all regions, company types, sizes, and industries and find, amongst others, that agile organisations leverage strategy- and people-related practices including a shared purpose, strategic guidance, shared and servant leadership, and actionable strategic guidance. Furthermore, process-related practices like information transparency, fast experimentation, iteration, and ongoing learning seem important. The importance of structure-related practices like open workspaces and active partnerships seems low. Unfortunately, Ahlbaeck et al. (2017) do not disclose their specific methodology – another common shortcoming of practitioner literature as shown subsequently.

Practitioners often add culture as lever, but accompanying quantitative/qualitative studies are either missing or left unexplained. For instance, Holbeche's (2018) practitioner book, in extending Meredith & Francis' (2000) aforementioned agility wheel, adds

agile culture to connect the other levers, but conducts no validating study. Moreover, her levers are presented in an unstructured manner in the remainder of her book. Another example is Haeusling & Kahl (2018), whose experience-based framework to measure agility includes strategy, structure, processes, leadership, human resource management, and culture. They argue that companies regularly enter agility with agile processes. To facilitate processes, firms realign their structure and strategy. Leaders must understand and live their new facilitator- rather than directive-role (Haeusling & Kahl 2018). Human resource processes also facilitate agility. To establish these changes, firms need an organisational culture of open dialogue, trust, and change. The authors recommend measuring organisations' agility on each lever using indicators. Unfortunately, their framework to obtain data is so complex (including interviews, workshops, participant observations, quantitative data) that is seems excessively time-intensive for practical application. Further, while incorporating culture, they omit a validating study.

Likewise, Brosseau et al. (2019) and Powers (2018) use neither peer-reviewed sources nor transparent methodologies or accompanying studies. Brosseau et al. (2019) argue that companies iteratively pass through two stages: (1) aspiring, designing, and piloting the new agile approach and (2) upscaling and improving it. In these stages, firms shall adjust levers like vision, processes, technology, and culture – however, Brosseau et al. (2019) introduce these levers rather implicitly while focusing on the two stages. Finally, Powers (2018) deems agility levers mutually dependent since agility only becomes truly powerful when an agile mindset develops to embed agility's more formal levers. While the same criticisms apply here as with the aforementioned practitioner literature, both models interestingly indicate that becoming agile requires more than a set of agility levers. Namely, these levers' interdependencies require consideration – an aspect this thesis takes up later.

3.2.3 Synthesis 1: Two Clusters

For becoming agile "it is critical to create an effective integrated procedure [...] to ensure that the agility [levers] can satisfy the agility capabilities and cope with agility drivers" (Tseng & Lin 2011, p. 3694). This literature review demonstrated how academics and practitioners did this from different perspectives, proposing agility levers and adding them to frameworks. Academics' models often incorporate tangible, definable levers and have a tradition in manufacturing research. Conspicuous is how some academics' frameworks

confuse agility levers and capabilities. Practitioners' models are more implementation-focused and often incorporate culture, but lack validating studies and references to existing works. Most academic and practitioner frameworks treat agility levers as independent factors without considering possible interrelations (Walter 2021). Another finding is that the levers included in the reviewed models differ strongly – *there exists no comprehensive model that does not either focus on manufacturing, ignore culture, or suffer from practitioner literature shortcomings*, wherefore basing this research on only one existing model seems incomprehensive.

Considering both academic and practitioner research, Step 1 of this thesis' conceptual framework (Figure 3.2) distinguishes two holistic clusters of levers: (1) tangible (i.e. **hard**) levers identified by academic and in early days mostly manufacturing-related literature and (2) those broadly related to intangible ***organisational culture*** added by scarce academic, but mostly practitioner literature. The next chapter will progress this framework and populate these clusters by examining research on individual levers more deeply.

Source: Own contribution
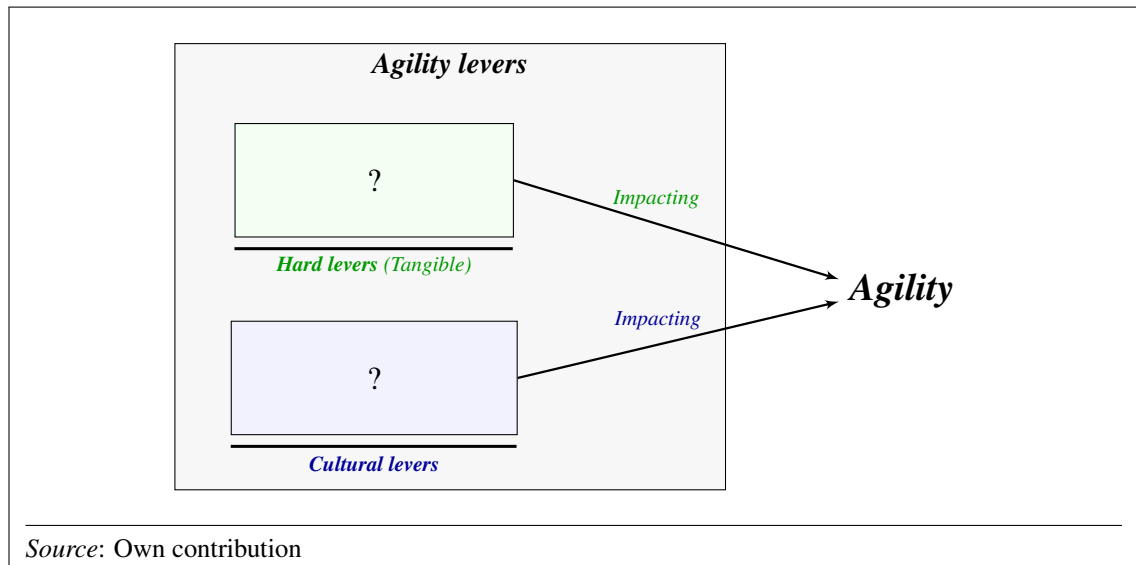
FIGURE 3.2: Conceptual Framework – Step 1

3.3 Review 2: Identifying Levers

This chapter briefly reviews research on agility levers mentioned by the works outlined in the previous chapter. To populate the two lever clusters, the author **identified individual levers** as follows: First, he extracted high-level levers aiming at mutual exclusivity (by combining some of them) from the aforementioned and additional frameworks and

collated them in Excel. Second, he considered one-lever publications that provide more detailed accounts. Third, he allocated the levers to the two clusters. The levers found by this process will be briefly introduced.

Importantly, this review shall not provide an exhaustive elaboration of the levers, but rather create a baseline guiding the upcoming empirical study. This research project leaves detailed discussions of individual levers to others and follows Furnari et al. (2021) in focusing on the explanatory power of levers' complex interdependencies. Considering the adopted CR perspective, details would anyway differ among contexts (Bhaskar 1978). While this review indeed aims for critical juxtaposition, existing studies rarely challenge old findings, but rather confirm them via descriptive case studies or investigate adjacent areas (Vázquez-Bustelo et al. 2007).

3.3.1 Hard Levers

Six hard levers could be clustered and will be explored subsequently.

Technology

Technology was highlighted as lever by pioneering manufacturing agility research like Gunasekaran (1998) and Monplaisir (2002), and later Vinodh et al. (2008) and Bottani (2010). These works stronlgy point to existing large technology assets like manufacturing plants (in this thesis for instance power plants) that are either flexible or lead to path dependencies as limiting factor for agility.

Aside from asset/manufacturing technology, information technology (IT) gained even stronger attention as lever, as it increases the information-base by generating, analysing, and leveraging real-time data, hence impacting knowledge exchange, responsiveness, and structural adaptiveness (Breu et al. 2002, Lu & Ramamurthy 2011, Tallon & Pinsonneault 2011). IT also facilitates working agilely as non-co-located teams (Breu et al. 2002), which gained additional importance during the COVID-crisis. In a theory-building publication, McGaughey proposed already in 1999 that the internet can facilitate organisational agility. Sambamurthy et al. (2003) value IT's potential for agile cooperation with customers and business partners through virtual communities and information sharing as well as for internal process integration. Statistical evidence for a positive impact on agility exists for technology in general (Bottani 2010), IT competencies (Chakravarty

et al. 2013), IT infrastructure and capabilities (Shams et al. 2021, Weill et al. 2002), business intelligence (i.e. technology-supported environment and data scanning and analysis) (Cheng et al. 2020), strategic IT alignment (i.e. the fit between IT and strategy), and IT infrastructure flexibility (i.e. network, hardware, and software scalability and adaptability) (Tallon & Pinsonneault 2011). Especially Tallon & Pinsonneault's (2011) quantitative mediation-analysis study offers a diligently outlined methodology and shows that the positive impact on firm performance from aligning IT with strategy is fully mediated by agility. Therefore, firms can leverage strategic IT investments effectively by being agile (Tallon & Pinsonneault 2011).

Yet, technology's benefit seems to have limits. While Tallon & Pinsonneault (2011) find no support for their initial sunk cost-based hypothesis that large IT investments necessarily lead to path dependencies and hence rigidity, other researchers identify real limitations. Weill et al.'s (2002) cross-industry survey study contradicts Tallon & Pinsonneault (2011) and warns that unfit IT infrastructure investments can strongly hinder agility, as this infrastructure delimits companies' operations in the years to come. However, the notion of *unfit* investments indicates that suitable investments might not produce path dependencies. With a narrower focus, Vickery et al. (2010) observe no significant direct impact of supply chain IT on agility. However, their research focuses on manufacturing. Others identify technology as detrimental if not *used* appropriately: Lu & Ramamurthy (2011) provide statistical evidence that IT structure investments hinder agility unless combined with profound IT capabilities to leverage them. Gunasekaran's (1999) literature review warns that unfamiliarity with technologies diminishes the communication critical for agility. Finally, Breu et al.'s (2002) UK-based survey research discovers that IT contributes to agility only when optimally embedded into working processes. All that said, **new technology and technology capabilities** (IT and, especially in the energy industry, large technology assets), when used properly and when preventing path dependencies, seem to be a potential lever for agility.

Processes

Processes that are flexible and changeable were highlighted as lever by early agile manufacturing research (Zhang & Sharifi 1999, Brown & Bessant 2003). Holbeche (2018)

suggests that this early process-focus was since processes must reflect an agile strategic intent for efficiency and the ability to quickly redeploy resources. This thesis defines processes as any structured procedure or activity bundle aimed at a defined outcome (Davenport 1993). Agile processes feature stakeholder involvement, transparency, employee empowerment, evolutionary refinement, and time-boxed iterations aiming for creativity and adjustability (Meade & Sarkis 1999, Harsch & Festing 2020). In a brief article building on his consulting experience, Rigby (2018) further reports greater morale, productivity, and accelerated time to market from using agile processes. McKinsey research hints at a positive correlation of agility and agile processes since agile organisations can rely on flexible processes to value creation (Aghina et al. 2017, Ahlbaeck et al. 2017).

Reviewing the literature, the author found three agile process-categories, which are not discussed at length but are introduced subsequently. (1) Agile organisation-level operational processes (e.g. production or procurement) decrease cost and accelerate both process adjustments and creation to respond to volatile markets (Sambamurthy et al. 2003, Zhang & Sharifi 1999). (2) Agile team-level processes (e.g. agile working methods like Scrum) improve cost, quality, and simplicity (Conboy 2009). For instance, the Capgemini Consulting Agile Organization Study concludes that agile team-level processes "support a company in the road to agility" (Kroll 2017, p. 7). (3) Agile organisation-level administrative processes support the former two categories. Researchers focus here heavily on HR-related processes. Adaptive and flexible talent management processes attract, select, retain, and develop employees capable to deal with agility's challenges – i.e. an agile workforce (Cunha et al. 2020, Harsch & Festing 2020). According to Cunha et al. (2020) and Gunasekaran (1999), this includes agile formal training and compensation processes, but also soft cultural adjustments and top management support (see Section 3.3.2). Other administrative processes like bookkeeping, however, seem to receive little attention from agility research.

Interestingly, Annosi et al.'s (2020) case study research on software development observes detrimental compartmentalisation, short-term thinking, and greater time pressure resulting from agile processes. However, their study has a clear shortcoming: What Annosi et al. (2020) identify as agile organisation is rather a rigid company forced to apply agile processes. The problem seems to be an incomplete implementation of agility in the observed firm rather than general conceptual deficiencies.

Conclusively, while not all agile process research finds only positive influences, **processes that are changeable/flexible and fast** seem promising as potential agility lever

(Aghina et al. 2017, Brown & Bessant 2003, Zhang & Sharifi 1999). Although this lever has been introduced early, its empirical enquiry remains rare.

Structures

Structures refer to hierarchies, formal grouping of individuals, and functional work responsibilities structuring organisation members' behaviour (Dauber et al. 2012). Agile structures received early manufacturing-attention (Gunasekaran 1998, Zhang & Sharifi 1999), but remained prominent in later research (Teece 2007). Harsch & Festing's (2020) grounded theory study concludes that structural agility means aiming for decentralisation and simplified bureaucracies, which leads to accelerated decision-making, employee responsibility, and customer proximity through redesigned roles, responsibilities, and functions.

Yet importantly, research demarcates agility from unstructuredness (Ambituuni et al. 2021, Nemkova 2017) and pegs it to what Brown & Eisenhardt (1997) term 'semistructures'. For instance, Cunha et al.'s (2020) theory-building research and Ambituuni et al.'s (2021) interview research suggest that lacking structures (i.e. total freedom for employees) leads to detrimental improvisations and consequentially unsuccessful innovation and experimentation. Therefore, Cunha et al. (2020) recommend defining simple high-level rules that ensure some continuity and accountability, but that also provide employees with a framework for meaningful improvisation. Similarly, to prevent "too many degrees of freedom", Brown & Eisenhardt (1997, p. 16) recommend loose structures via simple agile high-level rules and goals (i.e. responsibilities, priorities, and communication), which mirror the renowned 'enabling bureaucracy' (Adler & Borys 1996), allowing to work agilely while leveraging a stable structural foundation (Holbeche 2018). Such agile structures are necessary to effectively implement change – i.e. as per Doz & Kosonen (2010), to act and overcome the inertia of the existing. Personal accountability and reward systems could, for instance, serve as such enabling structure (Ambituuni et al. 2021). Interestingly, Nemkova (2017, p. 260) also mentions the guidance from enabling bureaucracy through "common pre-established goals", yet defines even those goals as being impermanent. This contradicting view (cf. Holbeche 2018) is not actively approached by this thesis and thus bears potential for future research.

Overall, researchers seem to highlight two levels of agile organisational structures:

(1) *Company structures* should be decentralised – thence, abandoning pyramid structures that result in structural silos, hinder crucial cross-team communication, and induce bureaucracy and slow business processes (Harsch & Festing 2020, Teece 2007, Worley & Lawler 2010, Zhang & Sharifi 2007). However, according to Wulf's (2012) longitudinal research with CEOs (via interviews), 'delayering' or 'flattening' without meaningful agenda can even lead to centralisation. Therefore, new structures and hierarchies must be carefully planned. Related to decentralisation, company structures should be flexible and adaptive-modular consisting of short-term projects and teams to enable continuous changes (Fourné et al. 2014, Tallon & Pinsonneault 2011). For this, March (1991) and Teece et al. (2016) recommend relatively independent divisions with different mandates. That said, Doz (2020) notes that such structures are hard to apply for some types of businesses, showing how company-specific agility is. Further, Ambituuni et al. (2021) warn that too little structural centralisation can neutralise agility, meaning that a careful balance is required. Interestingly, Weill et al. (2002) add that also the IT infrastructure should be scrutinised as to which systems to hold centrally and which within business units. These choices directly impact where decisions are made, since central versus local IT holding defines where information is available at first instance. While Weill et al.'s (2002) general thought still seems relevant, their list of IT systems appears outdated after two decades.

(2) *Team structures* should mirror the company structure – i.e. they should be cross-functional and non-hierarchical to enable autonomous but cooperative work with other teams and external stakeholders (Fourné et al. 2014, Harsch & Festing 2020, Zhang & Sharifi 2007). Agile organisations are therefore organisms of "teams built around end-to-end accountability" (Aghina et al. 2017, p. 6). This concurs with McGaughey (1999), whose theoretical work defines a workforce structure allowing for rapid unexpected changes as agility prerequisite.

In summary, organisational structures seem to potentially impact agility, with the general theme being **enabling bureaucracy to achieve decentralised structures**. Ambituuni et al. (2021, p. 172) describe this as tackling "the paradox of too much/too little structure in ways that allow for effective improvisation and avoid complete chaos and disorder" and Levy (2000) as balancing centralisation and decentralisation in order to manage complexity and provide direction. Adler & Borys' (1996) enabling bureaucracy seems therefore more suitable for agility than rigid structures. However, researchers are divided on whether such loose structures should be stable or not (cf. Holbeche 2018, Nemkova 2017). This could be potentially industry-dependent.

Strategy

Strategy traditionally refers to an organisation's plans of action to achieve its long-term goals (Chandler 1962). Manufacturing researchers first identified strategy as lever (see Brown & Bessant 2003, Vinodh et al. 2008). Yet recently, extra issues of the *California Management Review* (2014), *Journal of International Management*, and *Human Resource Management Review* (both 2020) even established strategic agility as dedicated field.

On the one hand, this attention could result from an interesting supposed paradox: strategy intuitively appears associated with long-term commitments, which seems incompatible with agility (Brannen & Doz 2012). Yet, Cunha et al. (2020) reject this incompatibility. They see agility's value precisely in combining strategies with improvisational capabilities – the latter preventing haphazard ad hoc reactions ignoring strategies. Learning from the COVID-crisis, Lee et al. (2021) note that strategies should consider the near-term future, rather than locking companies in for the upcoming decade. Strategic agility can therefore be defined as the "ability to develop strategic alternatives and make well-grounded, thoughtful decisions in a timely fashion [...] rather than remain caught in rigid strategic planning processes" (Brannen & Doz 2012, p. 78). Related to this, Brown & Eisenhardt (1997) find that strategic alternative options allow managers to act quickly when needed. Also countering the argument that strategising impairs agility, Tallon & Pinsonneault (2011) detect no statistical evidence for their hypothesis that committing to strategies via large strategic IT investments diminishes agility.

On the other hand, strategy's general importance for agility might explain the recent attention: Robust agile strategies enable performing in unstable environments by following multiple strategies, which gives the flexibility to switch agilely among tasks and nimbly leverage short-term opportunities (Sherehiy et al. 2007, Worley & Lawler 2010). While Shams et al. (2021) see organisational agility as prerequisite for strategic agility, other research argues vice versa. For instance, Weber & Tarba (2014, p. 7) highlight the importance of an agile strategy for "adapting the necessary organizational configuration for successful implementation", which suggests that agile organisations are configurations of different levers. Weber & Tarba (2014) and Lee et al. (2021) further argue that to support organisational agility, the agile strategy needs two core capacities: (1) spotting and sensing opportunities and threats and (2) responding appropriately by seizing them

(e.g. through innovation). This matches Teece et al. (2016), who identify DCs as strategic themes for agile firms: *sensing* the unknown future, *seizing* resources, and *transforming* resources as continuous renewal. Building on Teece et al.'s (1997) and Teece's (2007) seminal research on DCs, Teece et al. (2016) therefore provide an esteemed academic base for the strategy lever. Doz & Kosonen (2008) define an alternative view of strategic agility by considering it as combination of strategic sensing, united leadership for fast decision-making, and the ability to reconfigure resources. This sounds coherent, but in this thesis, leadership is considered as a lever itself, so Doz & Kosonen's (2008) model seems inappropriate.

Absorptive capacity research also contributes to the strategy lever. The process of organisational knowledge acquisition, storage, and usage, which is closely related to strategic sensing, seizing, and transforming, is deeply anchored in the research strand of absorptive capacity. As per Lane et al. (2006), the absorptive capacity concept extends far beyond its original focus on R&D-related knowledge and relates to the broader knowledge acquisition for strategic agility. Cohen & Levinthal (1990, p. 128) famously define absorptive capacity as organisations' "ability to evaluate and utilize outside knowledge" and "to recognize the value of new information, assimilate it, and apply it to commercial ends". The three dimensions from the second quote closely match the three subelements of dynamic capabilities (sensing ≈ recognising; seizing ≈ assimilating; transforming ≈ utilising). Interestingly, the absorptive capacity to utilise outside knowledge strongly depends on own internal R&D capabilities and prior knowledge, which therefore provide the baseline to deal with external knowledge (Ahuja & Katila 2001, Cohen & Levinthal 1990). In 1994, Cohen & Levinthal even extended this view from exploiting external knowledge to also include predicting future changes. This extended view matches the aforementioned combination of reactiveness and proactiveness (Section 3.1.2), the underlying ideas of dynamic capabilities and agility. Namely, for agile companies, this means that their strategy must not only drive change internally, but also be ready to sense and predict it externally and then seize and transform – these aspects rely on possessing the aforementioned foresight (Section 3.1.1). Lane et al. (2006) note that strategic seizing and transforming also strongly depend on the capability for internally sharing externally acquired knowledge with the areas requiring it to generate value and to establish strategic alliances. Ultimately, from a resource-based perspective (Barney 1991), these findings on absorptive capacity identify knowledge as raw material adding value in dynamic, agile environments.

In conclusion, agile strategies are adaptive, focus on knowledge acquisition and utilisation, and thereby address the paradox of maintaining continuity while undertaking swift changes (Cohen & Levinthal 1990, Cunha et al. 2020, McCarthy & Tsinopoulos 2003). The study of agile strategies started in manufacturing and evolved into the dedicated field of strategic agility. Benefiting from its close relation to the well-researched fields of DCs and absorptive capacity, strategic agility research seems mature compared to research on other levers. Concretely, DCs and agility research characterise agile strategies as **'sensing and seizing'**, with 'transforming' here being considered as sub-element of 'seizing' (Teece et al. 2016, Teece 2007, Weber & Tarba 2014).

Company Purpose

Company purpose, as formally defined company mission (i.e. reason for existence) and vision (i.e. aspiration for future) aligning employees with agile approaches, was originally presented by manufacturing-related literature (see Crocitto & Youssef 2003, Zhang & Sharifi 2007). Today, this lever seems prominent with practitioners. In her book, Holbeche (2018) proposes that aspirational purposes – i.e. stable missions and visions – guide through changes. Unfortunately, practitioners' arguments seem anecdotal at times, lacking a deeper specification on the lever and getting lost in detailing analogies rather than the lever. For instance, Denning (2018) pictorially compares the agile change in company purpose from efficiency and profitability towards delighting customers to the paradigm shift triggered by the Copernican Revolution. Alternatively, Aghina et al. (2017) classify the vision and mission as guiding north star.

Fortunately, more substantive *academic* literature exists. Worley & Lawler (2010) find in a single-firm case study that the impact of a shared purpose is only modest. Yet, their methodology remains opaque. Other academics' findings are more promising. Recently, Cunha et al.'s (2020) theory-building work argued that a shared, stable vision empowers people and guides when lacking standard procedures and when other levers change agilely. Doz & Kosonen (2010, p. 378) indicate that joint values from a formal and stable purpose "can act as an inner cultural and ethical compass that allows more flexibility in reconfiguring business models". Yet later, Doz (2020) himself argued that organisations must feel comfortable with changing their purpose, which contradicts the aforementioned recommendation of a stable purpose. Somewhere in between Doz & Kosonen (2010) and

Doz (2020) concerning the purpose's stability, Battistella et al. (2017) contend that agile firms rely on a stable long-term vision which offers guidance when the immediate strategy or even the mission changes.

In summary, this overview shows (1) that the formally defined company purpose could be an agility lever and (2) that academics (even the same ones at different points in time) do not fully agree on whether this purpose is stable enough to serve as guiding north star. Notwithstanding, more works indeed indicate a **strong, stable purpose** as potential agility lever (esp. Aghina et al. 2017, Cunha et al. 2020, Doz & Kosonen 2010).

Linkages

Linkages were introduced as agility lever by Goldman et al.'s (1995) manufacturing research, which considered agility unfeasible without internal and external networks, interaction, and formal partnerships. For instance, building on the resource-based view (see Barney 1991), Mueller & Jungwirth (2022) show that such linkages contribute essential resources to becoming agile.

In reviewing the literature, the researcher found that academics and practitioners broadly describe three linkage-types:

(1) *Firm-internal cooperation* supports sharing and leveraging knowledge newly acquired through absorptive capacity in uncertain environments (Lane et al. 2006). Via cross-functional project teams, communication technologies, and internal transparency of information, cooperation fosters creativity and flexibility (Aghina et al. 2017). Cross-project communication is also central for internal cooperation (Brown & Eisenhardt 1997). Breu et al.'s (2002) survey research on agile workforces indeed finds through principal component analyses that firms' ease of moving employees between projects – as proxy for internal cooperation – impacts agility. Whether this specific proxy really fully captures internal cooperation may require reconsideration; however, this thesis takes a more qualitative, less proxy-based approach.

(2) *Customer cooperation* provides a direct path to customers' needs (Sambamurthy et al. 2003) and allows for agile co-creation (Eilers et al. 2022). Hence, both Nambisan's (2002) theoretical research and Zhang & Sharifi's (2007) quantitative cluster analysis of manufacturing companies agree that customers are a source for innovation and a partner for developing and testing new products.

(3) *Other external linkages* with parties like competitors, suppliers, or universities allow sharing capabilities, knowledge, and assets and thereby progress the own core competencies (Crocitto & Youssef 2003, Sambamurthy et al. 2003, Sherehiy et al. 2007). Further, strategic alliances help probing the future (Brown & Eisenhardt 1997). Lane et al. (2006) summarise that interorganisational relationships, as part of the absorptive capacity, support leveraging new knowledge. Breu et al.'s (2002) aforementioned quantitative work also identifies such cross-company cooperations as lever for agility. Mueller & Jungwirth (2022) find a statistical relationship between the number of external links and agility. While Gunasekaran's (1999) early work argues for such partnerships and networks being temporary, Sherehiy et al. (2007) and Sambamurthy et al. (2003) recommend more permanent relationships. Firms within these strong networks can translate their agility into superior performance (Yang & Liu 2012) as they deliver a quality, scope, and scale unfeasible alone (Yusuf et al. 1999). Therefore, Gunasekaran (1999, p. 99) argues that "partner selection is one of the most important activities in agile enterprise". At a more granular level, Zhang et al. (2022) quantitatively show that business linkages have a stronger positive impact on agility than political linkages. Yet, in competitive environments, business linkages' positive contribution decreases, while political linkages' positive impact increases. Yet, since Zhang et al.'s (2022) study took place in China, with its unique political and economic dynamics, western contexts should be evaluated before making confident conclusions for this German study.

In general, the research on linkages' agility impact seems relatively mature, as the early manufacturing research had little focus on this sector, making it easily applicable more broadly (e.g. Yusuf et al. 1999). Jackson & Johansson (2003) even provide interview questions to identify linkages' impact. Contrary to what he found for other potential levers, the author found no studies actively disputing a positive effect from **strong and diverse linkages**.

3.3.2 Cultural Levers

The second lever cluster concerns agility's intangible, cultural aspects. To distinguish culture from hard levers, this research applies a narrow definition of organisational culture: It rejects some works' view that culture *is* the organisation and vice versa (e.g. Schein

1985, Smircich 1983), but argues that organisations *have* a culture which, like other factors, affects agility (Alvesson & Sveningsson 2007). Thence, other levers like strategy or structure are not mere cultural subelements (Ostroff et al. 2012). This thesis therefore defines culture as 'intangible' beliefs, interpretations, and norms inherent to organisations, motivating certain behaviours which ultimately all reflect in mindsets (Alvesson & Sveningsson 2007, Ostroff et al. 2012) or more concretely (non-)agile mindsets (Eilers et al. 2022). Fully congruent with the findings from Section 3.2.1, Mann (2014) criticises the lacking attention of agility researchers to these organisational mindsets. Nonetheless, this thesis could cluster three cultural agility levers from agility literature: employee mindsets (with two sub-levers) and leadership mindsets.

Employee Mindsets

In changing environments, people need a change-driven mindset, where change relates to the openness and enjoyment to deal with uncertainty and newness (Eilers et al. 2022). Eilers et al. (2022) find a significant positive impact of such mindsets on agility. Employee mindsets include both, organisational mindsets embedded in the organisation and conveyed to employees ($organisation \rightarrow employee$) and personal mindsets (including values) that employees themselves bring into the organisation ($organisation \leftarrow employee$) (Harsch & Festing 2020, Dauber et al. 2012):

On the one hand, agility seems to presuppose a certain high-level organisational mindset – an agile *shared* way of thinking and approaching problems that must be deeply embedded in the organisation (Harsch & Festing 2020). Brannen & Doz (2012, p. 77) argue that these joint assumptions reflect in "informal language as an enabler or constraint for growth and strategic agility" and therefore have observable implications. Practitioners suggest that organisational mindsets enable tangible consequences of agility (Brosseau et al. 2019) and they identify mindset changes as basis of any agile cultural transformations (Kroll 2017). As per Holbeche (2018), agility could therefore be rejected by stability-driven cultures. Hence, the organisational mindset should be change-driven by promoting experimentation, team spirit, and trust (Kroll 2017). After reviewing the early academic literature, Gunasekaran criticised in 1999 that the organisational change mindset has yet to be scientifically tested. While empirical academic work remains sparse, some researchers have since provided theoretical arguments. Theory-building works by

Crocitto & Youssef (2003) and Harsch & Festing (2020) outline the importance of organisations' agile change- and action-attitude for autonomy and communication. Harsch & Festing (2020) even proclaim proactive and adaptive (i.e. changeable) organisational mindsets as agility's baseline. Complementary to the formally definable purpose lever, a joint mindset and feeling of belonging can guide changing organisations by providing a shared identity (Worley & Lawler 2010). Conversely, mindsets that reject change and hard agility levers will make agility unfeasible (workforce rejecting change as cultural obstacle) (Gunasekaran 1999).

To summarise this, shared organisational values jointly constitute an organisational mindset. Existing research recommends a **change-driven organisational culture** as lever (Crocitto & Youssef 2003, Harsch & Festing 2020, Kroll 2017).

On the other hand, also personal mindsets that employees bring into the organisation shape the employee mindset (Dauber et al. 2012, Harsch & Festing 2020). While individuals' formal responsibilities had been introduced to agility research by early manufacturing literature like Goldman et al. (1995) and Gunasekaran (1998), individuals' personal mindsets, attitudes, and work values were emphasised later. For instance, Salamzadeh et al. (2014) test the relationship between agility and personal work values within virtual universities via regression and fuzzy analyses. They identify self-development and work-life balance as dominating work values for agility. However, given the lack of any control variables for alternative levers in their regression models, their research can be questioned. Other research seems less problematic. Breu et al.'s (2002) UK-based exploratory survey-research shows that employees' fondness for agility depends, amongst others, on their *personal* appreciation of empowerment, decentralisation, and collaboration, which all require some degree of personal flexibility. Similarly, Oliveira et al. (2012) highlight the role of employees' personal appreciation of communication, flexibility, and ongoing improvement within uncertain environments. Harsch & Festing (2020) add that employees need a mindset appreciating 'positive stress' and the excitement of unsteadiness (i.e. fondness for flexibility). Likewise, Nemkova (2017) argues that employees must enjoy the excitement of newness and ambiguity. While Harsch & Festing (2020) criticise research on employees' personal mindsets as agility lever as conceptual with scarce empirical analyses, they still note that personal values and mindsets could be a lever for agility. Across the sparse literature, especially **personal appreciation of flexibility and uncertainty** seem to be key to agile personal mindsets (Harsch & Festing 2020, Nemkova

2017, Oliveira et al. 2012).

Leadership Mindsets

Leaders' mindset also received attention since agility is "a systemic organisational value and a strategy championed by leadership" (Crocitto & Youssef 2003, p. 388). While leadership has formally definable aspects and responsibilities, it is primarily a part of the culture, but also shapes it (Groysberg et al. 2018). Leaders across all hierarchies must patronise agility as new status quo (Crocitto & Youssef 2003) and communicate its cause and impact (Haeusling & Kahl 2018). Therefore, Crocitto & Youssef (2003) stress managers' role in developing an agile culture of innovation, information, and teamwork. Leaders also need a deeper personal understanding of uncertain markets. Therefore, managers in agile companies require foresight (Ahuja et al. 2005) (Section 3.1.1). If they dedicate sufficient time, attention, creativity, and entrepreneurial thinking to it, foresight enables them to translate the diverse collected quantitative and qualitative data into organisational responses (Rohrbeck et al. 2015).

From the literature, the author clustered three broad traits of agile leadership mindsets:

(1) *Agile participative or integrative leadership* means that leaders value dialogue over directive leadership (Doz 2020) and in turn self-empowered employees take over responsibilities, develop foresight and alternative scenarios themselves, and respond faster to change (Cunha & Da Cunha 2006, Eilers et al. 2022, Fergnani 2022). Enabling bureaucracy in form of priorities facilitates such accountability and autonomy (Brown & Eisenhardt 1997). This empowerment then leads to greater employee commitment to the company and its ambition for change (Eilers et al. 2020). While traditional leadership mindsets identify collaboration and shared leadership as threat to personal esteem (Doz 2020), in agile leadership "both managers and nonmanagers may have to accept a more participative decision making style" (Crocitto & Youssef 2003, pp. 392-393). At this point it should be noted that Doz's (2020) theory-building work on this topic focuses on strategic agility and hence might require a transfer to the broader organisational agility. Furthermore, Weber & Tarba (2014) warn that leaders should maintain a leading role in strategic decision making (e.g. in bundling resources) and Fourné et al. (2014) note that managers at headquarters sometimes need to provide central guidance to ensure global integration. Therefore, leaders must sense when to exercise power and when not (Holbeche

2018). Still, the general theme of participative/integrative leadership seems clear.

(2) *'Developing others leadership'* has been covered by two subdimensions. First, 'role modelling' means that leaders shall exemplify agile values to promote a common understanding (Fourné et al. 2014). Reversely this also means: If the new values and culture are not lived by leaders, employees will neither understand nor live them (Holbeche 2018). Second, and more actively, leaders shall 'coach and facilitate' employees by becoming responsive, inclusive, and by empowering and supporting employees in making sense of the complex, agile environments (Doz 2020). They shall establish a learning culture and develop employees (Felipe et al. 2016). This challenging role (Zhang & Sharifi 2007) requires leadership authenticity – i.e. becoming relatable through disclosing one's intentions (Doz 2020).

(3) *'Developing oneself leadership'* means that leaders constantly challenge themselves intellectually and apply new learnings in the business environment (Doz 2020). They should develop foresight through an alertness to recognise business environment patterns and evaluate these concerning possible outcomes (Doz 2020). Thus, Teece et al. (2016) and Walter (2021) argue that agile leadership requires managers to develop DCs: They should learn to sense and seize growth options and agility drivers before these become widely visible, and to transform proactively. Unfortunately, how specifically leaders should apply Teece et al.'s (2016) approach to become 'entrepreneurial managers' remains somewhat unclear. Despite this shortcoming, also the developing oneself trait seems justified.

Overall, the perception arises that the literature on agile leadership mindsets has some gaps and is dominated by purely theoretical works (e.g. Doz 2020, Fourné et al. 2014, Weber & Tarba 2014). Eilers et al. (2022) note that it still must be understood whether agile employee mindsets lead to agile leadership mindsets. Nonetheless, different works do underline leadership mindset's role for agility. An overarching theme covering multiple traits seems to be an **integrative and developing leadership mindset**.

3.3.3   Synthesis 2: Agility Levers

By clustering factors defined in literature, this chapter identified and outlined nine *possible* levers, leading to the lever longlist presented in Table 3.1.

Notably, levers with typical manufacturing-origin (i.e. hard levers) seem tangible – e.g. processes and strategies are formally definable (Harsch & Festing 2020), whereas

TABLE 3.1: Agility Lever Longlist

Cluster	*Lever*
Hard levers	(1) New technology and technology capabilities;
	(2) Changeable/flexible and fast processes;
	(3) Enabling bureaucracy for decentralised structures;
	(4) Sensing and seizing strategy;
	(5) Strong and stable formal purpose;
	(6) Strong and diverse linkages;
Cultural levers	Employee mindset:
	(7) change-driven organisational culture,
	(8) personal mindset appreciating flexibility and uncertainty;
	Leadership mindset:
	(9) integrative and developing leadership.

Source: Own review and clustering of literature

leaders' mindsets must develop (Doz 2020). All levers populate the identified clusters (Figure 3.2), extending the conceptual framework with Figure 3.3.

While a positivistic researcher might develop concrete hypotheses for these levers, the author, as critical realist (Section 4.1), perceives the existing research as too fragmentary and therefore refrains from defining hypotheses. Moreover, these levers would not qualify for hypotheses, as some levers describe multiple characteristics – e.g. sensing *and* seizing strategies. In positivistic, variable-based research, this would require splitting into several variables. However, this thesis strongly argues against such splits, as it is not, for example, about strategies that are either sensing or seizing, but about strategies that combine both, as such have been associated with agility. The author considers the descriptive-style levers as pool of potential dimensions that could impact agility. Considering agility's context-specificity (Fourné et al. 2014), this thesis' explorative research focus, and its focus on the German energy industry, the author conducted upstream interviews to determine which of these potential levers matter and shall be empirically researched in this industry. The outcome of this pre-selection is presented in Section 5.1 and it reveals that future research is needed in other industries where some levers might matter that are removed during the pre-selection in this thesis. The next section situates agility in organisational theory to enable an empirical investigation of agility and its levers.

Comment: To simplify the representation, the levers in this figure have been genericised. For the specific lever longlist see Table 3.1.

Source: Own contribution
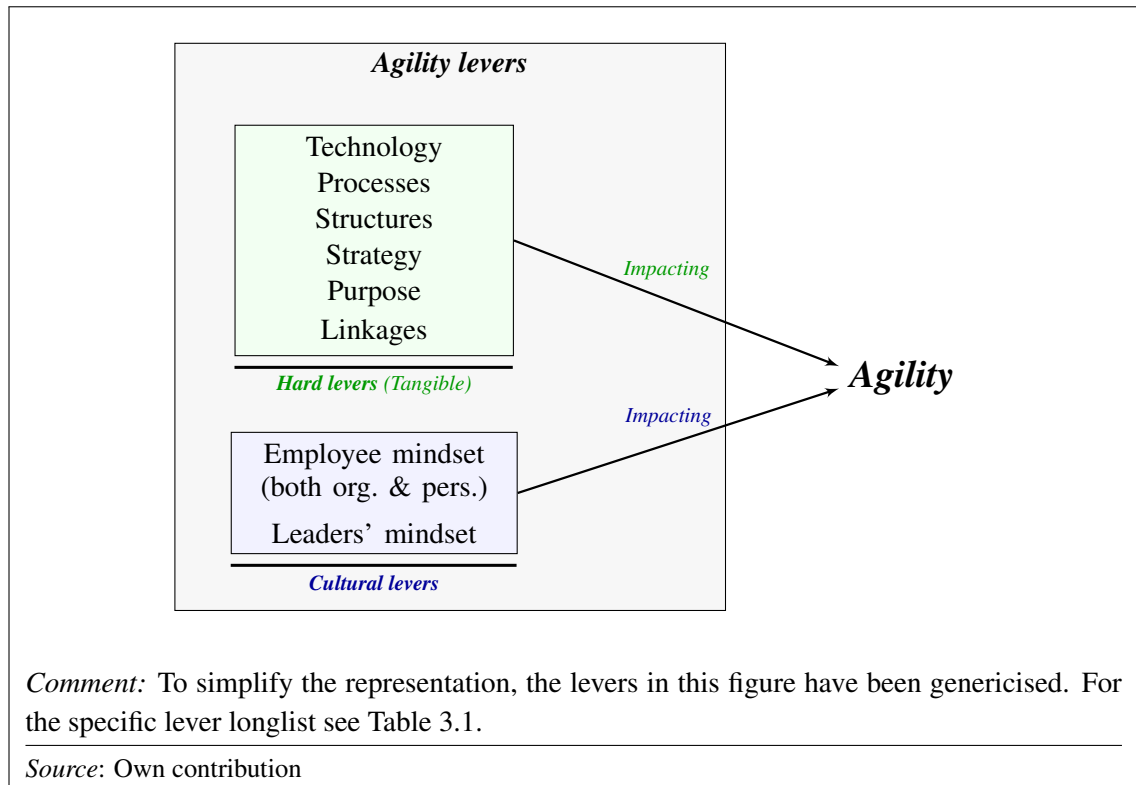
FIGURE 3.3: Conceptual Framework – Step 2

3.4 Review 3: Underpinning Organisational Theory

Already two decades ago, Anderson (1999) recommended observing firms as nonlinear and complex, and thus focusing on how levers interact in creating organisational outcomes. However, agility research has yet to reach this development stage. No research could be found that comprehensively describes how the identified *potential* agility levers in conjunction generate agility. Mueller & Jungwirth's (2022) indication of very specific lever interdependencies, namely that cooperative relationships (i.e. linkages) provide the knowledge to adjust technology and strategy towards agility, remains an exception. While agility levers are typically treated as independent factors (like in Figure 3.3), recent literature urges to factor-in their interdependencies: Nejatian et al. (2019) suggest that agility levers are strongly related. Shams et al. (2021) criticise levers' individualistic consideration and call for an interdependent perspective, though without devising one themselves in their theory-building work. Similarly, Walter (2021, p. 381) recommends future researchers that "the focus on [...] e.g., strategic agility, is not sufficient and should be considered together with the other agility [levers]". Baškarada & Koronios (2018) conclude that different complex configurations of levers can generate agility capabilities and that this requires future research.

Calls for interdependent perspectives extend beyond agility literature. Barreto (2010) notes that any scientific theory can only be 'complete' after understating the relations among the relevant levers. Wynn & Williams (2012, p. 792) argue that "the properties of a given structure emerge from the interactions between the components". Likewise, Misangyi et al. (2017, p. 256) conclude that "organizational outcomes tend to depend on the alignment or conflict among interdependent attributes". To prevent oversimplifications, Furnari et al. (2021, p. 10) urge therefore to consider "causal complexity" as "trade-offs, inconsistencies, and redundancies" among dimensions. Reflecting this in the conceptual agility lever framework presupposes an underpinning theory, which is sought subsequently.

3.4.1 Agility and Organisational Theory

Agility research is relatively scarce in top-tier *management* journals, which Nemkova (2017) criticises in the Journal of Business Research. As mentioned earlier, agility has a stronger base among practitioners and extends beyond strategic management, the focus of such journals. However, this absence might also relate to agility research's apparent ignorance of established organisational theories as broader theoretical foundation – a foundation expected by top-tier journals. A possible explanation for this ignorance could be agility's incompatibility with some organisational theory streams. For instance, classical organisational theory focusing on bureaucracy, authority, stability, and one 'best way of acting' (see e.g. Taylor 1911) seems incompatible with agility's and business environments' instability and complexity. Thence, Gunasekaran's (1999) recommendation to use this theory for manufacturing agility seems misplaced. Similarly, neo-classical theories, adding informal-social factors, insufficiently represent unstable context-specific environments. More promising seem modern theories that can capture instability and dimensions' interdependencies (Misangyi et al. 2017). As this DBA thesis aims for no broad review of organisational theory, the upcoming sections take a solution-oriented approach. Namely, they juxtapose two modern theories possibly compatible with agility and especially lever interdependencies: structural contingency theory (SCT) and configurational theory (CT). Both have been covered exhaustively in top-tier management journals.

3.4.2   Juxtaposing CT and SCT

As per SCT, the 'best organisational setup' depends on internal and external factors which jointly describe organisations (Drazin & Van de Ven 1985, Schoonhoven 1981). According to Sherehiy et al. (2007), this internal/external combination suits agility, which is motivated by external drivers and created by internal levers (see also Tseng & Lin 2011). While Grandori & Furnari (2013) classify CT as mere extension to this SCT, Misangyi et al. (2017) recently disagree by declaring CT as a new way of conceptualising organisations. Key to CT is that organisational levers generate outcomes (i.e. organisations) synergistically, not individually and linearly (Misangyi et al. 2017). By rejecting SCT's reductionist approach which would target agility with very specific aspects like hierarchy (see Sherehiy et al. 2007), CT holistically captures the full organisation with sets of *non-linear asymmetric* relationships among dimensions (Greckhamer 2016, Meyer et al. 1993, Misangyi et al. 2017). This asymmetry – i.e. dimensions having a differing impact in different configurations of dimensions – cannot be reflected in correlation-based solutions (Misangyi et al. 2017). Thus, given agility levers' diversity, CT reflects agility better than SCT. Moreover, CT rejects SCT's additive thinking (Grandori & Furnari 2013). Specifically, according to Misangyi et al. (2017) and Fiss (2007), CT rejects SCT's additive 'correlational perspective' (more 'X' means more/less 'Y') and the net-effect 'regression thinking', since CT assumes that the outcome can only emerge from dimensions working in conjunction. This means that levers for agility are to be considered as whole rather than in isolation (Meyer et al. 1993), which exactly reflects the point where this thesis progresses agility research: Section 3.3 extracted a multitude of potential agility levers from existing research. Yet, a configurational perspective on these levers' impact on agility is still to be developed. The next section further reviews the idea of organisational configurations.

3.4.3   Understanding Configurations

According to Meyer et al.'s (1993) seminal work, a *configuration* is a collection of organisational dimensions or characteristics occurring together. Somewhat more concretely, Siggelkow (2002) defines a configuration of dimensions as organisational setup without inconsistent and some reinforcing dimensions. He declares a *dimension* (in this research: lever) as important if having strong interdependencies with other dimensions – meaning that changing it requires changing other dimensions it interacts with. Further, Siggelkow

(2002) specifies that *interaction* means that dimensions reinforce each other. Organisations and their outcomes like performance develop from an interdependent, causally complex combination or pattern of theoretical dimensions, not from a collection or disaggregation of isolated dimensions (Fiss 2007, Furnari et al. 2021). Meyer et al. (1993) list typical configurational dimensions for any research, including structure, strategy, organisational culture, technology, processes, beliefs and members. Interestingly, this list features many of the agility levers extracted from existing agility research (Figure 3.3).

3.4.4 From CT to NCT

Reviewing configurational research, the author identified two stages of CT, driven by methodological developments. After Meyer et al.'s (1993) original call for configurational research with focus on holistic patterns created by organisational dimension configurations, rather than on detail-obsessed multivariate analyses, a first wave of empirical research emerged. Misangyi et al. (2017) state that this early understanding of configurational theory relates back to research defining different organisational typologies like Mintzberg's (1989) research. Yet, Misangyi et al. (2017) also note that these works lacked suitable methods, which led to the misguided practice of researching configurations with correlation and regression methods. This was problematic since even statistical interaction terms could not sufficiently represent dimensions' synergistic effects, as these terms become impossible to interpret given CT's 'many-way' effects (Fiss 2007).

Due to this theory-method gap, CT lost its momentum (Fiss 2007) until Qualitative Comparative Analysis (QCA) established in management research (Vergne & Depeyre 2016). It provided a research strategy that triggered a second CT-wave under the label **neo-configurational theory** (NCT) (Misangyi et al. 2017). In this sense, the evolutionary move from CT to NCT originates from QCA – hence it confirms Van Maanen et al. (2007, p. 1146), who argue that for "organizational research projects [...] method can generate and shape theory, just as theory can generate and shape method". However, QCA is neither the starting point for the configurational perspective on organisations, which Meyer et al. (1993) already introduced in the 1990s, nor is QCA the author's motive to adopt a configurational perspective for this thesis. Rather, QCA is a comprehensive research strategy to empirically investigate this perspective (Greckhamer 2016). In fact, having chosen a configurational perspective, the author thought about using other analysis tools

(e.g. performing a thematic analysis as only analysis step) before even considering a QCA strategy. Elaborations on QCA follow in Section 4.5.

In general, NCT seems attractive for this thesis. According to Grandori & Furnari (2013), NCT allows truly investigating organisations' heterogeneity. They argue that NCT reflects both: (1) internal heterogeneity whereby different organisational aspects can follow different logics/ideas (e.g. organisational ambidexterity) and (2) external heterogeneity whereby different configurations can meet the same external need. This mirrors agility's aforementioned focus on internal levers and external drivers. NCT could also overcome agility levers' individualistic consideration as it reflects how levers jointly as configuration create an outcome (*conjunctural causality*), alternative configurations create the same outcome (*equifinality*), and a lever's absence does not necessarily reverse its presence (*causal asymmetry*) (Furnari et al. 2021). Misangyi et al. (2017) find that configurational research focuses increasingly on organisations. Similarly, Fiss et al. (2013) promote NCT to delve into organisations' rising complexity, in which agility is clearly 'at home'. Therefore, Short et al.'s (2008) general call for organisational research using NCT to determine lever configurations is being adopted to the agility field. Mann (2014) uses CT in his agility research, but he understands CT in a more static sense in that agility must include a multitude of levers, without him considering their interrelations. While NCT has not yet been explicitly endorsed for organisational agility research, Vergne & Depeyre (2016) have already applied it researching the agility-related concept of DCs. Moreover, Felipe et al. (2016), in the Journal of Business Research, use an fsQCA to research agility and thereby implicitly adopt an NCT perspective. However, they limit their levers to information system capabilities and absorptive capacity and provide little details on their fsQCA, hence leaving much room for improvement. McCarthy & Tsinopoulos (2003) dedicate an entire publication to connect agility with CT. However, they limit themselves to agile manufacturing and they outline no real framework applicable outside manufacturing. Moreover, like Mann (2014), McCarthy & Tsinopoulos (2003) have a static understanding of configurations, considering them as mere collection of methodologies, and they remain unclear as to what holistic levers could constitute an agile configuration. Thus, McCarthy & Tsinopoulos (2003) provide limited value for this thesis, aside from confirming configurations as opportune perspective for agility. Also Park et al. (2020) make an early attempt to establish the configurational perspective in agility research, but with a strong IT-focus. All these works confirm NCT's attractiveness.

3.4.5   Relation to Complexity Theory

An adjacent theory is complexity theory, which builds on the earlier mentioned evolution theory. Complexity theory adopts the idea of fitness landscapes, where individual aspects of organisms – in this thesis organisations – change and tend to stay only if this leads in combination with the other aspects to a 'fitter' organisation (Levy 2000). In agile environments with changing conditions, these fit settings are 'ready to change' organisations.

Like NCT, complexity theory emphasises interdependencies as decisive for modern conceptions of organisations (Anderson 1999) and, to capture opportunity, continuous organisational change alongside stepwise radical change as new norm (Brown & Eisenhardt 1997, Cunha & Da Cunha 2006). Complexity theory studies nonlinear dynamic systems like organisations operating under uncertainty, and hence indicates the requirement to reflect flexibility in organisational analysis (Anderson 1999, Levy 2000). Similar to the more recent NCT, complexity theory considers organisations as complex networks in form of nodes, where the outcome of each node depends on the properties of other nodes and their connections (Levy 2000). This also reflects the NCT conceptualisation that different concepts are mutually dependent. Like NCT, "network theory [as basis of complexity theory] is more interested in the emergent order and patterns in complex systems than in an attempt to find a simple mathematical engine in the system" (Levy 2000, p. 73). The focus is hence on the complex interaction and response of diverse aspects (Anderson 1999, Cunha & Da Cunha 2006). Changing one aspect can therefore strongly, in a nonlinear manner, change the entire system and the impact of other aspects (Anderson 1999). More specifically, this thesis implements what Anderson (1999, p. 219) describes as modelling complexity by "examin[ing] regularity that emerges from interaction of individuals connected together" and considering that the outcome of an aspect "depends on the behavior (or state) of some subset of all the agents [(i.e. aspects)] in the system". A representative empirical work is Brown & Eisenhardt (1997), who use case studies to connect product development portfolios to structures and processes supporting ongoing change. Cunha & Da Cunha (2006) conclude that companies must master a balance of consistency and flexibility. Still, complexity theory differs from NCT by lacking the clearly-specified system-wide interaction rules of causal asymmetry, equifinality, and conjunctural causality (Cunha & Da Cunha 2006, Furnari et al. 2021) and a tailored methodology like QCA. Hence, NCT seems more appropriate.

3.4.6 Culture's Role

Literature furthermore indicates a special role of cultural levers in configurations: Culture's traditional classifications as underlying assumptions (Schein 1985) and root metaphor (Smircich 1983) indicate that culture/mindset guides the perception of hard levers. As per Dauber et al. (2012), mindsets enable, prevent, legitimise, and steer tangible changes. For example, culture should foster the strategic company goals (Groysberg et al. 2018). Thus, culture could serve as high-level filter for formal levers' interdependent impact on agility. This has been indicated by multiple agility researchers. Harsch & Festing (2020) identify agility at its core as mindset that guides the agile methodology (i.e. hard levers). Doz (2020) suggests that mindsets can constrain agile structures and processes. A shared unwillingness to apply agile methodologies will deny overcoming old practices (Gunasekaran 1999). Similarly, Brosseau et al.'s (2019) consulting work indicates that visible manifestations of agility can only function when steered or filtered by an agile mindset. Since agile mindsets encourage, enable, or hinder formal agility levers' application, they could be anchors or hidden forces integrating hard levers (Haeusling & Kahl 2018, Harsch & Festing 2020). For the agility-related concept of DCs, Teece et al. (1997, p. 520) identify culture as "de facto governance system [that] mediates the behavior of individuals and economizes on more formal administrative methods". Agile changes become easier when being embraced by the culture (Teece et al. 2016). These ideas reflect also in configurational theory. Already in 1993, Meyer et al. argued that mindsets and ideologies shape organisational configurations. Still, Dauber et al. (2012) see a lack of research investigating how culture impacts other dimensions' effect within configurations. Dauber et al. (2012) themselves then propose a configurational model combining organisational culture, structure, strategy, and operations. Building on Schein (1985), they classify culture as guiding underlying assumptions that directly or indirectly influences other levers' impact. Following Furnari et al.'s (2021, p. 22) NCT terminology, this is a cultural contingency effect, where the researcher must "think more deeply about how or why a combination of multiple attributes [...] is contingent upon some other factor [...] in producing an outcome".

3.4.7 Synthesis 3: Interdependencies and Filtering

This review proposed NCT as theoretical basis to investigate agility levers' interdependent impact. NCT unmasks separate analyses of inextricably linked levers as inadequate, calling for dynamic models for adjusting levers in light of dynamically changing environments (Dauber et al. 2012). Cunha et al. (2020, p. 8) request "a configurational view" for agility levers' "interactive effects in addition to their independent value". Consequently, the conceptual framework must reflect lever interdependencies.

The configurational NCT perspective and the cultural filtering/steering effect provide the final conceptual framework extension (Figure 3.4). In this CR reserach (Section 4.1), this framework serves as theory used and specified in the empirical analysis "to decompose the [...] structure [of agility] into its constituent parts such as actors, rules, relationships" (Wynn & Williams 2012, p. 799).

Comment: To simplify the representation, the levers in this figure have been genericised. For the specific lever longlist see Table 3.1.

Source: Own contribution
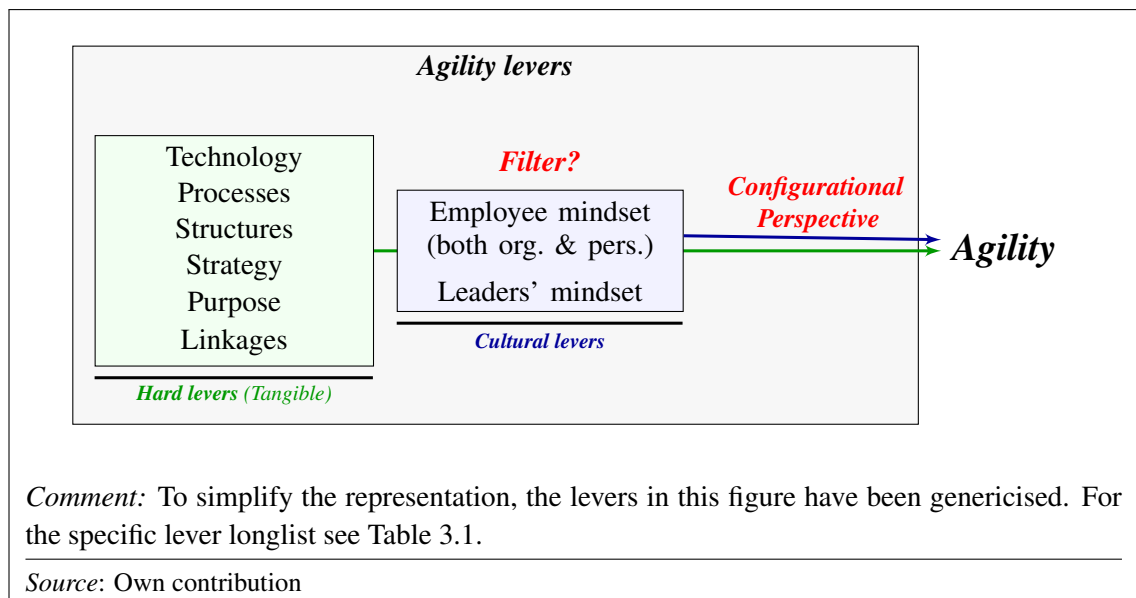
FIGURE 3.4: Conceptual Framework – Step 3

3.5 Resulting Research Gaps

In summary, the literature review reveals four related gaps:

Academic vs. practitioner research: Resulting from agility's definition being contentious, which Walter (2021) deems fatal for agility levers' inquiry, no consensal set of levers could establish (Section 3.2). Early **academic** research identifies levers for manufacturing firms (e.g. Goldman et al. 1995, Gunasekaran 1998). According to Walter's

(2021) systematic literature review, 79% of all early agility publications target manufacturing. Still, later publications consider also levers beyond manufacturing (e.g. Sherehiy et al. 2007, Shams et al. 2021). Only few academics also add cultural mindset levers (e.g. Harsch & Festing 2020). Simultaneously, **consultants and other practitioners** define experience-based models (e.g. Aghina et al. 2017, Holbeche 2018), which focus more on mindsets (Eilers et al. 2022), but rarely disclose methodologies or reference existing research. Overall, agility lever researchers adopt either academics' theory-biased view (possibly lacking practical validity) or practitioners' experience-biased perspective (possibly lacking theoretical validity), strictly ignoring each other's valuable inputs.

Lack of empirical work: Walter's (2021) review also shows that purely theoretical studies dominate agility research (48% of all publications). This holds true for research on agility levers. While agility levers are generally underresearched (Walter 2021, Mueller & Jungwirth 2022), many academic and practitioner works that do include them remain conceptual without empirical analyses (Harsch & Festing 2020).

Ignored lever-interrelations and cultural filter: Agility research struggles to reflect organisations' complexities (Holbeche 2018). While agility is a holistic concept calling for concurrent inclusion of the various ingredients (Vázquez-Bustelo et al. 2007), existing frameworks ignore how agility lever interdependencies impact agility (Cunha et al. 2020). "Interrelationships and dependencies between the applied agility [levers] should be considered" (Walter 2021, p. 375). While Shams et al. (2021) argue that agility must consist of a cluster of related factors, they limit themselves to the strategy lever. Similarly, Brown & Bessant (2003) call for integrating agility levers, without elaborating. Walter (2021, p. 381) concludes that agility levers or in her words agility dimensions "are interdependent and future research must integrate the research results regarding the specific agility [levers]. Due to interdependencies, [she does] not recommend an isolated view". Besides, research clearly indicates that hard levers and their impact on agility are steered or filtered by the mindset/culture (Brosseau et al. 2019, Harsch & Festing 2020). Closer examinations seem justified.

Lacking theoretical underpinning: By ignoring existing organisational theory, agility research also lacks a sound theoretical foundation. Older organisational theories seem too static for the nimble agility concept. However, NCT, as modern theory, could provide this theoretical foundation and reflect agility levers' interdependent fashion. Indeed, various top-tier management journals suggest researching volatile business environments with NCT – e.g. the *AMJ/AMR* (Fiss 2011, Furnari et al. 2021, Vergne & Depeyre 2016), *JoM*

(Misangyi et al. 2017, Short et al. 2008), and *SMJ* (Greckhamer 2016). Cunha et al. (2020, p. 8) demand that "research should test the configurational hypothesis" on agility's antecedents. Still, NCT has yet to be associated broadly with agility. The next section proceeds to define the research problem and explorative research questions.

3.6 Research Problem and Questions

The purpose of this research is further exploring agility levers' and their interrelations' role as means for (non-)agility in the German energy industry. It investigates these interrelations and organisational culture's role from a CR perspective. This research supports companies in managing resources and capabilities agilely in hypercompetitive, uncertain environments and provides scholars and practitioners with a better understanding of agility and its origin. It follows Walter's (2021, p. 384) call:

> "At this point, an intensive investigation of the interdependence of the agility dimensions [(i.e. levers)] and their effects on higher-level OA [(i.e. organisational agility)] is necessary".

This problem statement underlines *what this research aims to achieve*: By aiming to progress agility lever research using an interdependent perspective via an established theory (i.e. NCT), ***this work aims to achieve theory elaboration***, i.e. it extends existent research with other theories or conceptual ideas (Bluhm et al. 2011). Therefore, guiding research questions (RQs) rather than predictive hypotheses are formulated (Edmondson & McManus 2007). The research problem divides into three RQs. Following Furnari et al.'s (2021) recommendation for configurational enquiry, they apply the non-technical term *contributing* (rather than *causing* or *leading to*).

1. *What* levers contribute to (non-)agility in the German energy industry?
2. *How* do these levers interdependently contribute to (non-)agility?
3. *How* does organisational culture affect these levers' contribution to (non-)agility?

RQ1, in line with CR (Bhaskar 1978), acknowledges agility's context-specificity and therefore tailors the longlist of agility levers (Figure 3.4) to the researched industry. A first shortlisting took place with upstream interviews prior to the main study (Section 4.4.3.1). However, the RQ is fully investigated in the main study. This lays the foundation for RQ2.

RQ2 aims to determine dependencies among levers when contributing to agility. It follows Vergne & Depeyre's (2016) RQ, as their configurational perspective and their methodology with fsQCA and interview data resemble this research.

RQ3 seeks to understand how culture impacts the interdependencies from RQ2. Existing research indicates a filtering effect from the mindset levers (i.e. culture).

All RQs also include the negation of agility. Since agility is not always attractive (Teece et al. 2016) and since, as suggested by NCT, the conditions for not being agile are probably not simply reverse of those for being agile (Furnari et al. 2021), it also seems interesting to understand what makes organisations non-agile.

3.7 Synthesis 4: Literature Maturity and Implications for Methodology

By now, existing literature has been reviewed and synthesised stepwise into a theoretical framework. Building on the identified research gaps, steering RQs have been defined. Next, Chapter 4 aims to formulate a methodology with the goal that all parts of the research project form a coherent whole, following Edmondson & McManus' (2007) call for internal consistency and mutual reinforcement of RQs, theoretical contribution, existing research (i.e. research field maturity), and research design. Specifically, Edmondson & McManus (2007, p. 1158) describe how the maturity of the research field – "the one element over which the researcher has no control" – should influence the research design. They differentiate three maturity states: (1) mature theory with widely accepted constructs, (2) intermediate theory with proposed constructs and indicated relationships among them, and (3) nascent theory. To achieve methodological fit, research should be rather qualitative or quantitative, depending on the underlying literature's maturity: Mature theory allows for predictive hypotheses that are typically evaluated quantitatively, while nascent theory first requires developing a rudimentary understanding (e.g. via qualitative case studies) (Edmondson & McManus 2007). Figure 3.5 illustrates this, with the two axes representing continua and the shaded area representing research designs recommended absent 'special circumstances'.

The author situates this research as per Figure 3.5: On the one hand, research on agility lever interrelations has not yet reached the intermediate theory "zone in which enough is known to suggest formal hypotheses, but not enough is known to do so with
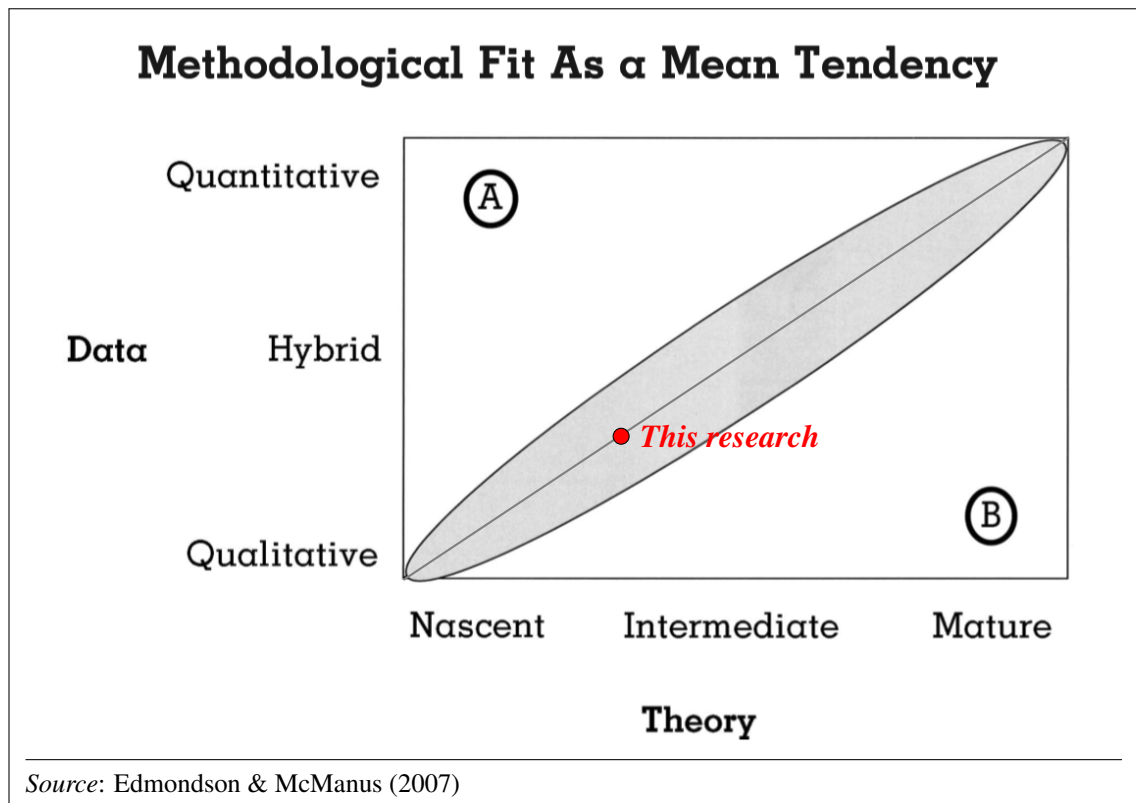
Figure 3.5: Research Maturity Implications

numbers alone or at a safe distance from the phenomenon" (Edmondson & McManus 2007, p. 1166). Therefore, research on agility lever *interrelations* leans towards nascent theory, which is typically marked by research "identifying and addressing gaps in existing theory" (Edmondson & McManus 2007, p. 1162). On the other hand, agility levers already have received some attention, wherefore this thesis can indeed draw "from prior work [...] from separate bodies of literature – to propose new constructs and/or provisional theoretical relationships" (Edmondson & McManus 2007, p. 1165) – which is suggestive of intermediate theory. Therefore, the literature base for this thesis sits between nascent and intermediate theory. For this maturity, Edmondson & McManus (2007) recommend a blend of rather qualitative data (see Figure 3.5) which, however, could also be analysed non-qualitatively. Agility lever research therefore would benefit from examinations beyond purely qualitative case studies, which are more akin to nascent theory. This is an important insight for the upcoming methodology section. The research maturity, just as the research's theoretical contribution (*theory elaboration*), again justifies the choice for relatively specific RQs, rather than either very open RQs on the one end, or predictive hypotheses on the other end (Bluhm et al. 2011, Edmondson & McManus 2007).

Edmondson & McManus (2007) conclude that 'good research' chooses the most powerful methodology in light of the other research aspects. The upcoming chapter outlines

this methodology, which builds on the aspects: literature maturity, the RQs, NCT, and the chosen research paradigm (i.e. CR) – an aspect which Edmondson & McManus (2007) surprisingly ignore.

Chapter 4:   Methodology

As per Edmondson & McManus (2007), the methodology follows from the RQs, the literature base, and the research objective (here: theory elaboration). However, the methodology must also align with the research paradigm/philosophy. Therefore, section 4.1 starts with the philosophical discourse leading to the selection of critical realism (CR) as research paradigm. Next, Section 4.2 builds on CR to develop a research strategy. Section 4.3 delves into the research context: the German energy industry. Section 4.4 then covers purposive sampling and the interview data collection, and 4.5 outlines how these data were analysed in three steps. Section 4.6 proceeds by showing how this research meets the established quality criteria and Section 4.7 mentions ethical concerns and their implications on the research process. Finally, Section 4.8 resumes the essence of this chapter.

4.1   Research Paradigm

The author proposes a CR paradigm to implement this exploratory study in the German energy industry. CR assumes a reality independent of individuals, yet *perceived* differently (Modell 2009), since "perceptions are a window on to that blurry, external reality" (Sobh & Perry 2006, p. 1199). The adopted configurational (NCT) perspective aims by identifying different alternative configurations to 'look into as many windows as possible', striving to get the most complete picture of the reality of agility in German utilities (Park et al. 2020). A paradigm marks the researcher's beliefs, understandings, and theoretical positions guiding methodological choices (Edwards et al. 2014). Denzin et al. (2008) add that the paradigm combines choices regarding ontology, epistemology, and methodology and thus covers the researcher's beliefs about the environment and how it should be researched. Guba & Lincoln (1994) identify ontology (Greek: $onto = being$ and $logia = study$) as research of what is real – i.e. as search for the nature and form of reality. In contrast, epistemology (Greek: $episteme = knowledge$) is the research of 'knowing' (Guba 1990) – i.e. what is the knowledge in a field, respectively, what can be known (Bryman & Bell 2018). Finally, methodology concerns how to find something out

– i.e. how to generate knowledge (Guba 1990). These three dimensions allow to define three broad paradigms: positivism, social constructionism (SC), and CR. All paradigms challenge the researcher's reflexivity; i.e. awareness regarding the challenge to maintain an external role, which can be especially difficult in research with direct interaction with the research subjects like this thesis by interviewing them (Nightingale & Cromby 1999). Reflexivity, however, can only develop if one is aware of the own philosophy. Therefore, the subsequent paragraphs discuss the choice for CR and against positivism and SC; yet, without delving deeply as the author leans towards pragmatism. Namely, he prioritises a methodology suiting the RQs over rigidly following a paradigm.

Positivists argue in the ontological debate for *one* reality independent of individuals (Sobh & Perry 2006). They seek unbiased findings from mostly quantitative methodologies (Edwards et al. 2014). However, positivism's critics deem the world too complex and unsteady for generalisations (Sobh & Perry 2006). This criticism coincides with agility: the world is too unstable for standardised solutions (Zhang & Sharifi 2007). Agility is no "yes–no decision but, rather, as a continuum, integrated into a holistic concept, connected to the organizational context and business environment" (Walter 2021, p. 381). Levy (2000, p. 74), in his work on complexity theory, which closely relates to NCT, warns that "complexity [...] rejects the reductionist epistemology built on simplifying assumptions and algebraic maximizing behavior". Consequently, this research seems incompatible with such reductionist prone positivism. Moreover, positivism's assumption of everything being measurable and hence observable most likely fails within fuzzy interpersonal relationships, emotions, and feelings (Sayer 2000; 2005) present when changing organisations towards agility. Thus, the complex, ever-changing business environment including agility should not be evaluated using positivism. The dominance of qualitative studies on agility's origin suggests that other researchers share this perception. Therefore, existing quantitative works like Shin et al. (2015) and Yang & Liu (2012) rather measure agility's impact on performance than its origin, the intention of this thesis.

Contrary to positivism, **SC** rejects the notion of *one* reality (Edwards et al. 2014), but suggests that individuals develop own realities from interpretations and interactions (Sobh & Perry 2006). In the ontological debate, SC defines reality as evolving social construct without generalisability (Edwards et al. 2014). Initially, SC seems appropriate given agility's volatile context and SC's focus on human interactions and unsteady, complex environments (Edwards et al. 2014). However, SC's view on results' non-transferability

would limit this thesis to the observed companies. This seems unnecessary given agility's rise as global phenomenon, where organisations share several challenges. By declaring all findings as mere constructs of the specific firm-context (Sayer 2005), SC opposes this thesis which aims for generalisability at least in the observed industry. Sobh & Perry (2006) also criticise SC's weakness in exploring phenomena like agility imposed by the external environment rather than internal conditions. Therefore, and in combination with the author's personal preference for some objectivity and problems broken into numbers, SC is not preferable for this research.

A middleway is **CR** (Modell 2009). Burrell & Morgan (1985, p. 4) argue that "for the realist, the social world exists independently of an individual's appreciation of it". Yet, as individuals' perceptions differ, their own 'observed' realities differ (Sobh & Perry 2006). The difference between reality and observations emerges from CR's nested ontological levels (Bhaskar 1978). While positivism and SC are restricted to the empirical level (i.e. observable outcomes which we perceive as knowledge), CR closes the gap between reality and our knowledge of it – i.e. the gap between ontology and epistemology (Wynn & Williams 2012). Specifically, CR intends "to seek out and to clarify the generative social mechanisms at work" (Edwards et al. 2014, p. 13). This coincides precisely with this thesis' analysis of levers as agility's generative mechanisms. Further, Bhaskar (1978) argues that CR seeks mechanisms' interactions towards an outcome, which mirrors NCT's conjunctural causality (Misangyi & Acharya 2014). Therefore, CR has been recommended for NCT research like this thesis: Tóth et al. (2017, p. 194) write that CR "looks at the causal conditions, including their interplay, as parts of a 'given' reality, and allows for a more exploratory view of the relationships between them, as well as their effect on specific outcomes". They conclude that CR's focus on interdependencies suits NCT and the related fsQCA method. This connects the CR paradigm with this thesis' configurational perspective, the configurational RQs, and the methodology outlined subsequently. Consequently, the author chooses CR. This decision is reinforced by CR's methodological flexibility (Tsang 2014) which allows designing methods along the research aims and combining the author's personal fondness for numbers with the need to investigate agility with qualitative data.

4.2   Research Strategy and Generalisability

This paragraph justifies the chosen research strategy by contrasting it with alternative approaches. As per Bluhm et al. (2011), who recommend developing a research strategy that optimally uncovers the phenomenon and its causal mechanisms, the author uses an fsQCA (Section 4.5) research strategy. Given the configurational RQs and the author's personal preference for numbers, positivists might conduct quantitative large-sample studies with regressions and interaction terms. Yet, Fiss (2007) warns that these interaction terms become impossible to interpret with many levers. Moreover, positivism was deemed unsuitable for this research. Likewise, the author decided against a qualitative, small-sample case study strategy. Guetterman & Fetters (2018, p. 795) define a case study as "investigation of one or more real-life cases to capture its complexity", often "integrating qualitative and quantitative research". Hence, it "investigates a contemporary phenomenon in depth and within its real-life context" (Yin 2013, p. 13). As per CR, outcomes like agility indeed depend on both the underlying mechanisms (e.g. agility levers) and their context (Modell 2009, Walter 2021). However, case study strategies seem more suitable for detailed research on individual agility levers/mechanisms within firms, whereas this thesis aims for systematic, industry-wide analyses of lever interrelations. Further, Wang & Ahmed (2007) criticise empirical dynamic capabilities (DCs) research – which closely relates to agility research – for its over-reliance on qualitative case studies that 'simply' review how firms evolve over time. Therefore, the author sought alternative strategies that both fit his CR paradigm and qualify for systematic lever interrelation analyses. Recently, NCT researchers recommended QCA strategies (esp. the sub-type fsQCA) for such purposes (Misangyi et al. 2017). QCAs "integrate the best features of the case-oriented approach with the best features of the variable-oriented approach" (Ragin 1987, p. 84). They are a middleway: Opposing 'typical' case studies, the eventual unit of analysis is levers and their interrelationships rather than companies (which are the unit of sampling). Therefore, contrary to Pratt (2009), who equates unit of sampling and analysis, this research distinguishes them. Yet, simultaneously, the firm-specific contexts, in which these levers are embedded, are factored in, which contrasts 'typical' quantitative studies disaggregating firms into mere variables (see Fiss 2011). The fsQCA research strategy shares many case study traits while having a higher case number and consequently not delving as 'deeply' into each individual case; thus, the author deems it case study-*like*. As with many case studies, qualitative interview data were collected for each company. Moreover, the firms'

unique context received attention (see Mills et al. 2010, pp. 757–760). Overall, the chosen strategy can be summarised as follows: Semi-structured interviews were (1) qualitatively analysed in a thematic analysis, then (2) identified themes transferred into fuzzy-values, and (3) ultimately analysed in an fsQCA. Findings were generated during all steps.

Like case studies, such fsQCA strategies have been criticised for their limited cross-context generalisability (Misangyi et al. 2017). While this must be acknowledged, it should be questioned whether the agility concept even qualifies for cross-sectional en-quiries given its context-dependency (McCann et al. 2009). Still, the author took action to improve generalisability. As per Stake (1995) and Tsang (2014), case study research is particularly powerful (1) when using cases representative for other cases in their popu-lation and (2) when using a population representative for other populations experiencing the phenomenon of interest. These steps should be even more effective here given QCA strategies' similarities with case studies along with the larger sample which should en-hance representativeness. Similarly, Misangyi et al. (2017) demand countering QCAs' limited generalisability through the research design. The author did so by conducting his study in the German energy sector, a representative field demanding agility. This is specified subsequently.

4.3   Research Context

This section provides a synopsis of recent industry developments, including residual hur-dles to agility.

Why choosing the German energy sector: In fact, before the 2010s, the German energy market was all but stable. Throughout the 20th century, local monopolies mit-igated any competition. Ironically, after the 1998 EU decision to liberalise the energy markets, four even more dominant players formed through mergers of the former mo-nopolists (Berkel 2013). The resulting $Big\ Four$ were EnBW (south-western Germany), RWE (western Germany), Vattenfall (eastern Germany), and E.ON (central and south-eastern Germany). In the 2000s, this oligopoly owned 85% of all power plants (Wetzel 2013), contributed 80% of German electricity production, and dominated the energy grids (Mez 2011). Energy was generated locally where it was needed by continuously operat-ing power plants – nuclear power plants running at 100% to meet the baseload demand and more flexible (i.e. dispatchable) coal-fired power plants also running continuously,

but adjusting their production to cover the daily fluctuating peakload demand. Due to this predictable local production, energy grids could focus on supplying a limited region. Yet, all this changed.

4.3.1 General Uncertainties in the German Energy Industry

With the German government's early commitment in 2000 to renewables, the complexity increased dramatically, as these are not dispatchable. Illustrating this, in 2021, the daily contribution of wind and solar power to German energy consumption fluctuated between 4% and 68% (Fraunhofer Institut 2022) due to the so-called Dunkelflaute (periods when neither sun nor wind are available) – numbers which energy companies face helplessly (Deutschlandfunk 2022). The industry must now agilely coordinate among themselves and with the authorities to cover these Dunkelflaute periods with the remaining traditional dispatchable energy and to maximise the energy generation from renewables (Deutschlandfunk 2022). Another new complication is that with renewable energies, the locations of energy production and consumption differ greatly. While industry is predominantly located in southern and western Germany, the potential for wind power lies particular in northern Germany. Therefore, electricity has to travel through the whole country, which requires new grids and more coordination among the different grid operators, whose main concern so far has been their own region (Wetzel 2019).

Besides these holistic complexities and uncertainties, in the 2010s, the calm oligopolistic environment vanished. Policy shifts became the norm (Heiligtag et al. 2015). Fukushima, which led to legislation phasing-out nuclear power by 2022, and the aforementioned new environmental targets, which led to legislation phasing-out hard coal and lignite-based power generation by 2038 (as described by the wordy Kohleverstromungsbeendigungsgesetz), penalised the $Big\ Four$'s traditional power generation (Berkel 2013, Buck 2019), requiring rapidly scaling-up renewables capacities (Heiligtag et al. 2015). While renewables' average share in Germany's net energy production indeed rose from 19.1% to 50.7% between 2010 and 2020 (Fraunhofer Institut 2022), previously dominant players see their dominance vanishing. By end of 2020, after a market realignment, the new $Big\ Five$ in power capacity were EnBW, RWE, Vattenfall, LEAG, and Uniper (the carveout of E.ON's fossil fuelled power plants) with a capacity of 56.7% (Bundesnetzagentur 2021). The trend of the large players' share decreasing seems to continue – in 2018

their share was 60.8% (Bundesnetzagentur 2021). Moreover, erratic renewables subsidies, unstable carbon prices, and new unexpected competitors introduce volatility and make profitability difficult to plan (Witsch 2018, Heiligtag et al. 2015). The technological progress is also immense: For instance, offshore wind turbines' average capacity will have been risen from 1.6 megawatts in 2000 to up to 20 megawatts in 2025-2030 (IRENA 2019). Floating wind technology, hydrogen energy, and battery storage solutions are only few topics that – although far too extensive to discuss here – will shape this industry, make it highly R&D-intense, and demand agile cross-technology coordination and extensive partnerships, including joint product development with competitors and suppliers like Siemens Gamesa or Vestas (IRENA 2019).[1] At the same time, customers can nowadays transparently choose from on average 112 energy suppliers (StromAuskunft 2021) and compare and switch them unbureaucratically via platforms like Verivox. All this contributes to overcoming this industry's former oligopolistic conditions.

However, German-based power generation is only one area within this transitioning industry. Especially in the renewables business, German firms start competing for wind park development rights in foreign countries – often via joint ventures – against resident players (iwr 2019). In return, foreign companies build wind parks in Germany. Yet, also besides power generation, the industry is in flux. For instance, E.ON refocused its business from power generation to grid operation and retail, and thereby reshuffled the market (E.ON 2019). Given these ecological, economic, legislative political, and technical challenges, the industry sees itself forced to react. Buck (2019) argues that companies "will be transformed beyond recognition". Energy firms must excel at rapid learning, adaptability, cooperation and all other key outcomes of agility (Heiligtag et al. 2015). Therefore, this context attracts agility studies.

4.3.2 Sudden Uncertainties from Russo-Ukranian War

In addition to these longer-term developments, the recent Russo-Ukranian War poses potentially unprecedented challenges for the German energy industry, magnifying its complexity and volatility. More than most other countries, Germany relies heavily on Russian gas for heating, but also increasingly for electricity generation in the medium-term (Kaeckenhoff & Eckert 2022). Gas-fired power plants, which are less polluting than coal-fired plants, were envisaged as dispatchable 'bridge technology' to cover the Dunkelflaute

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[1]Consult IRENA (2019) for a well-written report introducing these developments, while also complying with academic citation standards.

periods and general peak demand until alternatives like green hydrogen reach the maturity to serve this purpose (Kuhlmann 2021). Therefore, despite gas power plants contributing 'only' 15.8% to the German energy production in 2021 (Fraunhofer Institut 2022), they still play a critical role, as only they can flexibly cover unexpected periods of supply shortage (i.e. they are the fastest to start among all dispatchable plant types). However, three things happened with the Russian gas supply curtailment: (1) Gas prices rose from 10-25 EUR/MWh (megawatt hour) to 214 EUR/MWh in early March 2022 (WDR 2022), bringing some major energy companies to the brink of bankruptcy and forcing them to invoke a force majeure clause that allows them to adjust prices in their current customer contracts. (2) Utilities and the government face the challenge of quickly reprioritising the limited gas available for the most urgent uses, which is in the first instance heating in private households rather than electricity generation (dpa 2022). (3) They must rapidly develop an alternative to Russian gas, which could be LNG (liquefied natural gas) imported from countries like the USA and Qatar via ships. Unfortunately, due to its longstanding reliance on cheap Russian pipeline gas, Germany has not built the necessary LNG terminals in its ports. While the construction plans for these terminals are available, the required permitting procedures usually take far longer than the situation allows (Delhaes & Neuerer 2022). Other options to cover potential shortages in electricity generation include extending the lifetimes of existing hard coal and lignite power plants, which are currently being gradually shut down and dismantled, or even postponing the shutdown of the remaining three nuclear power plants beyond the end of 2022. No matter what combination of solutions will be chosen to prevent a potential collapse of the German energy system, the traditionally inflexible energy companies but also the local authorities must now react, coordinate, flexibly revise plans for the shutdown of power plants, and offer solutions with unprecedented speed.

4.3.3 Limiting Factors to Agility in Utilities

Nonetheless, obvious concerns regarding agility in asset-heavy sectors like the energy industry remain. Handscomb et al.'s (2019) consulting report addresses these: 'failing' as part of agile learning compromises technical quality and safety. In fact, from his own time as energy industry consultant, the author remembers a manager just below board-level saying: "for us, analysing failures and failure rates is not possible, because failing is simply no option. Even small failures cost us and our joint venture partners – to whom

we are accountable – millions". This setting indeed differs from agility's forerunners (IT and even manufacturing businesses), where failures on a small, experimental scale are tolerable. Further, the industry being asset-heavy at first glance counters the key to agility: being able to change quickly. Teece (2007) notes that large investments are particularly affected by errors, wherefore they hardly reconcile with agile trail-and-error processes. However, this is too limited a view. While some business-aspects are indeed difficult to align with agility, others such as energy distribution, customer interaction, R&D, and many strategic decisions like partnering qualify very well for agility (Handscomb et al. 2019, Heiligtag et al. 2015). Moreover, according to Handscomb et al. (2019), even sensitive areas like energy production site operations qualify for agility when carefully setting boundaries (see Adler & Borys's (1996) enabling bureaucracy). Moreover, even the energy industry is evolving from a purely asset-driven to an information-driven industry, giving greater room for agility (Heiligtag et al. 2015). All this underscores the author's choice for the energy industry, which is currently highly volatile and thus representative for industries rewarding agility (Heiligtag et al. 2015).

4.4 Data Collection

This section outlines the data collection, including the sampling strategy and the data collection steps.

4.4.1 Sampling

Focussing on the main study, this section first describes the researched firms, second the chosen participants within these firms, third the resulting sampling strategy, and fourth the sample size. Section 4.4.3.1 covers the more simplistic sampling for the preparatory upstream interviews.

Companies within different contexts face different agility drivers (Lin et al. 2006). Also, the impacts of different lever combinations depend on these external conditions (Fiss 2011). To avoid a non-comparable sample from differing agility drivers in different national cultural and industrial contexts (see Harsch & Festing 2020), the author holds the external context constant: The sampling frame comprises German energy companies with turnover $\geqslant EUR\ 1bn$ to have comparable companies with meaningful size. Turnover and not electricity output is the benchmark, as not all market incumbents focus on energy

production equally strongly (e.g. also energy trading or grid operations). Nevertheless, all these companies belong to the energy industry and can therefore be studied jointly, as industry experts emphatically emphasised during upstream interviews (Section 4.4.3.1). They described the industry as highly interconnected, meaning that the same developments influence all players, at least indirectly. After struggling to develop a comprehensive company list from one single database, the author pragmatically extracted companies meeting the turnover requirement from Osiris and then added further firms with existing contacts (see below) meeting the turnover requirement. This led to a list of 37 potential companies. Two of these were used for the pilot project described in Section 5.2.

To research context-dependent concepts like agility, Harsch & Festing (2020) recommend interviewing experts from different companies to gain different perspectives. Thus, within the participating firms, leaders from three groups were contacted:

(1) *Executives and top managers* own the holistic view on organisational change and play the key role in endorsing agility (Holbeche 2018). Hence, they are the only group imperatively interviewed for each firm.

(2) *HR managers* are central for 'softer' employee-, mindset-, and leadership-related agile adjustments (Holbeche 2018).

(3) *Strategy managers & corporate development leaders* contribute to outlining agility (Holbeche 2018).

Ultimately, mostly top managers (13 interviews) and strategy managers (20 interviews) participated, as they were more responsive and interested in the topic than HR managers (3 interviews). The downside but also the benefit of focusing on management-level participants must also be acknowledged: Since the overarching objective is 'understanding' the interviewed organisations, a large sample of each single company covering all hierarchies and business units would have offered the most representative interview sample. In particular, interviewing the working level could reveal the granular specificities of the different business units. However, to get a complete picture of the company, a very large number of working level employees would have had to be interviewed. Therefore, given the time-intensive interview method combined with prevailing time restrictions, and given the explorative research strategy, which does not necessarily aim for

sample representativeness, the researcher made the simplification of interviewing the people with the broadest understanding of the organisation. By their job's very nature, these are the described management groups. In addition, high-ranking managers are typically among the most intelligent and educated employees and consequently most capable to express themselves and their company (Harvey 2011). Apart from managers' ability to provide the broadest perspective, the author also expected a greater willingness from this group. German working level employees are typically represented by works councils and employee representation and hence fear sharing too much themselves about the company – this is at least the author's prevailing experience after five years as energy industry consultant. In contrast, managers, which are not personally represented by these committees, were expected to be more confident to share (anonymised) company information. As a result of this decision to interview managers, some information depth has been sacrificed in favour of information breadth.

All this represents **purposive sampling**, where systematic choices construct a sample suiting the RQs: The energy industry was chosen for its recent exposure to volatility, large incumbents for their stronger exposure to this volatility, and the outlined leader groups for having the required insights. Both Ragin & Rihoux (2009) and Tóth et al. (2017) recommend such purposive theoretical sampling when applying fsQCA research strategies, and McIntosh & Morse (2015) when conducting semi-structured interviews (data collection methods in Section 4.4.3). The author leveraged his consultancy's broad contact network across the sample frame. This element of **convenience sampling** allows accessing top managers, which seems unfeasible using random sampling and 'official' channels. Fiss (2011, p. 402) argues that "some of the most influential and path-breaking [configurational research] studies [...] have in fact used nonrandom samples of organizations selected on the basis of geographical proximity and social contacts, indicating that use of random samples is not an essential feature of the current research context". Ragin & Rihoux (2009) likewise prioritise case-knowledge and accessibility over random sampling for configurational research. Still, the author also successfully acquired two participants without existing bounds using LinkedIn. Because the managing partners of the author's consultancy provided access to their contact network, all contacted potential interviewees agreed to participate in the pilot within hours of being contacted. With this experience, the author approached the target persons in the main study company by company shortly before the interviews, instead of contacting all companies in one large

wave. Since 'corporate elite' research participants demand binding instructions about the project, its timeline, and their contribution (Harvey 2011, Welch et al. 2002), the participants received the information sheet and the consent form (Appendix Figures A.1, A.2, & A.3). Following Harvey (2011) and Welch et al. (2002), the author outlined in his first touchpoint his research, their role, his academic affiliation, disclosed his energy industry consultancy background, and guaranteed confidentiality.

The **sample size** was chosen systematically. While the sample size N is regularly contentious for interview research with a quantitative element – especially if it concludes in a quantitative-style analysis of originally purely qualitative data (McIntosh & Morse 2015, Baker & Edwards 2012) – more concrete 'rules' apply to sample sizes in fsQCA strategies. Therefore, the required sample size emerges from the chosen fsQCA research design (Section 4.5) and the CR perspective: Ragin (2008) vaguely recommends such CR-style research 10 to 50 cases (i.e. firms). Ragin & Rihoux (2009) suggest focusing on the ratio $\frac{dimensions}{cases}$ and warn that with too many dimensions (i.e. levers) only a small fraction of all possible agility lever combinations would be covered by the sample. Their specific formula is $\frac{4\ to\ 7\ levers}{10\ to\ 40\ companies}$. Maggetti & Levi-Faur (2013) most specifically propose a ratio of $\frac{levers}{companies} \leqslant 0.33$. Applying this ratio led to interviewing 15 companies with at least two interviews each (see Section 4.4.3.2), which was required to pay *dedicated* attention to five agility levers. Five levers were identified in the upstream interviews as particularly relevant to the chosen context – with a sixth lever being cautiously introduced (see Section 5.1). A summarising overview of these 15 companies covered by 36 interviewees is intentionally omitted, as even holistic parameters expressed in ranges would compromise the companies' anonymity when paired with the relatively concrete qualitative information from the results section.

4.4.2 Qualitative-only Data Collection

This section provides the qualitative-quantitative discourse for the data collection. While quantitative data collection methods like surveys are compatible with QCA strategies (Ragin & Rihoux 2009), they seem inappropriate for this research, as they could miss important fine-grained aspects given agility's context- and firm-dependence (Harsch & Festing 2020). In contrast, qualitative data collection methods could reflect agility's unsteady context; yet, a purely qualitative analysis of these data might struggle to analyse lever

interrelationships systematically (Edmondson & McManus 2007, Walter 2021). From CR's standpoint, combinations optimally reflect underlying mechanisms like agility levers (Sobh & Perry 2006). Downward & Mearman (2008, p. 136), for instance, demand that CR research *should* leverage a qualitative-quantitative combination to "reveal different features of the same reality" and "to capture related but different layers of this reality". Thus, combining a qualitative and a quantitative element extends information depth and breadth (Creswell & Clarks 2010) and accordingly mitigates a limiting either-or-decision (Tashakkori & Teddlie 2010).

Therefore, the author collected qualitative semi-structured interview data, which were first analysed qualitatively and then transformed into quantitative-like fuzzy-values, aligning with Vergne & Depeyre's (2016) approach to fsQCA. As per McIntosh & Morse (2015, p. 9), every study using semi-structured interviews "therefore, may itself constitute a qualitatively driven, mixed-method design through the internal transformation of its data set from qualitatively analyzed textual data into numerical data for quantitative analysis". The fsQCAs following the transformation "simultaneously capture both qualitative and quantitative differences" (Vergne & Depeyre 2016, p. 1658). This design automatically arises from the overall fsQCA research design, which simplifies the research: While other researchers collecting and analysing quantitative and qualitative data regularly struggle with integrating their qualitative and qualitative findings (Creswell & Clarks 2010, Edmondson & McManus 2007), the integration in this thesis came naturally from the well-defined strategy concluding in the fsQCA (Section 4.5) (Ragin 2008, Tóth et al. 2017, Vergne & Depeyre 2016). Matching this entire project, Wynn & Williams (2012) plea from CR stance for qualitative-quantity research to uncover causal mechanisms and their interrelations. In summary, this work is on the qualitative rather than the quantitative side, as the data collection focuses mainly on qualitative data (Section 4.4.3.2), with the final fsQCA introducing a valuable quantitative element to make sense of the qualitative data.

4.4.3   Data Collection Method

The preparatory upstream interviews with consultants to tailor the research tool to the context and this tailored semi-structured interview tool are discussed next.

4.4.3.1   Upstream Interviews to Pre-select Levers

To research fields with the maturity of agility lever research (Section 3.7), Edmondson &
McManus (2007) recommend interviews within industry organisations. However, before
designing the underlying energy company interview guide, the lever longlist extracted
from existing research (Table 3.1) had to be tailored to the energy industry and reduced
to dominant levers for two reasons. First, to be able to discuss levers in company inter-
views and analyse them via fsQCA, the levers must be well understood in the researched
context and tailored to it. Second, building on reason one, NCT and CR specifically de-
mand accounting for the researched environment (Grandori & Furnari 2013, Misangyi
et al. 2017). Following the principle of parsimony, this means removing the levers not
relevant in the energy industry. This parsimony requirement reflects in the guidelines for
medium-sample fsQCAs, where the complexity increases exponentially (with 2^l possible
configurations; where l = number of levers). Hence, Misangyi et al. (2017) recommend
focusing empirical configurational enquiries on the most relevant levers. The aforemen-
tioned **rule is** $\frac{levers}{companies} \leqslant 0.33$ (Maggetti & Levi-Faur 2013). Analysing 27 companies to
cover the full nine-lever-longlist ($\frac{9}{companies} \leqslant 0.33$) was unrealistic, justifying shortlisting.

To do this shortlisting systematically, the author followed Walter's (2021) agility re-
search (that included preparatory expert interviews) and conducted upstream interviews
with the five most experienced energy industry consultants from his consultancy. The
consultants received a confidentiality guarantee, consent form, definitions of the generic
levers, and a survey to prioritise the levers for the energy industry by giving each lever an
importance rating between one and ten. This made the consultants think about the levers'
importance prior to the interviews. The lever longlist (Table 3.1) and the survey responses
then guided the interviews. Participants were asked to elaborate on the importance they
had attached to each lever in the survey. To progress the longlist into a prioritised shortlist
of levers relevant for the energy context, the audio-recorded interviews were transcribed
by an automised service (see Section 4.5), revised by the author, and in a rudimentary
analysis coded for themes capturing the importance of levers. The reduction to only
context-relevant levers followed Misangyi et al.'s (2017) recommendations for NCT and
adhered to Ragin's (2008) understanding of fsQCA. For configurational research, Fiss
(2011, pp. 395–396) recommends "to reduce the complexity of the empirical world [...]
[through a] pragmatic reduction of an extensive set of attributes to a limited set relevant
to the purpose at hand". Similarly, Ragin & Rihoux (2009) recommend considering the

research context to decrease the number of dimensions. Vergne & Depeyre's (2016) NCT study likewise had a preliminary phase where they surveyed external experts to give their 'real' study more focus. For the present project, the preliminary interviews allowed the researcher to practise the interview method and gave him another helpful impression of agility in the energy industry in light of agility's context-specificity (Fourné et al. 2014). The results from these upstream interviews are summarised in Section 5.1.

4.4.3.2 Semi-structured Company Interviews

Building on the pre-selection of levers, the author then conducted 36 semi-structured interviews with the aforementioned groups ($\geqslant$ 2 interviews per company), following Cooper & Schindler's (2013) recommendation to use semi-structured in-depth interviews for exploratory research.

This interview type was chosen for multiple reasons. Such 1-to-1 interviews are preferable to group interviews (e.g. focus groups) for keeping participation confidential. Semi-structured interviews also combine benefits of other techniques. Like structured interviews, semi-structured interviews are comparable across cases given their underlying guide (Bryman 2016). Simultaneously, like unstructured interviews – structured interviews' counterpart – semi-structured interviews generate rich data through open-ended questions and spontaneous follow-up questions (Bryman 2016). Thus, they facilitate researching levers' pre-determined issues while retaining the flexibility to explore new, surprising, or inconsistent aspects arising during an interview (Bryman 2016, Yin 2017). McIntosh & Morse (2015, p. 5) summarise that semi-structured interviews' "dual qualities of replicability and flexibility yield pertinent as well as rich data".

Semi-structured interviews also echo CR: they abstract experiences (i.e. the *empirical*) to understand the underlying mechanisms (Wynn & Williams 2012). They also align with the chosen research strategy, as they reflect fsQCA's recent focus on organisations (Basurto & Speer 2012). A downside is that they require training and the ability to deal with unexpected interviewee behaviour and to follow the interviewee's explanation in real-time (Bryman & Bell 2018). However, the researcher could 'train' interviewing in the upstream consultant interviews, and he knew the industry, enabling him to follow the interviewees. Moreover, semi-structured interviews have been criticised as labour-intensive and time-consuming (Adams 2015). The author took this in consideration when scheduling the research.

Accommodating participants' busy schedules and uncertain COVID-conditions, the author conducted compact 60-minute interviews via MS Teams (see Harvey (2011) on such elite interviews). Video conferencing allowed observing non-verbal communication and establishing a connection (Paulus et al. 2013). Upon explicit consent, a recording device was used to enable accurate verbatim transcriptions (Bryman & Bell 2018). To make the interview situation comfortable, the interviews were offered in English or German, as per each interviewee's preference. Yet, German was indeed always interviewees' preferred option. To preserve the language-specific subtleties, German interviews were not translated into English but analysed in German. Afterwards, representative quotations used in the thesis were translated into English. The interview guide used to access interviewees' knowledge in a structured, standardised manner is discussed next (McIntosh & Morse 2015).

To develop the **interview guide**, interview and survey questions from existing agility research were collated. However, this provided only few suitable questions for the RQs, none of which tailored to the energy industry. Hence, the literature review and the energy industry background from the upstream interviews were used to formulate appropriate interview questions. Where possible, questions from existing publications were included and adapted. The interview guide mainly covered the shortlisted energy industry levers. As preferred by eloquent elite interviewees, predominantly open-ended questions were asked (Harvey 2011). Nevertheless, following Bluhm et al.'s (2011) and Adams' (2015) recommendation to 'count the countable', closed-ended Likert questions were used to smoothly enter the discussion on each lever. A five-point Likert scale (1 = very low; 5 = very high) was chosen because, as per the author's industry experience, participants are very familiar with this scale that is regularly used in surveys within their companies. A thorough discussion of Likert scales' pros and cons is omitted, as no sophisticated statistical analysis was conducted with these questions. Overall, the interview guide was categorised into Likert questions, mandatory follow-up questions (priority 1), and optional priority 2 questions. The full guide included a large number of the latter to elicit more in-depth answers in case the mandatory questions would not yield the required information. As this full version would have been too long to include here, a version reduced to Likert and mandatory questions, following post-pilot adjustments, is shown in Appendix Figures A.4, A.5, and A.6. Further details on the pilot follow in Section 5.2.

The interview guide was structured as follows: The first interview section identified

firms' agility level by exploring the reactive and proactive capabilities of agility to in-corporate the "multidimensionality and vagueness of the concept of agility itself" (Yauch 2011, p. 385). Following best practice for NCT research, separate sections with dedicated questions then covered each shortlisted lever (Basurto & Speer 2012, Tóth et al. 2017). This structure avoided 'not mentioned' data points, which the analysis methods cannot distinguish from 'not existent' (De Block & Vis 2019). Following the thesis' assumption that culture impacts other levers' effect and upstream interviewees saying that agility must start with culture, the cultural levers were discussed first and then the remaining shortlisted levers were covered in descending priority ascribed by upstream interviewees (see Section 5.1). Next came a question about culture's influence on other levers, before the final section closed with some general themes flagged by industry literature. Overall, the thesis followed Mills et al.'s (2010) call to CR interviewers to guide the interview. Here the extensive literature review of agility research showed its strength: it allowed developing an interview template building on existing knowledge (Tóth et al. 2017).

4.5 Data Analysis

The energy company interview recordings were transcribed verbatim using the automised tool f4x audiotranskription[2] and reviewed personally using the f4transkript software. For this software, Dresing et al. (2015) introduce two alternative verbatim transcription conventions applicable to German and English interviews and documents. Their 'complex' convention adapts the Jeffersonian convention and captures all verbal utterances. Yet, Poland (2001) notes that such conventions create unnecessary effort for researchers focusing on *what* rather than *how* something is said. With its semantic analysis focus, its many interviews, and the transformation into fuzzy-values (see below), this thesis belongs to the *what*-strand. Hence, Dresing et al.'s (2015) 'simple' convention, which enhances readability while maintaining sentence structures, seemed more appropriate. After transcribing, the transcripts were pseudonymised by replacing participant and company names with unique identifiers. Next came the analysis.

Choosing the analysis methods: As discussed earlier, both purely qualitative or quantitative designs could not satisfyingly answer the RQs. Regression analyses, by identifying one variable's impact through holding the others constant, contradict NCT's very nature

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[2]f4x is visible only after switching the website to German.

of synergistic levers (Fiss 2007). Purely qualitative analyses struggle to depict systematic interrelations across a larger set of firms. To outweigh these downsides, this research combines qualitative and quantitative analyses. Given the volatility and change inherent to agility, Lin et al. (2006) therefore call for fuzzy-logic agility research. "Fuzzy logic provides a useful tool to deal with problems in which the phenomena are imprecise and vague", like agility (Lin et al. 2006, p. 355). It uses research participants' own linguistic expressions and thus, like CR, accounts for individuals' different perceptions of agility (Lin et al. 2006). Researchers must then analyse these 'perceptions' consistently using their case knowledge. For a fuzzy-logic introduction, see Ragin (2008).

Following recommendations by NCT research, CR, and fuzzy-logic (Misangyi et al. 2017, Tóth et al. 2017, Ragin 2008), **three analysis steps were conducted:** First, thematically analysing all data; second, transforming the identified themes into fuzzy-values; third, conducting an fsQCA. Step (1) is the within-case analysis where firms are analysed separately, step (2) is a preparatory step for the third step, and step (3) is the between-case analysis, where the analysed entities change from 'firms' to 'levers' (Tóth et al. 2017). As per Bluhm et al. (2011), this analysis is reflexive in that later analysis steps build on issues and output from the earlier.

4.5.1   Step 1: Thematic Analysis

The first step was a thematic analysis of the interviews in German. This method was chosen since, for this research, positivists' word count analyses (Krippendorff 2004) seem inappropriate, as semi-structured interviewers distort the time/words spent on aspects by steering the conversation. Moreover, constructionists' referential analyses that search deeper meaning within language seem unnecessary, because high-ranking interviewees can explicitly express opinions (Harvey 2011). Between those extremes, thematic analysis systematically searches the essence by breaking qualitative data into codes and themes (Braun & Clarke 2006). With its focus on perceivable patterns, this method fits with CR (Braun & Clarke 2006) and has been recommended and applied to identify themes for a subsequent fsQCA (Tóth et al. 2017, Akbari & Safari 2020). Using NVivo to process the large dataset, the initial thematic analysis therefore sought themes for agility levers within each firm (Tóth et al. 2017). Braun & Clarke's (2006) well-established six thematic analysis phases were applied and partially adapted:

(1) After the transcription, the data were reviewed. Next, as prerequisite for deriving fuzzy-values from themes, Braun & Clarke's (2006) process was modified: Following Gibson's (2017) recommendation, a template of levers to code by was pre-defined. Indeed, for fsQCA studies, Tóth et al. (2017) firmly dissuade from coding without such predetermined, structuring categories. O'Mahoney & Vincent (2014) recommend critical realists to leverage literature for developing an early framework to enter the analysis better informed. Ambituuni et al.'s (2021, p. 173) explorative agility research therefore advises "defining a priori themes based on the existing theories and the review of literature". The shortlisted agility levers, which also structured the interview guide, served as this template (King 2004). It ensured as initial template that all levers were covered by codes at each firm, while it maintained the flexibility to find different themes for each lever at different companies (template see Figure 4.1) (Tóth et al. 2017, King 2004).

(a) Prevalence of change in the industry

(b) Agility level

(c) Change-driven organisational culture

(d) Integrative and developing leadership mindset

(e) Sensing and seizing strategy

(f) New technology and technology capabilities

(g) Strong and diverse linkages

(h) Decentralised structures using enabling bureaucracy

Aside from (a) and (b), these categories are the non-genericised levers from Table 3.1, reordered as per the interview guide. The sub-codes and themes within these categories differ for each company following from companies' separate analyses – as required for the GMET.

FIGURE 4.1: Coding Template

(2) Building on this template, relatively granular codes were developed as verbal description of a small interview transcript piece, capturing an aspect relevant for agility or its levers. As per Braun & Clarke (2006, p. 89), coding thus aimed to "identify particular (and possibly limited) features of the data set" rather than trying "to code the content of the entire data set". Both multiple coding of text sections and the use of one code for different text sections were permitted.

(3) These detailed codes were then clustered into higher-level themes describing the agility levers. Specifically, the author manually reviewed the longlist of codes and developed themes, each capturing the overarching idea of multiple codes. NVivo allowed the researcher to 'drag-and-drop' the codes into their allocated theme to create a hierarchy. At the top of this hierarch were the template categories (i.e. the levers), into which the themes and their lower-level codes were allocated. A graphic representation as thematic map (Braun & Clarke 2006) was found not to be necessary, because the functionality of NVivo offered a great structure – this can be imagined like the logic of folders, sub-folders, and sub-sub-folders in a computer file explorer. It is important to note that only one level of themes was used; meaning, that there were no sub-themes even though Braun & Clarke's (2006) process allows for that. Also important, contrary to thematic analysis' common practice, the companies were analysed separately to enable deriving company-specific fuzzy-values for the levers (Tóth et al. 2017). Consequently, the themes identified for a lever differed among firms, which indeed concurs with semi-structured interviews' flexibility (Tóth et al. 2017). Practically, this meant that a separate thematic analysis was conducted for each of the 15 firms.

(4-6) The themes identified for every lever at each firm were then reviewed as a whole and thereby partially adjusted and refined. Next, the themes were defined, named, and summarised by developing a story for each theme (Braun & Clarke 2006) as part of the GMETs (Section 4.5.2). Finally, the sixth phase, writing the analysis report, was combined with the fsQCA results.

For thematic analyses, Braun & Clarke (2006) stipulate some explicit decisions. Considering these, this research did: (1) rather than describing the full dataset, focus pragmatically on specific theme-types bounded by the researched levers; (2) treat interviews as explicit representations of participants' perception (semantic thematic analysis) – following CR, that seeks perceptions of the reality (Wynn & Williams 2012); (3) use a coding template to code for data relevant to the RQs and compatible with fsQCA, which makes this a theoretical analysis, not a data-driven inductive analysis.

The identified themes, clustered by levers and firms, were the input for Step 2.

4.5.2   Step 2: From Themes to Fuzzy-values

Next, in preparing the fsQCA, the identified themes for the pre-determined levers at each firm were transformed into fuzzy-values – i.e. thresholds defining 'degrees of representing' a lever (Fiss 2007). Ragin & Rihoux (2009) argue that performing fsQCAs with qualitative themes has a better empirical justification than with quantitative data. Despite De Block & Vis' (2017) criticism that most fsQCA research still ignores qualitative data's potential, the author found three alternative methods to transfer themes into fuzzy-values for agility and each lever's strength at every firm: Crilly et al. (2012) offer a time-efficient approach in using a coding lexicon that predefines how imaginable interviewee statements are coded on the fuzzy scale. However, this approach is opaque as to how codes are connected to certain fuzzy-values. Transparency is integral to fsQCA (Misangyi et al. 2017). Alternatively, Basurto & Speer (2012) define a six-step-process. However, considering this process' initial aim of using qualitative data, its focus on mostly quantitative anchors surveyed during qualitative interviews seems inconsistent. Most appropriate to transfer the qualitative themes into fuzzy-values seemed Tóth et al.'s (2017) Generic Membership Evaluation Template (GMET). The GMET is more transparent (cf. Basurto & Speer 2012), which manifests in its final step: justifying each fuzzy-value. Furthermore, the GMET does not fall into the trap of using solely quantitative anchors queried in subsidiary sentences of qualitative interviews. Potential biases from the author determining fuzzy-values from themes himself indeed required caution. Yet, Fiss (2007) and Tóth et al. (2017) appreciate that this avoids problems of participants interpreting fuzzy-scales differently.

Before filling in the GMET once for each lever and for the outcome (i.e. agility) at each firm, the fuzzy-scale for each lever was chosen. Tóth et al. (2017) recommend even-numbered scales to avoid mid-points' ambiguity. Per Ragin & Rihoux (2009), this research considered the data granularity to determine the optimal scale for each lever: either using boolean-logic, or 4- or 6-fuzzy-value scales (Table 4.1). However, ultimately, the data quality was so good, that only 6-fuzzy-value scales were used.

TABLE 4.1: Fuzzy-scales

Boolean	4-values	6-values
$1.0 = fully\ in$	$1.0 = fully\ in$	$1.0 = fully\ in$
$0.0 = fully\ out$	$0.66 = more\ in\ than\ out$	$0.8 = mostly\ but\ not\ fully\ in$
	$0.33 = more\ out\ than\ in$	$0.6 = more\ or\ less\ in$
	$0.0 = fully\ out$	$0.4 = more\ or\ less\ out$
		$0.2 = mostly\ but\ not\ fully\ out$
		$0.0 = fully\ out$

Adapted from Ragin & Rihoux (2009)

The GMET then works as follows: It starts with an initial description of the lever as manifested in this firm, followed by the list of themes (incl. descriptions) for this lever that the thematic analysis revealed in this firm (Tóth et al. 2017). For each theme, separate columns describe its effect direction (i.e. positive/negative) and its intensity/importance (Tóth et al. 2017). Intensity relates to words and repetition (Tóth et al. 2017). Although populating these columns retains subjectivity, they make the researcher's perception transparent. The final column for representative quotes for each theme further improves transparency. The template closes with fields for supporting quantitative data (if available), the fuzzy-score for the lever (derived from the themes' ratings), and a verbal justification for choosing this score. To further guard against subjectivity in the scoring, a random review of some GMETs was conducted as credibility check by a friend currently pursuing her doctorate in business law. Tóth et al.'s (2017) Table 2 exemplifies one GMET and Tables 5.2 and 5.3 provide two GMETs from this thesis' pilot study and Appendix Tables B.2 and B.3 one GMET from the main study.

While the indeed work-intense GMET has yet to establish, it is the only tool for rigorously and transparently transforming qualitative data into fuzzy-values. Even top-tier journal articles like Crilly et al. (2012) and Vergne & Depeyre (2016) cannot match this. Tóth et al. (2017) promote the GMET in combination with thematic analysis. The pilot project demonstrated that this tool is well suited for this thesis and the main study confirmed this impression.

4.5.3 Step 3: fsQCA

The final step moved the 'analysis level' from firms to levers. It answered the RQs by using the identified fuzzy-values in an fsQCA. QCA was introduced by Ragin in 1987 and is a half-verbal qualitative and half-mathematical quantitative method (Fiss 2007). Like qualitative research, QCA incorporates that causality depends on the context and that individual cases are complex, wherefore no *single best* causal model can exist – even more, QCA explicitly seeks alternative lever combinations for one outcome (Rihoux 2003). Like quantitative research, QCA is replicable and examines causality (Rihoux 2003), and it introduces analytical rigour, which theory-building studies on logical relationships often lack (Fiss 2007). Importantly, QCA does not explain interrelations but identifies them, triggering a discussion leveraging existent theory and empirical findings (e.g. from a thematic analysis) (Ragin & Rihoux 2009).

Key to QCA is that conditions (here: levers) produce the outcome (here: agility) interactively as configurations/combinations, not additively (Ragin 2008, Rihoux 2003). QCA identifies necessary and sufficient agility levers for an outcome by testing if a (combination of) lever(s) is present in the subset of cases/firms showing the outcome (De Block & Vis 2019). Authors highlight aspects critical to QCA:

- *Mathematical foundation:* While linear regression methods use linear algebra to identify net effects, QCA uses boolean algebra to identify sets/configurations of (non-)existent levers jointly leading to an outcome. Unlike regressions methods, QCA reflects that different configurations produce the same outcome (equifinality) (Crilly et al. 2012) and that a lever's absence does not necessarily reverse its presence (causal asymmetry) (Furnari et al. 2021). Moreover, QCA accounts for how a lever's impact varies within different configurations due to interactions with other levers (Misangyi et al. 2017). Each case (here: firm) is thus a configuration of levers that should not be observed individually (Misangyi et al. 2017).

- *Conceptualisation of causality:* QCA determines causality as *necessity* and *sufficiency* (Vergne & Depeyre 2016). By determining all cases sharing a certain lever and identifying all combinations leading to the outcome, QCA identifies this outcome's necessary and sufficient levers (Fiss et al. 2013). In this research, a lever(-combination) x is necessary if present in every agile company A, while a lever(-combination) y is sufficient if all companies holding it are agile A (i.e. $y \in A \in x$)

(Fiss et al. 2013, Vergne & Depeyre 2016).

Two often-used QCA-types prevail: In crisp set QCA (csQCA), firms may or may not belong to a set – e.g. firms (not) good with new technology. Membership is coded with 1, non-membership with 0 (Fiss 2007). Hence, a lever's (non-)presence rather than its intensity matters (Misangyi & Acharya 2014). In fsQCA, levers take different levels, wherefore firms belong to a set with a degree measured on a fuzzy-scale (Fiss et al. 2013) – e.g. a *somewhat* agile strategy. Thus, fsQCA abandons csQCA's sometimes unworldly dichotomous thinking (Ragin & Rihoux 2009). fsQCA appeared preferable for this thesis because binary agility levers would have misrepresented agility's fuzziness. Vergne & Depeyre (2016) recommend investigating dimensions' conjunct outcome creation using fsQCA, mirroring this project's analysis of agility levers. Fiss (2007) even recommends researching organisational turbulences and organisational levers with fuzzy-scales. Thus, this research conducted an fsQCA using the outcome from the preceding thematic analysis and the filled-in GMETs. This identified alternative lever combinations for (non-)agility and agile mindsets' meaning for other levers' interactive agility impact. This method allowed searching for similarities and differences among cases with identical outcome (Vergne & Depeyre 2016) – i.e. those firms being agile or those that are not. The detailed fsQCA precedure is described in the Analysis Section 6.3. After these technical fsQCA steps, the real value must be created: in the discussion, the identified configurations are to be related to existing research and the qualitative findings from the thematic analysis.

4.5.4   Conclusion on analysis procedure

While the outlined three-step analysis procedure is challenging, it can build on existing works and has a sound justification. The applied thematic analysis process for analysing interviews (Braun & Clarke 2006) is well established and more compatible with the adopted CR philosophy than positivists' number driven coding approaches or constructionists' referential analyses. With only minor adjustments to the standard process, it was also possible to incorporate coding templates as required for this thesis. The use of the relatively new GMET, which has had little empirical application so far, could be questioned. However, its provided transparency seems no less than game-changing compared to the typically opaque determination of fuzzy-values from qualitative data (Section 4.5.2). Moreover, it has been recommended for CR work like this thesis (Tóth et al. 2017). fsQCA was chosen for this study of agility levers because it identifies unexplored

interrelations among levers earlier identified as individually meaningful for the outcome (Misangyi et al. 2017). It allows delving into organisations' increasing complexity (Fiss et al. 2013). Such an qualitative-like analysis of qualitative data is further justified because the theory underlying this work is, according to Edmondson & McManus (2007) (Section 3.7), located midway between a nascent and an intermediate theory which lends itself to such a qualitative-quantitative combination. fsQCA also aligns very well with the chosen organisational theory: From an NCT perspective, Misangyi et al. (2017) recommend fsQCA to research organisational change (like becoming agile).

Some researchers developed research strategies similar to this project. Crilly et al. (2012) exemplify an analysis, coding, and fsQCA with qualitative data to research organisational change. Tóth et al. (2017) and Basurto & Speer (2012) provide a methodological foundation. Similar to this thesis, Vergne & Depeyre (2016) research firms' adaption to change. Specifically, using interview data to conduct an fsQCA, they research how defence businesses responded to 9/11. They find joint causality – i.e. complex interactions by which a lever's impact depends on the other levers that it is combined with in a configuration (Vergne & Depeyre 2016). While examining stigmatisation experienced by HIV-positive people in Iran, Akbari & Safari (2020) combine the more simplistic csQCA with thematic analysis to investigate how configurations of levers interdependently lead to the outcome. Yet, they further call for combining thematic analysis and more meaningful fsQCA "as a new approach in the analysis of qualitative data, especially interviews, in other areas of research" (Akbari & Safari 2020, p. 1072). This thesis follows that call.

4.6 Quality Criteria

This thesis combines aspects of qualitative and quantitative research designs. From its CR standpoint, it rejects positivists' strive for full generalisability, but it also disagrees with SC, which rejects any generalisability (Edwards et al. 2014). Still, rather than building on the traditional quality measures for positivistic statistical works (i.e. reliability and validity), the alternative criteria designed by Lincoln & Guba (1985) for qualitative data-based works are subsequently being applied. These are credibility, transferability, dependability, and confirmability.

First, credibility concerns the 'truth value' (Lincoln & Guba 1985) of the research. This requires clarifying if the results are credible or believable from participants' perspective and if they represent the participants' realities and views (Tobin & Begley 2004). To

achieve this, the researcher chose to interview top managers who, as per Harvey (2011), are capable to clearly express their opinion. Moreover, the author did not translate the German interviews to English to maintain the interviewees' wording for the analysis. Only in the last step, filling in the GMETs, relevant quotations were translated. Second, transferability measures whether the results can be generalised or transferred to other contexts (Lincoln & Guba 1985). The researcher's responsibility here is describing the applied researched context, so that other researchers can arrive at an educated judgement (Nowell et al. 2017). For this purpose, Section 4.3 provided a detailed account of the current developments in the energy industry. Other researchers wishing to apply the findings in other contexts can hence review if their industry is comparable to the energy industry. Third, dependability investigates if the research process is logical, rigorous, transparently documented, and not biased by the researcher (Nowell et al. 2017). Achieving this makes the research replicable (Tobin & Begley 2004). To offer this, the methodology chapter provided a detailed outline, explanation, and justification of all applied data collection and analysis methods. This can serve as step-by-step guide for other researchers wishing to replicate this study. Fourth, confirmability determines whether the results could be confirmed by others. In practice, this requires that the results are derived from the data and do not merely represent the researcher's opinion (Tobin & Begley 2004). To be transparent, the researcher engaged in a philosophical discussion. His choice for CR means that he acknowledges the existence of one reality, but also that people's perceptions of this reality differ (Sobh & Perry 2006). By strictly applying existing research methods, he ensured that the bias from his own perception was minimised. Further, he took a reflective stance to minimise his bias (next section). As per Lincoln & Guba (1985), fulfilment of this fourth criteria can also be concluded when the other three criteria are fulfilled, which is the case.

4.7 Ethics and Reflexivity

The author also made the necessary ethical considerations. Before signing the consent form including audio recording consent (Figure A.3), interviewees received information (Figures A.1 & A.2) about the study, confidentiality, voluntary participation, and the automised transcription through audiotranskription. This academic transcription tool fulfils all GDPR (General Data Protection Regulation) requirements, maintains Germany-based servers, and deletes data after the encrypted transcript download. All data were

pseudonymised and, following EBS' data storage policies, stored on encrypted, password-protected devices. The researcher received Ethics Committee approval by submitting an DPIA with his research proposal, and he experienced no issues given the organisational (non-personal) data focus.

The author further took a reflective stance by acknowledging his role. As critical realist, he believes that his perception impacts his reporting (Bhaskar 1978). The GMET introduced transparency by disclosing how fuzzy-values were derived from qualitative interviews – an opaque step in other works (e.g. Vergne & Depeyre 2016). However, other biases remained. While the author's energy industry consulting experience benefited the data analysis, it denied an unbiased outsider perspective. Using existing contacts might have biased respondents' answers. Yet, these high-ranking participants would have been otherwise inaccessible and they had no direct personal ties to the author. The author also recognises his methodology's complexities, that much data was generated, and that his project was time-consuming. Yet, he sees considerable value-added compared to e.g. pure thematic analysis, which would have allowed for no such systematic lever interrelation analyses.

4.8   Methodology Summary

This methodology chapter explained and defended the research strategy to approach the RQs. It identified the ontological and epistemological assumptions and justified the chosen CR perspective. CR and NCT were connected to the research strategy, sampling, and the data collection and analysis methods, guaranteeing a sound base for this research. Interviews were chosen as data collection tool. The analysis was conducted in three steps: (1) Coding the data thematically using a high-level coding template structured along the theoretical framework, (2) transferring the themes into fuzzy-values using GMETs, and (3) conducting an fsQCA. The full process, save for the last analysis step and the result interpretation (that both require the full dataset), was tested in a pilot project, which is discussed in the next chapter.

Chapter 5: Upstream Interviews and Pilot Study

This chapter offers in Section 5.1 the results from the upstream interviews conducted to tailor the study to the energy industry and in Section 5.2 the results and conclusions from the pilot study.

5.1 Upstream Interviews Results

Anderson (1999) recommends social scientists and organisations to simplify complex systems by eliminating the minor and unnecessary. To achieve this before conducting the full study, five upstream interviews (45-60 min each) were conducted and then analysed in a simplistic thematic analysis; simplistic in the sense that coding focused on the importance interviewees attached to each lever. Instead of filling in a thorough GMET template as in the main study, this analysis served to gain a good impression of the individual levers' importance in this context, which coincided with the corresponding answers from the upstream surveys. The results were highly unanimous on which levers are relevant for the German energy industry and therefore contribute to RQ1 identifying the context-relevant levers. Keeping the focus on the pilot and main study interviews in energy companies, only a brief summary of upstream interviewees' rationales for focusing on a lever subset follows, ordered by descending importance they indicated:

1. **Strategy** guides when and how to respond to and identify changes (especially concerning new regulations). Agile challenges in the energy industry are foremost strategic business development challenges, making strategising crucial. The participants noted that the goals towards which strategies work are often externally imposed in this industry (e.g. by governments).

2. Agility starts with strategy, which the consultants identified primarily as **leadership** issue in this industry. Conversely, Zhang & Sharifi (2007) recommend agile organisations broader participative employee involvement in strategising. But rather than conflicting, these two views indicate that some organisations in the observed industry are yet to become agile. More congruent with the literature review, the consultants observed that agility could not establish without leaders living and promoting it top-down. Leaders who clung to viewing organisations as inflexible accumulation of long-term investments failed. Consequently, leaders must define strategies that make organisations agile despite these investments.

3. **Technology** as part of any new product or market development must be well understood, and energy firms need technology competencies to meet and understand current market requirements. This relates, amongst others, to IT and collaboration tools, but also to other technology like game-changing energy generation technologies. Hence, while most recent agility research focuses on IT, participants also stressed other technologies' relevance for agility.

4. The **organisational culture** as organisational mindset guides employees with shared values. An inappropriate, rigid organisational culture hinders agile strategic responses (e.g. to new energy production regulations).

5. **Linkages** are required to sense opportunities and changes, and to access the capabilities to exploit them and develop e.g. new energy generation solutions.

6. Most controversial was the **structures** lever. Interviewees argued that decentralised structures shift the decision power close to the market/customer and hence provide the external focus important for agility. While they considered the lever moderately important compared to others, they still stressed the importance of enabling bureaucracies carefully balancing much versus little structure.

The participants clearly de-prioritised the levers on processes, purpose, and personal mindset (see Table 5.1). As no existing agility lever prioritisation could be found for Germany's energy industry (or any other country's), these levers were excluded for the remaining study. Future research should investigate their relevance for other industries.

The empirical energy industry study therefore focused on the aforementioned six levers. However, since the structures lever was controversial and since the analysis method recommends five levers (see above), the analysis carefully tests if including this sixth lever

TABLE 5.1: Excluding Levers After Upstream Interviews

Lever	Reason for excluding
Changeable/flexible and fast processes	Processes are more operational, efficiency-focused, and often regulated in energy firms, whereas agility is less operational and more strategic – processes must follow and are consequently less at the forefront of energy firms' agility.
Strong and stable formal purpose	The purpose is pre-given with 'energy transition' and 'clean energy'. The participants strongly argued that the inspirational power from 'making energy available' is low, wherefore other levers are more impactful in guiding agile changes.
Personal mindset appreciating flexibility & uncertainty	The themes flexibility and uncertainty acceptance were deemed important. But employees lacking this personal mindset could often be 'convinced' if there was an agile organisational culture, or they left the energy company without long-term impact, as workers from other industries filled their positions. Still, to not lose the idea of employees' individuals mindset, it was integrated via interview questions into the lever 'change-driven organisational culture'.

Source: Analysis of upstream consultant interviews

provides meaningful results. Figure 5.1 shows the shortlisted conceptual framework to be applied in the remainder of the study.

During the upstream interviews, all participants noted the strongly and constantly changing regulations and governmental interventions in the energy market. Yet, these were described more as a driver (i.e. black swan) than a hurdle for agility. Some participants described it as conundrum: Regular regulatory changes require agility, but at the same time they can limit firms' leeway and thus make agility more difficult. This was, however, described as no apology for not being agile. This underlined the meaningfulness of studying agility in this industry. In general, the received answers were surprisingly rich and the consultants had a good knowledge of the industry as a whole.

5.2 Pilot Results

After developing the research tools and conducting these upstream interviews, the author conducted a pilot to test the feasibility of his interview guide, data collection, recruitment, and to make adjustments prior to the actual study (Kim 2011). This pilot provided strong

Agility levers

Filter?

Configurational Perspective

Strategy
Technology
Linkages
Structures

Employee mindset (org.)

Leaders' mindset

Agility

Hard levers *(Tangible)*

Cultural levers

Comment: The levers are reordered following their order in the interview guide, which however begins with cultural levers (see Section 4.4.3.2). To simplify the representation, the levers in this figure have been genericised. For the specific levers see Table 3.1.

Source: Own contribution

FIGURE 5.1: Conceptual Framework – Step 3 – Shortlisted

support for the developed framework and the proposed methodology. Moreover, it underlined the importance of energy firms being agile given the rate of change, or, to quote a participant from Company 1: "*The whole issue of transformation within the industry, yes, is definitely a five [out of five in importance]*".

The pilot took place in two of the companies from the sample, with three one-hour interviews in each. This scope would not shrink the remaining sample sufficiently to put the main study at risk – i.e. sample 'contamination' caused by the fact that piloted companies may not be interviewed again in the main study, because second-time participants tend to be biased and incomparable with first-time participants, was avoided (van Teijlingen & Hundley 2001). It was found that the mandatory key questions from the interview guide can be adequately covered in one hour. Depending on the extensiveness of the answers, the optional secondary and probing questions were used to get more detailed responses. The questions were continuously refined from interview to interview, depending on how well they were understood. The final resulting interview guide is in a format already containing explanations for clarifying questions that the respondents had in the earlier interviews. A post-pilot version of the guide reduced to Likert and mandatory questions is shown in Appendix Figures A.4, A.5, and A.6. The continuous improvement process for the interview guide led to the last pilot interviews going very smoothly. The interviews were then coded and analysed as thematic analysis using a template as per Table 4.1. The results were inserted into GMETs and fuzzy-values derived. This process clearly proved

that the interviews, the thematic analysis, and the GMETs provide the sought information. While van Teijlingen & Hundley (2001) caution against including pilot data in the main study due to changes in the research instrument, this was not an issue here, since adjustments were only necessary to make the questions easier to understand, making the interview less arduous for the interviewer. Hence, the data from the pilot interviews could be used without concern in the final study.

One of the final interview questions asked the respondents whether the levers used comprehensively covered the agility concept. All agreed that this was the case and had nothing to add, which is why the shortlisted levers could be used for the final study. Importantly, this small-sample trail run served only as feasibility study for the interviews rather than allowing for direct conclusions about the three RQs, as the sample was considerably too small to conduct an fsQCA (Kim 2011).

Subsequently, some further impressions from the pilot interviews are outlined:

- Despite the topic's strategic sensitivity, the participants spoke openly about their business. They happily agreed to being recorded after being promised confidentiality.

- Using the network from the author's consulting firm, all contacted potential interviewees agreed to participate.

- The virtual format, recording quality, transcription, and coding worked well.

- Questions were clearly understood, and answers were given in the expected format and narrative – this got even better in the last interviews after refining the interview guide, whereas it was more challenging in the earlier interviews.

- Starting each section with a rating question worked well to introduce each lever, and it provided a valuable quantitative anchor for the GMETs.

- One of the first interviewees seemed to lack a self-critical view of his organisation as he exclusively reported on what was going well, until the interviewer pointed this out to him. In the following interviews, the interviewer emphasised in the introduction that a self-critical perspective is essential, and this remark solved that issue.

For illustration, Tables 5.2 and 5.3 show the resulting GMETs for the lever 'change-driven organisational culture' that was developed for both piloted firms. Using the coded template-based themes from the interviews, filling in the GMETs went smooth and the rating question for each section provided a valuable addition. As Tóth et al. (2017) note, deriving a quantitative (fuzzy-)score from qualitative data always involves a potentially biased assessment by the researcher; however, the pilot showed that GMETs make the decisions for a certain score transparent. The interview data was so rich that no secondary documents were consulted for the two pilot companies, which was originally planned, because this seemed simply not necessary. This was not perceived as a problem because (1) on average, respondents seemed to be very objective about their company and because (2) their internal view was considered more accurate than documents produced for external communication.

The next chapter outlines the full analysis which leveraged the methodology tested and refined by the pilot study.

TABLE 5.2: GMET – Company 1 – Change-driven Culture

Company:	Company 1			
Lever:	**Change-driven organisational culture**			
Overall case description from lever perspective:	The company's employees show mostly great awareness for the need to be change-driven and many do indeed also appreciate working on new topics. A challenge is that some tenured employees reject change, as they learnt the industry to be stable and as they experienced the company to be successful in times of being rather not change-driven. Yet, new people are entering the company coming from other industries and bringing a more change-driven mindset. The interviewees also indicated that there is a good balance of organisational areas being change-driven and such being not – as per the need and nature of the respective area.			
Dimensions:	**Context-specific description**	**Direction/effect on membership**	**Intensity/relative importance**	**Illustrative quote(s)**
Awareness there	People are aware that a change-driven mindset is needed	Positive	High	"There is also a significant part of the organisation that is aware that it is important to be ready for change"
Liking new topics	Mindsets transform towards being change-driven since many people (learn to) appreciate working on new topics	Positive	High	"So, when you talk to people, [...] the desire is articulated. Everyone is / is enthusiastically participating when somehow topics are set up, yes."
Company health and past success	Current company health and past successes makes need for change difficult to "sell" to such employees preferring stability	Negative	Medium	"So, and that is of course difficult, yes, when you [...] have a staff who [...] like to say something like, I'll put it flippantly now: "WHY THIS again? We're doing fine!"" "[...] because I have always been successful with a different behaviour, how do I actually manage to get rid of this other behaviour?"
Long company membership	Long company membership making change-driven difficult as people learnt industry to be very stable in the past	Negative	Medium	"You will find people in many areas of this house who have been working here for 20, 25 years." "So, and they come from a time [...] in which gas and electricity were not perceived as a product, as we understand it today, but as an inevitable necessity that the buyer had to take."
Recently increasing employee turnover	Some people coming from other industries bring along a more change-driven mindset establishing in the company	Positive	Medium	"New people come in who, let's say, with this way of working or who simply bring a different way of working with them."
Differently change-driven	Good balance as these company business fields requiring change are change-driven and those operating in stable environments are rather stable	Positive	Medium	"There are indeed differences, even in the different business units, it has to be said quite clearly" "Well, when I look at the transactional business, yes, where it's just batch processing, I would say it's definitely geared towards stability."
Strategic transactions	Strong strategic moves (e.g. acquisitions) make developing a joint culture somewhat difficult but also introduce more innovative cultural elements	Neutral	Medium	"Of course, also with the <acquired firm> integration, yes, there is also a completely different culture, which was of course more innovative in one place or another."
Supporting quantitative data	3.8 (on scale with 1 to 5 where 5 is highest)			
Set membership in 6-value fuzzy set	0.8 ('mostly but not fully in')			
Reason for fuzzy-set attribution score	Few negative influences can be observed; however, these themes relate only to a limited set of employees. In contrast, most of the organisation has been described as aware of the need for and ready to be change-driven. This strongly outweighs the impact from the negative dimensions. Also, the negative impact from tenured employees is counterbalanced by an increasing turnover with change-driven employees entering the company. As also the average quantitative rating for the question on the change-drivenness is 3.8 (on the 1 to 5 scale) it was decided that the company is 'mostly but not fully in' (0.8) the set of organisations with a change-driven employee mindset.			

TABLE 5.3: GMET – Company 2 – Change-driven Culture

Company:	Company 2			
Lever:	**Change-driven organisational culture**			
Overall case description from lever perspective:	The company sees providing a stable level of supply as its highest good – which is grounded in the company history. This means that it avoids change, which directly reflects in the employees who are traditionally change-averse and stay long in the firm and it also reflects in the type of change-averse employees attracted by the company today. While there are active efforts to also introduce a drive for change to the stability-driven organisational culture (an effort which is still in the early days), employees' mindsets are so stuck in their stability thinking that they even struggle to identify situations where change might be needed.			
Dimensions:	**Context-specific description**	**Direction/effect on membership**	**Intensity/relative importance**	**Illustrative quote(s)**
Organisational inertia	Long company history with little need for change meaning that no change-driven mindset could establish	Negative	Medium	"That is simply due to our history. We come from the water business and the water business is not one that is subject to strong changes. And accordingly, that is also the basic mentality."
				"If you go towards security of supply and long-term allocation, [people come to us]. Looking from the perspective, this simply leads to the fact that already in the DNA of people who have come to the company, we tend to be the ones who are out for security, long-term, stability."
Personal mindset	Existing employees (with low fluctuation) and also those newly entering the organisations have a personal preference for stability	Negative	High	"The large number of staff is, I would say, fluctuation-wise we have such a low turnover compared to many other companies, which is typical in the utilities industry, it's clear that once you land there, you stay there for about."
				"So this issue of fulfilling our supply mandate is definitely much more prevalent than dealing with new issues."
Risk-aversion	Security of supply is the highest priority, wherefore risk (e.g. from experimenting) is avoided at any cost	Negative	High	"We are definitely focused on stability. This is due to the fact that the highest good we are on the road with is supply SAFETY."
Heterogeneity of change-drivenness	There is an inconsistency among the areas as to how change-driven they are. Unlike the other pilot company, this was not seen as advantageous.	Negative	Low	"It's just a bit heterogeneous. I do believe that in the last few years we are already experiencing a change due to a change in the staff [...]. But you have to say [...] quite clearly that we also have colleagues who have been established for many years and who sometimes still feel a bit shy about change."
Hard to convince of change need	Employees suppress the need for change as they are reluctant to objectively judge situations where it might be needed	Negative	Medium	"So people have to be convinced and then really / realise, yes, the pressure to act is there now, or the insight to come to it, that can take time."
Non-agile business divisions dominate	Some departments that contribute a large share of the sales (making them internally powerful) are reluctant to change, as this could weaken their position	Negative	Medium	"Well, we simply have many historically grown business areas that are still very strong, i.e. also strong in terms of turnover, which unfortunately [...] still dominate very strongly as far as the topic of agility is concerned."
Efforts to change situation	Company currently in transformation to introduce change-drivenness to the prevailing risk-aversion mindset. This is a 'positive' development but still in the early stage	Positive	Medium	"Well, and I think there is now a bit of a rethink / that is, a rethink is taking place."
				"We are trying to develop the best of both worlds [stable and change-driven], so to speak. But this is a process that, like any cultural change, cannot be imposed overnight; it has to grow."
Supporting quantitative data	2.3 (on scale with 1 to 5 where 5 is highest)			
Set membership in 6-value fuzzy set	0.0 ('fully out')			
Reason for fuzzy-set attribution score	There are nearly exclusively negative influences which relate to most of the organisation. The impactful themes 'personal stability mindsets' and 'risk aversion for guaranteeing a stable supply' dominate the mindsets and lead to a non-change-driven mindset. Further medium important dimensions strengthen this effect. While there is an ongoing effort to move from stability to change-driven, this is still in the early days. Since also the average quantitative rating for the question on the change-drivenness is 2.3 (on the 1 to 5 scale), which is one of the lowest scores across all dimensions and firms, it was decided that the company is 'fully out' (0.0) of the set of organisations with a change-driven employee mindset.			

Chapter 6:   Analysis and Findings

Like Fiss (2011), the author decided to separate the results from the discussion, which follows in Chapter 7. Therefore, this analysis and findings chapter aims to only present the results. To do this, Section 6.1 explains the calibration procedure and the resulting fuzzy-values. Section 6.2 then shows qualitatively how particularly positive or negative manifestations of a lever look in practice. Section 6.3 moves on to illustrate the results from the conducted fsQCA. Finally, Section 6.4 resumes the essence of this chapter.

6.1   Calibration and Data

After the pilot and the interviewing, the author conducted the thematic analyses as described in Section 4.5.1 and then filled in the GMETs, which resulted in a document of 215 pages ($\sim$135,000 words) and 105 filled in templates. The results of the Likert questions are purposefully not disclosed separately as table, as this information would be misleading comparing it to the resulting fuzzy-scores, for which the Likert score is only one small contributing factor. Yet, the Likert scores are part of the GMETs, which the author is happy to share at request. Tables B.2 and B.3 in the Appendix provide another randomly selected filled in GMET as example. Before deriving fuzzy-values from the qualitatively filled-in GMETs, the author calibrated each lever by defining meaningful thresholds (fuzzy-value descriptions), so that being below/above has practical meaning for the attribute and distinguishes 'irrelevant variation' from 'meaningful variation' (Ragin & Rihoux 2009, Misangyi et al. 2017). For illustration, Vergne & Depeyre (2016) use temperature as example, where $0°$ Celsius marks the point where water changes its physical state. This boundary is therefore both quantitatively expressible and qualitatively meaningful, since being above/below has an observable impact. This calibration increases the filled-in GMET's rigour, is consonant with fsQCA researchers like Ragin & Rihoux (2009) and Fiss (2007), and enables "to distinguish a case that is more in the set from a case that is less in the set" (Basurto & Speer 2012, p. 161). For each lever and for agility,

three qualitative anchor points were pre-defined as generic statements (i.e. what means full membership 1, nonmembership 0, and the hypothetical maximal ambiguity point 0.5) (Basurto & Speer 2012). Existing and common knowledge, his experience with agility and the energy industry, obvious facts, and especially the literature review helped the author to define calibration points (De Block & Vis 2017). The calibration is shown in Appendix Tables B.4 and B.5.

Calibration provides an advantage over linear regression analyses, which can only compare firms relative to means and to each other – potentially focusing on irrelevant variations (Misangyi et al. 2017). However, fsQCA data might potentially not contain equally high and low values for each lever, even though both NCT and fsQCA aim to include very dissimilar cases to maximise diversity (Ragin 2008). In fact, contrary to statistical methods, a representative sample in fsQCA is clearly secondary to including the most 'diverse' cases (Ragin 2008). As Table 6.1 shows, the sample indeed covers wide variation with high and low values, with minor reservations for linkages. Further, the table illustrates that the mean fuzzy-values vary among the levers ($\mu_{CULT} = 0.35$ and $\mu_{STRA} = 0.79$). While the levers employee culture, leadership mindset, and structure have $\mu < 0.5$, strategy, technology, and linkages have $\mu > 0.5$, meaning the latter levers are on average rather present than not in the observed companies while the former are rather absent. However, this does no yet prove whether high or low scores indeed matter for being agile.

TABLE 6.1: Fuzzy-value statistics

Dimension	Mean	Std. Dev.	Min.	Max.	Cases
CULT	0.35	0.29	0	0.8	15
LEAD	0.43	0.25	0	0.8	15
STRA	0.79	0.30	0	1	15
TECH	0.52	0.28	0	1	15
LINK	0.67	0.23	0.4	1	15
STRU	0.49	0.27	0	0.8	15
Agility	0.55	0.28	0	1	15

Interestingly, despite the differing means, the levers have similar standard deviations (from $\sigma_{LINK} = 0.23$ to $\sigma_{STRA} = 0.30$). The comparably lower standard deviation for linkages is not surprising since the fuzzy-values only range from 0.4 to 1.0, meaning also that most companies have good linkages. Despite some caveats – Ragin & Rihoux (2009) recognise that it is hardly possible to develop data sets covering all possible ranges –

these statistics overall show that the data cover a wide variety of cases and are well suited for further analysis. The full fuzzy-value data set used in the remainder of the study is provided by Table 6.2, the raw data table.

TABLE 6.2: Raw Data Table (Set Membership Scores)

Company	Company scores for levers						
	CULT	LEAD	STRA	TECH	LINK	STRU	Agility
Company 1	0.8	0.4	1	1	0.4	0.6	0.6
Company 2	0	0.2	0	0.4	0.6	0.8	0.2
Company 3	0.8	0.8	1	0.6	1	0.2	0.8
Company 4	0.8	0.6	0.8	0.2	1	0.8	0.8
Company 5	0	0	0.8	0.6	0.4	0.8	0
Company 6	0.2	0.6	0.8	0.6	0.8	0.4	0.6
Company 7	0.2	0.2	1	0.6	0.8	0.4	0.6
Company 8	0	0	1	0.8	0.4	0	0.2
Company 9	0.6	0.6	1	1	0.8	0.6	0.8
Company 10	0.2	0.6	0.8	0.2	0.8	0.4	0.4
Company 11	0.2	0.2	0.8	0.2	0.6	0.4	0.6
Company 12	0.6	0.4	1	0.6	0.6	0.8	0.8
Company 13	0.2	0.4	0.6	0.4	0.4	0	0.6
Company 14	0.2	0.8	0.2	0	0.4	0.4	0.2
Company 15	0.4	0.6	1	0.6	1	0.8	1

6.2 Qualitative Results – the Levers

Before delving into the fsQCAs, this section shows how both low and high lever scores manifest by reviewing the levers' qualitative analysis (the populated GMETs) and, for each lever, looking at two companies representative of others with a particularly high respectively low rating. The aim is understanding which aspects (in GMETs: 'dimensions') create a 'good' or 'bad' rating for a lever. This is done by (1) looking at the GMET field 'Overall case description from lever perspective' and (2) supporting it with few relevant translated citations. To improve the readability of this section, the use of interview quotations is kept to a minimum; additional relevant quotations are given in the accompanying Appendix C (and identified in the main text by links: '(see quote)'), which mirrors the structure of this qualitative results section. The upcoming section, supported by this appendix, provides a good qualitative understanding of levers' real-life manifestation before

the quantitative-*like* fsQCA. Since the GMETs purposefully combine the 2-3 interviews in one firm as comprehensive pool of information on that company, also the quotes only identify the company but not the interviewee. The link to and discussion of literature is established in Chapter 7.

6.2.1 Results for Company Mindset (CULT)

Low CULT rating

Employees in companies with low CULT rating learnt stability and thus struggle with agility's change-drive:

Company 5: Many employees are attuned to and biased by the former stable monopoly setting – as reported by many firms lacking a change-driven culture:

> "Our culture is driven by stability and continuity, because that is what we have learnt over decades and it's not possible to switch so quickly."
>
> — Company 5

This representative quote shows how employees in this industry have long tenures and remain emotionally stuck in the past, which was very convenient for them. Legally stipulated requirements to deliver secure energy supply and to coordinate with co-determination, which is common in large, traditional German industrial companies and which reflect in guidelines and regulations, augment this stability-drive (see quotes). In fact, these companies were referred to as 'tankers', since their cultures make it difficult to change course. Practically, this means employees avoid change because they associate it with worries and anxieties and they are slow to depart from their currently prevailing mindsets (see quote). Even more specifically, mindsets seem difficult to change since they are deeply engrained in the company DNA. Efforts to change this DNA failed because the company approached its mindset only after introducing a new structure:

> "Whether that [...] is the right order to start with the organisational structure when the mindset is not yet there, I will better skip over (sarcastic voice)..."
>
> — Company 5

This indicates that companies should first establish a cultural ground before introducing new 'structural seeds' – or, at least, do both in parallel. Resulting from such failed

efforts (i.e. bad experiences), many employees became tired of change (see quote). Thus, cultural change should be diligently planned, because companies have few attempts before employees get weary of it. Only in the few situations where the company started empowering its employees, they began developing a greater change-willingness. Interestingly, the aspects identified for Company 8's low CULT rating confirm and extend these findings as shown next.

Company 8: While the previous firm lacked any change-driven mindset, this firm defined an ambition to achieve it. But there remains a large gap between ambition and reality, respectively how employees live this ambition:

> "We are not adaptable, because internally we lack [...] the mindset to do things differently and the conviction that you can continuously improve things"

> "Whenever you want to work in this [new, agile] way and do something new with the staff, we always say 'no, we have an external consulting firm'."
>
> — Company 8

Interestingly, the second quote reveals that the company lacks trust because it constraints employees' leeway to experience new agile ways by externalising such efforts. Employees that still possess a change-driven mindset are stalled by others (see quote). While this negative spill-over effect is new compared to Company 5, the firms have strong similarities (see quotes). Namely, also Company 8 struggles developing change mindsets due to long tenures in a stable context with rigid processes. A repeating justification is the requirement for stable energy supply. While this indicates the company's stability mindset being transferred onto employees, also employees' personal mindset tends to be rigid, as rather stability-driven employees join this company:

> "That [with stability] is also how people are moulded. [...] I think that's still a bit of [personal] DNA."
>
> — Company 8

An interviewee in Company 2 even better illustrates this issue: "already in the DNA of people who have come to the company, we are the ones who are out for security, long-term, stability". Resulting from such individual-level and the earlier mentioned company-level mindset aspects, employees in Company 8 prefer complicated processes and excessive documentation, reflecting in risk-aversion and creativity loss (see quote). Thus, a

risk-averse mindset seems to have negative effects, just as, conversely, other effects cause a risk-averse mindset.

In summary, across both companies there are negative cultural spill-overs and rigid personal-level mindsets. These combine with the aforementioned lacking cultural change-drive from rational arguments like the stable supply obligation, which would be threatened by uncertainty from a new culture, but also from more emotional arguments like being used to a stable, convenient, monopolistic past. Changes are associated with worries to lose this stability. Further aspects of low CULT ratings seem general change weariness and rigid employee co-determination requirements.

High CULT rating

Company 3 defined change-drive as part of its culture:

> "So [the culture] is definitely change-driven, both organisationally and strategically, so that change is part of the DNA."

> — Company 3

Specifically, the firm leveraged its recent formation (as carve-out of a utility) to define this culture. Clearly, such radical reorganisation is no template for all cultural change, but if the opportunity occurs, it enables to (re-)define the company culture. Therefore, within this company, change is both formally defined in the culture, but also embedded and lived by the employees – they see their contribution to change (see quote). While firms with low CULT ratings noted weak creativity, Company 3's staff reported how a change-culture triggers a creative, change-driven use of new technology, being further strengthened by the company-wide 'One P&L' approach (i.e. maintaining one cross-divisional profit and loss statements) streamlining all motivations (see quotes). This 'One P&L' approach develops 'one' overall company culture by aligning differing motivations and making everyone think of the bigger picture. Interestingly, this company also suggests that the strong technology/engineering base supports the change-culture. This surprises since one interviewee from Company 8 noted that "many engineers have been with the company for a very long time [...] and they have been laying and building power cables for 30 years, and for them it is now strange that someone is building software that does something with cables", which identifies engineers as change hurdles. Since it has not been covered

in-depth by the interviews, this seemingly inconsistent impact of a dominant engineering base holds potential for future research.

Since no company showed full membership in this lever, also Company 3 has downsides. Namely, some areas are struggling with change (esp. in operations) (see quotes). Specifically, some employees' fear of job loss and a lacking perspective in case of job loss, since they currently occupy positions in power plants that are prospectively no longer needed, remain as reasons for lacking change mindsets in some operative units. Moreover, the industry itself – through external regulations, decisions, and other boundaries – constrains the change-leeway and hence counters employees' emerging change mindset:

> "From the internal [change] readiness there are strong forces, but many external framework conditions [...] cannot be actively shaped. And that is [...] a bit neutralising."
>
> — Company 3

This quote therefore illustrates how not only the company- and employee-level mindsets impact the change mindsets, but also external factors.

Company 4's factors of a change-driven culture have yet to fully develop, but are currently shifting the firm to a change mindset. Indeed, the employees seem generally enthusiastic to shape the future and belief in the company:

> "We have colleagues wanting to contribute in a bottom-up way."
>
> — Company 4

This shows that employees not only accept the need for change but rather like to contribute actively. Yet even beyond such motivation, the culture developed and lives ambidexterity (i.e. living both stability and change) (see quote): employees are becoming willing and capable to alternate between states of change and continuity. This difficult balance seems like a major cultural asset. Nonetheless, issues prevail because personal- and company-level stability mindsets still dominate at least some employees (see quotes). The interviewees indicate two reasons for these partially limited change-mindsets: (a) employees have good, well-paid jobs and fear losing these and (b) the company performs good, so there is little change pressure from shareholders. Yet, facing these limitations, the utility and its employees learn from past successes and a full change mindset is indeed currently establishing (see quote). Consequently, employees take change-successes as

learnings for both how and that change can indeed work, representing the positive counterpart of Company 5's employees becoming change-weary due to failed efforts. Further, Company 4 establishes the aforementioned ambidexterity by allocating 'roles' through embedding change mindsets where they matter and maintaining old mindsets where they do no harm:

> "By [...] creating spaces, where you say 'here is transformational and here is exploitation', people can easier pursue their respective work."
>
> "There are areas on the left or on the right. So, we are talking about core business, new business and new new business - these are the three levels."
>
> — Company 4

The three levels from the second quote show how the firm accepts that a single area cannot be fully geared towards change and continuity simultaneously, and how it thus created different spaces. These spaces (i.e. areas) either deploy change- or stability-oriented staff. Thereby, the company addresses cultural change beyond mere platitudes. Unfortunately, the inept success monitoring of new, forward-looking divisions ('new new business') via short-term profits rather than long-term potential somewhat mars this great strength (see quote). Thus, some change must still follow to fully establish the change mindset lever. Nonetheless, the mindset is shifting towards change and the outlook is even better.

In summary, both companies subscribe to a change-driven mindset and live this ambition. Company 3 benefits from its 'One P&L' by seeing the company as 'interconnected whole' and therefore achieves cultural ambidexterity indirectly from aligning areas' motivations. Company 4 acts reversely by directly pushing ambidexterity through separating its areas and allocating them either a change or stability culture. Yet, both approaches seem to work. Two other aspects supporting change mindsets are harnessing positive experiences from past successful change and using general changes (e.g. carve-outs) to define and establish an agile mindset.

6.2.2 Results for Leadership Mindset (LEAD)

Interestingly, the companies with particularly high/low leadership mindset scores mostly coincide with those having high/low employee mindset scores.

Low LEAD rating

Company 5 indeed undertakes great efforts to establish agile leadership practices, and top management actively promotes and lives this goal (see quotes). Yet, despite these initiatives and top-leadership support, the issue remains that leaders at least partially do understand the need to adapt their style, but lack trust in employees dealing with additional responsibilities in an agile enterprise:

> "There is already resignation in the management team, [...] their own organisation is not trusted to do what is necessary."
>
> — Company 5

Unfortunately, it remains unclear if this absent trust in employees' capabilities is justified – but one might conclude so from the low employee mindset rating (Section 6.2.1). This lacking trust also reflects in LEAD's three sub-dimensions (shared leadership, developing leadership, leadership development), which are insufficiently implemented. Namely, a directive, non-shared leadership dominates; at least below the top management level (see quotes). Especially the middle management's fear to lose their influence is a hurdle to change – hence, top leader role modelling misses its effect. This goes so far that the middle-management decelerates the recent attempt for a reorganisation. The firm tries to overcome this fear by developing its leaders, but they do not practically apply what they learn in such leadership development programmes (see quote). As a consequence, there remains a implementation gap of newly trained leadership practices. The failure to act upon such training finally mirrors in leaders not living their coaching role through developing leadership:

> "When money was flowing, you needed experts, and then you made experts to managers [...]. Yes, but they are not [coaching] leaders and especially now it is more important to have leaders who understand [...] to be role models."
>
> — Company 5

Hence, in stable, successful times, subject matter experts were promoted. Today, though, it shows that they lack increasingly important people and coaching skills.

Company 8 likewise offers central support for agile leadership (see quote). Thus, the underlying issue is not a lacking support for new types of leadership. Rather, leaders do not understand what agility (as reaction to change) is and they see it not as their task to implement this agility:

> "Managers often stick to the 'what' – [...] our CEO has said at least 200 times now at a staff meeting we must become faster – but they lack understanding [...] how the company becomes faster."
>
> — Company 8

Thence, leaders struggle to move from understanding the goal to understanding and starting the journey. Consequently, leaders do not live what they preach and, as they do not role-model, also fail teaching employees the required changes (see quote). Further, leaders leave their employees only insufficient leeway (i.e. also time) for development and, more holistically, the company generally lacks a good approach for developing leadership, wherefore money is spent on development without tailoring measures to employees' individual needs (see quotes). Just as this 'watering can approach' for spending employee development budgets captures the non-tailored employee development approach, the development of leaders (via trainings) is not tailored to unique needs and relies heavily on leaders' often lacking own initiative (see quote). While some leader self-initiative for their development seems important, this becomes problematic if lacking complementary central company support and pressure, which is the case here. Ultimately, like in the previous company, also shared leadership lacks since the leaders do not trust, i.e. they do not live what they preach:

> "And then the supervisor says we must trust the employees more, but at the same time he says he can't abolish this process [...] because then he doesn't know what his employee is doing."
>
> — Company 8

Summarising both companies, leaders that lack trust in their employees' capabilities are reluctant to implement new leadership types and share their power. Therefore, despite existing support for agile leadership, leaders fail applying what they learnt. Also middle management's lacking understanding of agility and the related fear to lose power hinders shared leadership. In addition, some leader positions are occupied by subject matter experts lacking the leadership capabilities required nowadays. Other common problems are that the employee development is not tailored to individual needs and that leaders' development depends only on their own initiative, which is often non-existent.

High LEAD rating

In absence of firms with LEAD 1.0 ratings, two with 0.8 are reviewed subsequently.

Company 3's leaders are open for change, which is also formally/officially defined as part of the wider company culture:

> "When the company was founded [...] the aim was to contribute to bringing about change through values. [...] Change is clearly defined in leadership."
>
> — Company 3

This leadership culture of change could be easily designed 'on the drawing board' because the company was only recently founded as carve-out from another firm. Leaders are expected not to merely sense change but also to act upon change. Unfortunately, lack of funds sometimes constrains real action taking place (see quotes). These financial bottlenecks also result from the company being recently founded and therefore not yet having a nest egg. However, despite this caveat, the LEAD sub-dimensions seem relatively positive. Namely, leaders see themselves as coaches (see quote). Hence, the well-implemented coaching/developing leadership receives positive feedback in company surveys. Likewise, tools for participative/shared leadership are defined and lived (see quote). Yet, despite this decision sharing, major guidelines are still made top-down by the board (see quote). Such centralisation seemingly conflicts with the ambition for authority delegation. Yet, the interviewees limit this board involvement to making 'guidelines', which leaves considerable leeway for delegation. Also developing leadership is expected and formalised via tools; yet some improvement potential remains as it is not really 'enforced' (see quotes). Hence, developing leadership in its current form remains an aspiration rather than a granted leadership element. Considering such difficulties paired with other positive components, an agile leadership mindset exists with some constraints.

Company 14's top leaders have change mindsets and support in developing agility via role modelling. Thence, the overall leadership mindset supports agility:

> "So in this respect I do believe that a [leadership] culture is being set up here that promotes this [agile] thinking."
>
> — Company 14

Still, there remain some leaders that are incapable to live agility – especially the power plant managers which grew up in such a hierarchical world (see quotes). Unfortunately, there is a lack of alternatives for these managers in the labour market – hence, the company must keep them. Coming to the leadership mindset sub-aspects, the often-reported safety

requirements (HSE = Health, Safety, Environment) in operations seem to be no hurdle to shared leadership as the employees are capable to implement the safety requirements even without hierarchical guidance (see quote). Hence, this firm positively distinguishes itself from many peers. Still, some older leaders fear to lose impact and thus fight for their power. This combines with some employees being unwilling or incapable for shared leadership's added responsibilities (see quotes). This illustrates a common issue: some employees are close to retirement and hence unwilling to increase their job's complexity with greater responsibilities. Notwithstanding, many leaders indeed share responsibility where possible and many employees demand this and introduce their suggestions:

> "But [...] when I go through my managers, I am quite satisfied with how [delegating] works."

> "So we have young people who really feel, well, they haven't been given that much responsibility anywhere."

> — Company 14

Also, coaching leadership works well, especially through power plant leads (see quote). Only very few lower-level leaders lose themselves in their perceived lacking received personal development support through their leaders that they in turn 'forget' developing their own employees (see quote).

In conclusion, these two firms show that there is no perfect agile leadership in the sample. Positive examples defined it as part of their culture, receive top-leadership endorsement for agile leadership, are good in coaching and leadership role modelling and have employees demanding shared leadership. Also the safety culture, which is often a hurdle for agile leadership, can be managed. Still, even these firms struggle with e.g. insufficient leadership development or older leaders unwilling to share power.

6.2.3 Results for Strategy (STRA)

Low STRA rating

The STRA lever received high fuzzy-scores, with the exceptions of Company 2 (0.0) and Company 14 (0.2).

Company 2's strategy struggles to become sensing and seizing as it is tied to current assets. Together with a lacking central strategy process, this makes the firm unable to respond flexibly to change:

> "We are asset-oriented [...] and this means we consider flexibility or alternative approaches up to not at all, since the business areas are simply set."
>
> "So, I don't think we have holistic strategic planning in that sense."
>
> — Company 2

These quotes illustrate the severe strategic path dependencies from past investments and the uncoordinated strategising prone to missing changes. This is augmented by the firm being traditional and therefore risk-averse and, resulting from this, having rather an exploitation than an exploration focus (see O'Reilly & Tushman 2013) (see quotes), which severely limits the firm's innovative scope. Both directly reflect in weak sensing capabilities and in difficulties committing to seizing decisions (see quotes). The company therefore traces its difficulties in sensing to missing capabilities in form of methodologies and attributes the resulting difficulties in seizing to a weakness in committing. Interestingly, the firm still excels in taking action as part of seizing that follows after reaching the point of having made a commitment (see quote). Yet, despite this positive factor, the overall strategy lacks agility and strategic flexibility (see quote). The firm is not even open to theoretically consider alternatives to its current business areas or work with strategic scenarios, making it very rigid.

Company 14 also struggles with achieving an agile sensing and seizing strategy. Contrary to other recently established companies who used their 'newness' to define an agile strategy from scratch, this firm failed to do so. Indeed, it has an idea of how to combine change and continuity by involving staff in planning, but it never developed a 'real' holistic strategy with a unique selling point (USP). Rather it defined concepts for its individual sites, which is more of a strategy operationalisation and hence what typically follows after holistic strategy development:

> "We took the sites and thought about 'what can we do with them?' That is due to the shareholder structure and the short-term nature of how we had to ramp up this issue. Of course, I would always give it away and say 'where are we best at and what is our USP, where we are competitive?' So I would roll it all out the other way around."
>
> — Company 14

The interviewee criticises this approach and even argues that the company lacks a holistic strategy due to time- and shareholder-pressure. Beyond that, the shareholder shows no strategic thinking and acts transactionally, demanding short-term gains at the expense of potential long-term success (see quote). This again identifies shareholder priorities as bottleneck. Yet, despite these problems, the company seems good at sensing the industry with experienced personnel and excellent in developing concepts or reactions building on the sensed findings (see quotes). However, seizing these concepts is difficult. On the one hand, the shareholder is again problematic as it lacks proactiveness, reactiveness, and especially decision-willingness (see quote). On the other hand, external pressures and regulations and public opinions conflict with the developed site conversion concepts; and the firm lacks manpower to partly sensing but more severely seizing this change (see quotes). More specifically, the strategic leeway suffers from external regulations of the coal phase-out from the competitive labour market as barriers to improving with the STRA lever.

In summary, Company 14's weakness in STRA differs from Company 2's. While the former still lacks a holistic strategy, the latter must improve with the sub-aspects of strategies and strategising. Both focus conservatively on exploitation due to path dependencies and they have difficulties really committing to seizing opportunities.

High STRA rating

Many companies possess a high STRA rating. Two particularly well positioned ones are outlined below.

Company 12 recently made a strategic acquisition which provided a future-prove strategic portfolio on the power plant side as well as in terms of personnel and which allowed for defining a new, agile strategy (see quotes). Practically, this acquisition enabled the company to take a new strategic direction: generating sustainable energy while leveraging the successful roots. Yet, despite this centralised strategic core, the individual areas are empowered to live their own decentralised sub-strategies:

> "We have [...] a quite decentralised approach, we take the decentralised strategies
> and arrange them [together] in a communicative framework."
>
> — Company 12

Thence, the firm can react agilely to different areas' changes with decentralised sub-strategies integrated into a supportive communicative framework.

The strategy development process is also agile in that there is one large annual planning and regular reviews on small scale – i.e. continuous strategic planning on OpCo-level (see quote). This means that not only, as mentioned before, does the strategy allow for decentralised company area sub-strategies, but also that these areas agilely conduct ongoing strategising. Given this agile strategic setup and since the firm owns both the capabilities for sensing by (1) actively observing the market, following trends, and defining target figures and (2) then translating changes/opportunities into actions and projects, strategic sensing works well – this holds especially for the areas of renewables and decarbonisation (see quotes). After having defined alternative options, the strategy further excels at making the next step from sensing to seizing by having good implementation capabilities, and it has the financial resources for seizing since the capital market is convinced by the company's strategy (see quotes). This implies that the firm has both the capabilities and resources for seizing.

While some activist shareholders are trying to gear the company towards short-term profits, the company is more on a long-term strategic path with long-term asset investments, but also some potentially negative resulting path dependencies (see quotes). Yet, such path dependencies are inevitable in the asset-heavy energy industry, and they are already accounted for in the company's decarbonisation path/strategy, making them less problematic. Overall, this paints a picture of strong strategic agility.

Company 15 successfully used its recent formation to define an agile strategy that is sensing and seizing change. The strategy seems profound as the current and planned portfolio diversification provides strategic flexibility (i.e. make resilient) and the strong core business offers stability:

> "We have a good outlook: in the ten-year strategy, [...] we are aiming in particular at strengthening the core business."

> "We have made a very good step [towards balancing stability and change] in the corporate concept."

> — Company 15

The two quotes therefore show the ambidexterity in form of a good strategic change-and-stability balance. Further, like at the previous company, strategy development happens continuously, in a decentralised manner within the areas and is only centrally coordinated and integrated by the strategy area – this leaves leeway for agile moves (see quotes). Further, the strategy area and also the work with regulators and in associations enable the company to sense change and new framework conditions (see quote). Importantly, the company then also proceeds to develop, anticipate, and consider different outcomes/scenarios from this change and deducts own strategic actions (see quote). Hence, the firm develops alternative scenarios and makes strategy adjustments; however, unlike in many companies, seizing is indeed successful: With the alternative scenarios, the company requires no unstructured ad hoc reactions when initially preferred options fail. This flexibility makes the transformation strategy not a mere 'nice plan', but the firm implements this strategy at remarkable speed. Thus, the company possesses flexibility from strategic alternatives and this flexibility allows for fast strategic seizing (see quotes). Also, the new municipal shareholders support seizing the long-term strategy since they prefer long-term decarbonisation success over short-term financial profit. The only potential downside is that such long-term projects and commitments might also be considered as hurdle for agile strategic moves (see quotes). Yet, as shown earlier, Company 15's general change-and-stability balance offers enough flexibility despite some longer commitment.

Interestingly, both firms leveraged a recent reorganisation to define an agile strategy. While Company 12 made a large acquisition that changed its business focus, Company 15 was established only recently by being carved out from a larger utility. Similar reorganisations happened at Companies 1 and 3, which also have a 1.0 STRA rating. However, there are also companies with a 1.0 score lacking such radical structural changes, as well as Company 14, which failed to use its recent formation to define an agile strategy (Section 6.2.3). Still, organisational reorganisation might present an opportunity for a new agile strategy. Further, both firms with high STRA score define decentralised area sub-strategies and they excel at moving from sensing to seizing by making real commitments to change and at taking action. They also possess strategic ambidexterity to be nimble while still satisfying the energy industry's requirement for long-term investments and planning.

6.2.4   Results for Technology (TECH)

Technology in this industry was found to relate to assets (like power plants, wind farms, or energy grids) and IT.

Low TECH rating

Companies with low TECH rating were abundant, though Company 14 was the only company with a 0.0 score.

Company 14 remains too preoccupied with mastering the technology and digitalisation basics to move to more innovative, cutting-edge IT and asset technologies:

> "There is so much digitalisation demand, but we lack any of that, or we are not even in the process yet of somehow bringing batteries into it and so on [...]. We are still at the basics, and that is conventional power plant technology."
>
> — Company 14

This quote criticises that current technical efforts focus on old technologies and indirectly reveals there is a long way to go to be on top of the industry's technological development. This problem relates closely to the strong path dependencies caused by the company owners' imperative to maintain the current energy assets and business (see quote). This entails two interrelated hurdles: (a) the old inflexible asset technology and (b) the investors forcing to continue with these assets. However, the company seems eager to develop theoretical concepts to break these dependencies (see quote). Specifically, it already developed projects to convert the coal-fired plants to renewable fuels. Unfortunately, the path to implementing these projects and hence to make the company asset portfolio future-ready is still long (see quote).

Alongside the asset technology, the company is also struggling with IT. Its SAP environment is so complex that any change in the company, its structure, and technology leads to a huge effort and is anything but agile:

> "[SAP] is deeply integrated in the entire firm, so it really takes years [...] to make changes, yes, to make carve-outs, to integrate new company parts."
>
> "I've learnt one thing in the past 5 yrs., 'SAP is a scourge of modern firms'."
>
> — Company 14

Especially the memorable second quote from the company CEO indicates the strong constrains from the old, inflexible SAP environment. The lack of experts to introduce and maintain newer systems and software further manifests this issue (see quote). Specifically, this relates to two shortages: (a) qualified IT experts for the IT department and (b) IT affine employees in the business to adapt this IT. Consequently, the company remains a mere IT adapter (i.e. no IT innovation driver) due to lacking in-house competences (see quote).

Company 10 is struggling with any change and hence also with new assets – mostly as many employees operating old assets are used to these assets and the related technology (see quotes). These often long-serving workers prefer stability in the technologies they have used over decades. While the firm can indeed extend its existing power-producing assets with new, smaller assets to create virtual power plants – meaning only little change for the old, large assets – the firm's strong path dependencies from large assets make quick, fundamental shifts in the technology focus impossible (see quotes). Such historically grown assets and the fact that quick divestments seem like no option for this firm are therefore key difficulties. In contrast to struggles with older assets, new assets are developed by change-driven employees in a separate entity – this spilt allows for partly developing new assets despite the overall company inertia (see quotes). Hence, while struggling with old assets, at least a move into new assets takes place, building on a younger workforce.

Still, also the overall digitalisation (IT) aspect is difficult. Many workers personally prefer continuity and hence like to continue with their old IT systems which they have used for decades (see quotes). This demonstrates employees' emotional attachments to the old systems. However, IT changes are also rationally challenging due to the complex, rigid IT landscape. This means that changing one sub-system requires changing all related processes which have been optimised for efficiency over decades:

> "Try pulling out a noodle while cooking spaghetti. You won't succeed [...]. And our IT systems are similar. [...] You can't just say 'I'm going to use an [SAP S/4] HANA application for this area', because the interfaces to reporting, controlling and treasury systems are so complex."
>
> — Company 10

This analogy to cooking spaghetti explains how difficult it is to change only one part of the system landscape. Accordingly, while COVID-19 helped convincing employees of

'easy' digitalisation – like virtual meetings – there remains a long way to establish new IT landscapes and use all collected asset data to improve agility (see quotes). This in particular illustrates how little the potential of digitalisation is being tapped.

Overall, both firms suffer from technological path dependencies since investors are keen to maintain the existing plants and older employees prefer continuing to operate these plants unchanged. One firm developed conversion concepts to break these dependencies, but still has a long way to implementation. Both firms are struggling with IT as they lack qualified IT staff and capable users. Further, their old SAP environments make changes to subsystems overly complicated and complex.

High TECH rating

Company 1 considers technology (incl. IT) as absolute key to its pursuit of agility – up to the degree that technology drives the strategy towards agility:

> "I just think that our technological change [...] is going so fast that the strategy has difficulty following in parts."
>
> — Company 1

That strategy is under pressure from agile technology is interesting, as in most companies, technology became agile at the earliest with some delay after a clear strategic change. Contrary to firms with a low TECH score, Company 1's employees understand the importance of technology and IT and are intrinsically committed to apply it. This even applies to employees in the operational units, who are usually a barrier to technological innovation (see quotes). Such combination of understanding technological change and willingness to use the technology is therefore rare. Some employees struggle with actually implementing and using the technology (capability bottleneck) – but this seems to relate a minority (see quote). Despite one example of IT slowing down the integration of a new acquisition, there are many recent IT introduction successes (see quotes). This further improved during COVID-19, where the employees mastered collaboration tools like Microsoft Teams or Miro; and this positive technological development continues.

Company 9 partly struggles with (asset-)technology development's sheer speed, but nonetheless, it has already achieved an understanding and acceptance for changing existing technologies and adopting new technology/assets:

> "The speed of change with which, e.g. new technologies enter the market is not a linear function, but exponential, and I think we underestimate this speed, [...] so there is a need for improvement."

> "We know, though, that we can't continue with our current technology, [...] but will have to work on new technologies, e.g. in energy and heat supply."

> — Company 9

Quote 2 shows that the problems from rapid technological change (quote 1) are understood and worked on. While the long asset investment cycles and the overall asset-heavy portfolio led to some path dependencies, the company partly breaks these dependencies by divesting unwanted assets (see quotes). Especially the apparent ease to sell old technology assets protrudes, since other firms reported struggles finding buyers for unwanted assets. That gives this company great technology leeway.

Moving to the IT-side, people are open to use new IT – latest after fully understanding its benefits and how it simplifies their daily life:

> "With new [IT] updates, systems and so on, one hopes that this will somehow make one's own work easier. Exactly, and yes, that is quite well accepted."

> — Company 9

This quote shows that employees in Company 9, contrary to e.g. Company 14, see the benefits of new IT rather than shying away from related challenges. Successful past IT(-system) introductions make the people even more open for future IT additions (see quote). Employees therefore thrive from a certain positive experience effect. This drive for new IT is formally supported by a strong IT department (see quote). A strong IT support also distinguishes Company 9 from firms with low TECH score, which lack good IT personnel. Yet, despite this overall strongly positive impression of the asset- and IT-technology lever, there exist also negative/failed examples of IT projects/introductions (see quotes). Still, despite few negative instances of IT projects, Company 9's overall technological impression justifies a 1.0 score.

In summary, dominant factors for mastering the TECH lever are the abilities to divest path dependencies, to invest in new energy assets, and employees that understand as well as accept the need for new IT, assets, related changes, and that are intrinsically motivated to drive technology introductions. A capable IT department and positive past experiences are also critical for future projects.

6.2.5   Results for Linkages (LINK)

Low LINK rating

No very low ratings were found. Hence, two firms with 0.4 are being reviewed.

Company 5's LINK lever seems mixed. External linkages are rather long-term and stable, leaving little leeway for new agile linkages:

> "[External linkages are] long term. [...] Little is created in the short term – if anything
> – it's always [...] long-term ventures or initiatives being pursued."
>
> — Company 5

Hence, there is an incapability to agilely establish new linkages. Yet, much like a company with a high LINK score, the company is able to combine formal and informal (trust-based) connections depending on the optimal situation for each individual linkage (see quote). Specifically, for association work, linkages are trust-based, whereas elsewhere they are more formal. Yet, unfortunately, there are insufficient external linkages overall, due to a 'make it in-house preference', but this is slightly improving (see quote). Indeed, there are already strong external linkages for developing new topics and despite its apparent weaknesses with linkages, the company is well connected in its home region (see quotes). Consequently, the company attaches great importance to its home region and having a strong presence there. In return, however, the company lost its former political influence outside its home region:

> "We used to be very strong [in lobbying], but we have cut back considerably. [...] We
> were first movers on draft laws and tried to coordinate that. But it feels like we've
> taken a step backwards. We no longer play such a big role."
>
> — Company 5

The interviewee even seems resigned that his company has given up its ambitions for a larger national role that it was about to achieve.

Furthermore, internal linkages worsened during COVID-19, as virtual meeting formats are less conducive to informal exchange (see quotes). Aside from this concrete COVID-19 effect, it was noted that the company's steering via individual divisional KPIs (Key Performance Indicators) counters internal linkages (see quote). This critique of decentralised KPIs is interesting, as it was found for the STRA lever to be advantageous if

divisions develop relatively independently. Thus, such strategic independence appears to be at the expense of internal linkages. In summary, while there are positive and negative sub-aspects of external linkages, the firm strongly struggles with internal linkages.

Company 13 partly struggles with internal linkages because some areas cooperate and exchange insufficiently, and because the German employees partially lack the English-speaking capabilities to cooperate with their international colleagues (see quotes). However, both these limitations were described mostly as challenge for cross-company linkages with business units outside of Germany. Indeed, the company supports national internal linkages with programmes, development courses, and even a new centralised office building bringing people together. By providing people these diverse cross-divisional touchpoints, it achieved good internal linkages across the business units (see quotes). Hence, the limitations of internal linkages do not concern purely German entities. Unfortunately, the story is less positive for external linkages. These are often limited by regulations like unbundling rules, which also means that external linkages must be formalised, making them less nimble:

> "Externally, I would probably say that we are limited by regulations and legislation, so that we are at two [out of five]."

> "No, almost everything is contract-based with us. So, it has to be contract-based, [...] because that's how we are regulated."

> — Company 13

This limited leeway makes the company also careful when considering new external linkages, which results in slow formation of, and learning from linkages (see quote). While an initial assessment prior to establishing larger linkages is normal, the company described it as 'time-consuming', which seems like criticism. Due to this carefulness, due to the assets' long life cycles, and to mitigate/hedge risks, the company builds on long-term linkages with old customers and networks. Consequently, new topics are hardly addressed and potentials might be missed:

> "We always rely very heavily on long-term or old customers and old networks, and try less to address new topics, perhaps with new ideas, new models."

> "That's [...] also since we [...] always try to hedge risks. [...] And that's why we tend to rely on long-term partnership and relationships."

> — Company 13

An indirect consequence from all this seem to be inconsistently good external linkages across the company (see quote). This issue makes a company-wide alignment difficult. The only positive aspect regarding external linkages are good political linkages (which appears interesting, because these external connections were precisely Company 5's weak point) (see quote). The interviewees trace the strength in political linkages to the sheer necessity to deal with many regulations. Nonetheless, in summary, internal linkages seem to rather support agility here, whereas external linkages are a major challenge.

Across both companies struggling with linkages, the inability to quickly form new external linkages is central. Further, external unbundling regulations limit external linkages. Separate division KPIs hamper internal cooperation. Further, both COVID-19, which led to less informal exchange, as well as insufficient English-speaking capabilities hurt internal linkages.

High LINK rating

Company 3 has very strong internal and external linkages which it leverages for agility. Namely, it has external linkages for innovation, to develop new markets, and to broaden its impact on the value chain:

> "We rely on clear cooperation with partners, because you can't do things on your own, so we try to cover the entire value chain."

> "We cooperate closely with start-ups on the innovation side and [...] provide seed funding for completely new things."

> — Company 3

These quotes show the broad external linkage focus. Especially cooperating with start-ups (quote 2) offers valuable capabilities unavailable in traditional large enterprises. Furthermore, the company is strong at lobbying to deal with 'negative' regulatory developments (see quote). An objective is to establish a relationship with politicians to prevent such disadvantageous regulatory developments. In reciprocation, politicians also consult the company for its expertise. Important are also linkages with OEMs (original equipment manufacturers) to experiment, which give the company a competitive technology edge (see quote). With this 'Lead Engine Concept', joint innovation results in preferential treatment through these suppliers. The resulting lead ('years') seems enormous. The firm is further good at balancing situational vs. long-term and formal vs. informal external

linkages (see quotes). In other words, the firm (1) relies on long-term linkages while also establishing new linkages when short-term requirements demand this, and (2) mostly uses formal linkages, but also has informal, flexible linkages. This balance offers strategic and operative leeway.

Also internally, the firm is well connected (driven by having only one P&L) – COVID-19 hurt this exchange, but different exchange formats counter that problem (see quotes). In more detail, this 'One P&L' creates a joint target and mitigates uncoordinated silo thinking. Still, COVID-19 made internal exchange more difficult, potentially due to fewer in-person encounters; but this remains unspecified. Fortunately, the company makes efforts to counter this negative development. In conclusion, the company is exceptionally well externally connected, while it recently faces minor issues with its traditionally great internal linkages – but it actively improves this.

Company 4's LINK lever seems conducive to agility. Broad external linkages are used for innovation, learning, sensing/seizing, and to impact regulation and politics (see quotes). This broad focus of external linkages and the impact on regulations via political linkages mirrors Company 3. In fact, linkages' strategic impact on sensing and seizing seems even more concrete here. Only the external linkages beyond Germany require improvement (see quotes). This shortcoming endangers the company from overlooking new potential competitors. More positively, the firm has both long-term external linkages building on trust, and short-term linkages to agilely react to new topics. Further, the core business' external linkages are formal to have a stable base, those for new topics build rather on trust:

> "There are partnerships that were formed years ago and remain super-stable because a certain trust-basis has established [...]. Then there are others that come through new themes, trends, so with 'let's have a look in there'."

> "In the core business they are very formal, VERY formal. [...] In new business, they are very much trust-based."

> — Company 4

This balance of long- with short-term external linkages and formal with informal linkages again mirrors Company 3's strength.

In contrast, while Company 3 internally relied on its 'One P&L' idea, Company 4 has no such comprehensive concept for internal linkages. Still, the need to be internally connected is understood and good internal networks exist:

> "The [internal linkages] also work really well, even across the hierarchies. [...] This also works across completely different business areas."
>
> — Company 4

But there are some limitations with really implementing internal linkages (see quote). Namely, the operational areas sometimes do not engage in sufficient exchange at the working level. However, these areas are partly so unique that they lack a linkage-counterpart relevant for an exchange.

In summary, despite their partially different degree of institutionalising internal linkages (especially Company 3's One P&L-concept seems well-suited to align internal motivations and cooperation), both companies are similar in their linkage approach. They have many diverse external linkages to broaden the political impact and cooperate with suppliers for preferred technology access. Further, they balance informal vs. formal and situational vs. long-term linkages.

6.2.6 Results for Structures (STRU)

The STRU lever resulted in very diverse scores, with more negative examples.

Low STRU rating

Company 8 lacks decentralised structures and enabling bureaucracy. Specifically, it has a rare negative combination of (1) centralised, hierarchical, formalised structures where top-leaders make most decisions (leading to slow decisions) with (2) silo-like structures with only limited interaction among the business units:

> "I just saw an escalation matrix today with five silos of 10 levels each up to one executive. And if every [...] decision must go through such a matrix, then I'm not talking about a two-week decision-making horizon, but two months."
>
> "The implementation is more of a silo thing that we have. So when we must implement something [...] at the working level it is very difficult. You must bring everything together somehow, but it doesn't really work."
>
> — Company 8

This manifestation – i.e. both a restrictive centralisation and disturbing decentralisation – seems like combining two aspects that should be mutually exclusive but apparently

are not. Especially the second aspect also reflects in lacking cross-functional teams and agile project setups (see quotes). These struggles with projects setups emerge from rigid budgeting processes. Given these limitations, only the innovation department and some projects' implementations seem to work successfully decentrally (see quotes). Namely, project implementation has a supportive bottom-up drive, as the department heads have decision-making power. Still, the STRU lever is covered by mostly negative aspects, as also enabling bureaucracy seems hardly implemented:

> "Bonus systems, e.g. extrinsic motivation, haven't played a major role [...] as we are in a good position in terms of basic pay due to the collective agreement."

> "Otherwise, I have not seen anything like that [enabling bureaucracy]."

> — Company 8

These quotes show that there is no meaningful financial steering and also beyond that no mechanisms to drive employees' motivation indirectly (i.e. not via command-and-order). Thus, the potential to compensate negative formal aspects of the STRU lever with more informal enabling bureaucracy is missed.

Company 13 also lacks decentralised structures and enabling bureaucracies. It is hierarchical out of tradition and due to regulations, which slows down decisions:

> "You must specify things so that they're also legally accepted [...]. It's not easy to break this hierarchy. All must be traceable, laid down in [...] regulations or agreements and so on, and that's why it's sometimes relatively difficult."

> "It's difficult for us to completely break this up overnight because it has been growing for such a long time."

> "We are quite centrally controlled, so I would say rather."

> — Company 13

While the first quote shows how formalised structures (regulations or agreements) result in hard-to-break hierarchies, the second quote traces this to the long company tradition. The third quote again illustrates decision-making power centralisation at the company's headquarters. The firm has indeed formal DoAs (Delegation of Authorities) that give clarity on authorities and hence could support quick decisions (see quotes). Unfortunately, these DoAs fail to decentralise decision-making power because the financial thresholds for delegating decision are too low. Interestingly, like Company 8, also Company 13 suffers from silos and insufficient coordination despite its decision centralisation

(see quotes). This confirms the finding from Company 8: The undesirable byproducts of decision centralisation and decentralised structural silos lead to insufficient coordination and are not mutually exclusive. Interestingly, these silos positively enable divisions to address different challenges independently. Still, the overall formal structure seems simply too complex to approach complex changes in the current business environment (see quote). Furthermore, no enabling bureaucracy is implemented to mitigate this. The firm abandoned motivating financial incentives for 'normal' employees and the implemented incentives for leaders do not work (see quotes). Moreover, despite the ambition to steer employees indirectly with cross-functional exchange, the company mostly lacks cross-functional teams to meet this ambition. Also beyond that, there seems no meaningful enabling bureaucracy:

> "There are cross-functional teams, but probably fewer in principle [...]. So there is definitely still a big gap."

> "The good old 'cash and cars' is still there, and of course you can distribute points in annual reviews, but what is really measurable is the bonus payment. So it's really difficult for me to observe any other incentivisation."
>
> — Company 13

The second quote even seems resigned to the fact that there is no informal bureaucracy other than financial incentives. And, as already pointed out, even financial incentives are either non-existent or inappropriate at this company.

In summary, both companies with a low STRU score are similar. They lack enabling bureaucracy and suffer from an unexpected combination of rigid decision centralisation and decentralised operational silos which prevent coordination. The latter could offer the benefit of agile, independent strategic moves, but this is impossible as the decision centralisation slows the areas down. The potential to appropriately use DoAs to allocate decision authority is also missed in both cases.

High STRU rating

Since no companies with 1.0 rating were identified, two firms with 0.8 follow.

Company 4 has a good decentralisation of structures and decision power, as the different business areas have very different business focuses – this leaves the operational business great agile leeway:

"It is relatively decentralised as these businesses are extremely different."

"[The board] wants to be informed, but often, in a lot of decisions, for example when we start a company, the board is not involved."

— Company 4

Hence, in contrast to the firms with low STRU ratings, power is decentralised. Yet, in few instances, employees are struggling to live this decentralisation and thus bring decisions to the board, even though the board prefers self-sufficient decisions (see quote). In these instances, employees themselves, rather than the leaders, are struggling with decentralising decisions. To solve this, decentralisation is supported by some centralised elements and areas that offer but do not enforce their support (see quote). As a result, some centralised aspects help where the decentralised units lack capabilities. While silos still exist that prevent end-to-end process thinking, the firm is working against this and is indeed developing cross-area interaction:

"There are still these classic corporate diseases: Silo, not-invented-here, and so on. But you will always have that."

"Formats [are] deliberately found to create spaces outside the silo. There are Common Grounds, Green Fields [...], where everyone can work outside."

"We've a great information flow. It's not [...] 'let's see if it reaches everyone', but there is an app, there is an / everyone gets the information they need."

— Company 4

While the first quote criticises the partly remaining silos, the second describes the efforts to break these silos and the third shows the resulting great information flow across and along the structures. Further, financial incentives exist, but like the firms with a low STRU score, mostly on leadership level (see quote). Therefore, variable remuneration still requires a bigger role outside of management positions. Also beyond that, there exist no enabling bureaucracies (see quote). In summary, the decentralised structure is well implemented, but the company struggles supplementing that with good informal structures (enabling bureaucracy). However, this appears less relevant since this informal structure seems not necessary in this case to achieve agile decentralised structures.

Company 5 has a new structure along its business units:

> "We have just completed a major reorganisation project. We have positioned our-
> selves internally along business areas to be able to act faster."
>
> — Company 5

As the areas have more own competences now, they no longer rely strongly on cen-
tral functional support. This is achieved via legally separate areas. As a result, areas
are now independent enough to make their own quick decisions as nimble business units.
However, this independence also creates silos which hamper coordination where a co-
ordinated cross-area value chain perspective would be required (see quotes). The firm
is currently successfully bridging these silos, e.g. by establishing cross-functional teams,
but still struggles with conflicting salary structures which are rigidly regulated by Ger-
man works councils (see quotes). This could qualify for further research in the German
context. Interestingly, despite the decentralisation, the major company decisions remain
centralised, leading to slower main decisions (see quote). Thus, the company can itself
not fully life up to its decentralisation ambition. Informal bureaucracy seems underde-
veloped and unable to solve the remaining struggles. There is no financial incentive for
employees and also beyond that, the firm lacks further such motivation-steering structure:

> "Bonus systems, [...] target systems, we have at the management level, [...] apart
> from sales and consulting [...] there is nothing at employee level."
>
> "What I want [...] is exactly such informal structures, to promote and use them. So
> the people around me [...], to offer them the framework [...] to be able to use exactly
> that, to do their work better, to network."
>
> — Company 5

While the lack of enabling bureaucracy paints a final negative picture of the STRU
lever in this company, a positive score still seems justified given the mentioned recent
reorganisation, which strongly supports structural agility.

In summary, both companies with high STRU scores possess decentralised structures,
support for cross-company teams, but also some structural barriers to agility. They only
have 0.8 scores – the missing enabling bureaucracy, especially lacking incentivising on
employee-level, could be an explanation for not achieving 1.0 scores

6.2.7 Results for Agility

For agility, only one company was rated 0.0 and one 1.0, wherefore two further companies rated 0.2 respectively 0.8 are described below.

Low Agility rating

Company 5's problems start with lacking a joint understanding of agility (see quote). Developing a company-wide agility concept becomes impossible without such a shared understanding. Indeed, the firm wants to have the agile balance of change and continuity, but it fails really committing to change – partly as its owners' priorities conflict. This means that the firm is slow in reacting to change:

> "We realise that we have to deal with [change] more, we try to achieve a balance, an ambidexterity."

> "At strategic level, at business level, [change to react to] was known long before [...], there were initiatives dealing with it, but converting the concrete operative business to deal with it, [...] that's bad."

> "We're mainly municipally owned, [...] on the other hand we've a financial investor. [...] It's hard to say if there are always congruent goals [...]. This alone triggers discussions on how quickly we can address certain changes."
>
> — Company 5

Hence, the sheer awareness and sensing of change does not lead to the capability to deal with it (quote 2), and the third quote traces this incapability to conflicting goals among the owners. Moreover, just as the firm is unable to deal with change reactively, it is also unable to proactively drive industry-wide change. But it embraces this fact and instead focuses on developing niches through spin-offs (see quotes). Thus, the firm approaches its missing capabilities by pursuing a focused differentiation strategy as per Porter (1980). But despite its benefits, this niche offers only smaller overall revenues.

The firm also has a good balance of leveraging existing business for short-term profit, while giving new business the leeway to develop and deliver in the long run (see quotes). Yet, despite such positive aspects, the company lacks the courage to adopt a new face/structure in light of change and only partly mitigates this by externalising change via spin-offs/start-ups (see quotes). This means that the company balks at real change to operations and has even accepted complete failure to implement this change within the core group. If anything takes place, it is only in spin-off companies to escape the rigid corporate cage.

Company 8 understood the change need and even established a dedicated department and individual incubators (central innovation department and decentralised innovation managers) to drive proactive change (see quotes). This shows the ambition to be agile, but the firm retains a gap between understanding this ambition and broadly acting upon it by really living agile:

> "There is just a lacking commitment between aspiration and reality, where also resources are behind, and people allowed to do certain things."
>
> — Company 8

This inability to live what has been understood mirrors Company 5. It occurs since the internal environment impedes agility. Processes are delayed and the company is slow to change and decide because people fear for their jobs, and there prevail inflexibility and lacking resources, commitment, and improvement spirit (see quotes). As a result, employees stop agility if they expect negative effects on themselves. All this leads indirectly to slow decisions. Yet, interestingly, contrary to other firms, the operational business is relatively good with change; still, the management is cautious and not proactive in implementing change (see quotes). Hence, like in other companies, management supports agility; yet, unlike in most companies, operations is also open to change, but then held back by the management's passivity for real action. If at all, change happens via externalising it to consultancies, which takes motivation for change away from internal employees (see quote). This illustrates that the company lacks trust in its employees to drive agility forward.

Ultimately, both companies with low agility scores are comparable in recognising the need for agility, but then lacking the courage to implement radical changes. Hence, they are slow to react and not proactive in driving industry change. They implement agility only by externalising activities to consultancies or by establishing spin-offs for new topics. Thus, they have no trust in their employees.

High Agility rating

Company 9 lacks a consistent, company-wide level of agility. But it is agile where it really matters – i.e. it has areas focusing on the present (esp. areas with supply obligation) and others focusing on the future:

> "There are many islands where [agility] is already very much lived. On the other hand, they remain in this structure, which is also hierarchical. So it always depends a bit on that."

> "Our strategy must [...] tap into long-term success potentials while simultaneously defending existing short- and medium-term success potentials."
>
> — Company 9

Even though the second quote cannot perfectly reflect this agile dual focus on change and continuity, the presence of this ability emerged as strong impression throughout the interview. Further, while the company sees itself as too small to be national champion of change, it became a strong, proactive regional change driver (see quote). Therefore, the company understands its limitations and mitigates them by giving itself a proactive regional focus. This changeability is facilitated by external pressure in form of political and social events and internal motivation via strategy and projects (see quote).

Moving from proactiveness to reactiveness, the company excels at identifying required changes, but when it comes to fully committing to reacting, struggles at times (see quotes). But despite this partial struggle, the responsiveness ultimately prevails because the company has the necessary skills, tools, and procedures. In this area, the company is learning from its past successful transformation programme:

> "The monitoring works well, legal requirements, etc. are implemented. [...] We're already reacting and maybe sometimes ahead of other energy suppliers."

> "We already had a transformation programme, [...] which we implemented very well, from a financial point of view, but also from a cultural point of view [...]."
>
> — Company 9

Such positive experience provides a unique drive to pursue agility – especially compared to other companies, whose employees have grown weary of failed change programmes. For instance, in Company 5 an interviewee stated: "because there have been too many initiatives that have not worked, [...] people are tired of change."

Company 15 is also agile. After its carve-out and subsequent merger, it achieved greater attention to the business, faster decision paths, flatter hierarchies, and new/young people with start-up mindset joining the company (see quotes). Aside from these benefits from the recent reorganisation, the company size seems suitable to be agile (i.e. neither too small nor too big), which combines with a good portfolio diversification:

"Due to our size [which is no longer too big after the carve-out] and the certain diversity that we already have in our portfolio, but which will increase in the future, we are relatively well positioned."

— Company 15

This quote reveals that the overall company setup is well designed for agility. Further, there exists a clear strategic path for the company purpose and portfolio to become agile – i.e. a dedicated theoretical concept for the transformation:

"We have the transformation plan that we are preparing for right now, which then determines what [is] the big theme that we will do in the coming year."

— Company 15

This transformation plan shows that the organisation understood the theory behind agility. Practically, this means that the firm is successfully and proactively driving industry change within its narrow specialist area – i.e. does not get lost in the unachievable aspiration to be the forerunner for everything (see quote). With this proactiveness targeting specific areas, this firm acts similar to Company 9. Moreover, besides this proactiveness, reactiveness is also good, as the firm considers reactions on all time-horizons and reacts quickly (see quote). This means, the company successfully takes into account potential changes on three time horizons (short-, medium- and long-term). Nonetheless, some employees are still surprised and unprepared facing the current speed of change (see quote). Yet, the interviewees limit that inability to only 'some' people in the organisation. Another agility hurdle is that the business' core – i.e. district heating and energy production with large, inflexible assets – was historically very stable, meaning the company faces difficulties when trying to transform (see quote). Yet, exactly this issue is being addressed by the aforementioned transformation path and should hence be manageable in the longer run. Thus, the company as a whole seems indeed agile.

In summary, both utilities with high agility scores are comparable in that they have successfully focused on proactiveness and innovation in a confined area. They have good reactiveness and defined conceptual transformation plans that solve their dependency on large, rigid assets in the long run. Further, they have developed a toolkit for dealing with both change and stability.

6.3   fsQCA Results

This section switches from the qualitative analysis to the resulting fuzzy-values by using these to conduct an fsQCA. Hence, in contrast to the previous section, this section will be quantitative-*like*. This will, amongst others, show whether it really 'matters' if a company has a high or low score on a lever. In the first instance, the necessary and sufficient levers-(combinations) are identified, but since "the role of each element is not fixed but may change across multiple configurations depending on its interdependencies with other elements in the configurations" (Park et al. 2020, p. 1499), also the potential filtering effect of CULT and LEAD is reviewed.

Since this is recommended as best practice, the author initially performed a csQCA (see e.g. Ragin 2008) by transforming all fuzzy-values > 0.5 to 1 and < 0.5 to 0. However, the results were significantly more complex, less parsimonious, and often even counterintuitive compared to the elegant fsQCA results. This certainly results from csQCA's boolean variables obscuring the subtleties of agility and agility levers. Therefore, the focus is subsequently exclusively on the fsQCA.

6.3.1   Necessary Levers

Before initiating the analysis of sufficiency by constructing the truth table, it is recommended to investigate individual levers' necessity (Ragin & Rihoux 2009). This means determining levers that must be part of the solution and, if they are eliminated by the fsQCA algorithm, should be added back. Table 6.3 shows the outcome, where '∼' marks the absence of an aspect. The consistency column displays the degree to which a lever is necessary for the outcome to occur. To identify the relevant aspects, Crilly et al. (2012) recommend finding a natural cut-off point visible in the consistency scores' distribution. In this case, a large gap prevails between the consistency scores of 0.88 and 0.76. Thus, the cut-off is set to $\geqslant 0.85$. For agility, two necessary levers emerge: the presence of STRA and LINK. Likewise, for non-agility, two necessary levers emerge: the absence of CULT and LEAD. While the consistencies for the presence of STRA (0.98) respectively the absence of CULT (0.97) are so close to 1.00 that these levers must without doubt be part of every configuration for agility respectively non-agility, the evidence for the presence of LINK (0.93) and absence of LEAD (0.88) is somewhat lower. Hence, for the latter

two there is more leeway to challenge/explore whether they must be really part of every configuration leading to the outcome. All this is considered in the next analysis step.

TABLE 6.3: Necessary Levers for Agility and Non-Agility

	Agility			non-Agility	
	Consistency	Coverage		Consistency	Coverage
CULT	0.61	0.96	CULT	0.35	0.46
LEAD	0.68	0.88	LEAD	0.59	0.63
STRA	**0.98***	0.68	STRA	0.76	0.44
TECH	0.71	0.74	TECH	0.68	0.59
LINK	**0.93***	0.76	LINK	0.76	0.52
STRU	0.71	0.78	STRU	0.71	0.65
~CULT	0.66	0.55	~CULT	**0.97***	0.67
~LEAD	0.71	0.67	~LEAD	**0.88***	0.70
~STRA	0.20	0.50	~STRA	0.44	0.94
~TECH	0.61	0.69	~TECH	0.71	0.67
~LINK	0.41	0.68	~LINK	0.65	0.88
~STRU	0.68	0.74	~STRU	0.76	0.68

Comment: Numbers with asterisks mark necessary levers (consistency $\geqslant 0.85$)

6.3.2 Truth Table

This research then applied Ragin & Rihoux's (2009) standardised fsQCA process. It first inserted the fuzzy-values into a 'raw data table' (Table 6.2) and then performed the fsQCA using fsQCA3.1b. This tool develops a 'truth table' where each line represents one of 2^l feasible configurations (l = number of levers) and states the consistency/degree with which the firms within this configuration are agile in the investigation of agility, respectively non-agile in the investigation of non-agility. Thus, the truth table lists all logically possible causal condition combinations and the empirical outcome ascribed to each configuration (Ragin & Rihoux 2009).

From all feasible configurations, these represented by at least one firm in the dataset are included in the analysis (i.e. frequency threshold = 1) and kept in the truth table, as Ragin & Rihoux (2009) recommend for intermediate-N fsQCAs with appropriate case-knowledge. By testing the following statement, these configurations are then recoded as to

whether they lead to agility: Membership in this lever combination c is with a consistency threshold of $\geqslant 85\%$ sufficient for agility A (i.e. $c \in A$) – a threshold imposing even higher standards on the model than other sources (Ragin & Rihoux 2009). To identify paths towards non-agility, the tested statement is: Membership in this lever combination c is with a consistency threshold of $\geqslant 85\%$ sufficient for non-agility $\bar{A}$ (i.e. $c \in \bar{A}$). Consistency thus concerns the degree to which all firms with similar levers (i.e. one configuration) are similarly (non-)agile (Ragin 2006). After manually coding configurations meeting the threshold as 1 and the others as 0 in the column 'raw consistency', the fsQCA algorithm ignores these coded as 0 for the remaining analysis. Table 6.4 presents the final truth table for agility, where the grey lines are ignored in the further analysis as they do not meet the threshold. Table 6.5 does the same for non-agility, which results in new scores where a high raw consistency indicates non-agility.

TABLE 6.4: fsQCA Truth Table for Agility (Incl. Structures)

CULT	LEAD	STRA	TECH	LINK	STRU	Agility	Raw cons.	Cases
0	1	1	1	1	0	1	1	Company 6
0	1	1	1	1	1	1	1	Company 3
1	1	1	1	1	0	1	1	Company 1
1	0	1	1	0	1	1	1	Company 4
1	1	1	0	1	1	1	1	Company 12
1	0	1	1	1	1	1	1	Company 15
1	1	1	1	1	1	1	1	Company 9
0	0	1	0	1	0	1	0.94	Company 11
0	1	1	0	1	0	1	0.93	Company 10
0	0	1	0	0	0	1	0.92	Company 13
0	0	1	1	1	0	1	0.89	Company 7
0	1	0	0	0	0	0	0.78	Company 14
0	0	1	1	0	0	0	0.77	Company 8
0	0	1	1	0	1	0	0.73	Company 5
0	0	0	0	1	1	0	0.67	Company 2

Comment: Only the black lines meet the consistency threshold (consistency $\geqslant 0.85$)

Truth tables were also constructed for the model variation without the STRU lever (Appendix Tables B.6 and B.7). Three things became evident when constructing the truth tables.

(1) Not all possible configurations were covered by observed cases. This is, however,

TABLE 6.5: fsQCA Truth Table for Non-Agility (Incl. Structures)

CULT	LEAD	STRA	TECH	LINK	STRU	~Agility	Raw cons.	Cases
0	1	0	0	0	0	1	1	Company 14
0	0	1	1	0	0	1	1	Company 8
0	0	0	0	1	1	1	1	Company 2
0	1	1	0	1	0	1	0.93	Company 10
0	0	1	0	0	0	1	0.92	Company 13
0	0	1	1	0	1	1	0.91	Company 5
0	0	1	0	1	0	1	0.89	Company 11
0	0	1	1	1	0	0	0.84	Company 7
0	1	1	1	1	0	0	0.80	Company 6
1	0	1	1	0	1	0	0.80	Company 1
1	1	1	1	1	0	0	0.73	Company 3
1	0	1	1	1	1	0	0.67	Company 12
0	1	1	1	1	1	0	0.67	Company 15
1	1	1	1	1	1	0	0.67	Company 9
1	1	1	0	1	1	0	0.62	Company 4

Comment: Only the black lines meet the consistency threshold (consistency $\geqslant 0.85$)

normal. In fact, fsQCA is largely about identifying the non-observed (i.e. counterfactuals), making fsQCA one among few techniques currently available dealing explicitly with constrained diversity of observable configurations (Ragin & Sonnett 2005).

(2) All observed configurations in the model including STRU were covered by only one firm. Also this is positive because it shows that very different firms were observed. fsQCA is not at all about investigating the most typical firm (i.e. identifying a dominant configuration represented by many observed companies), but maximising the observed difference of firms (Ragin & Rihoux 2009). Observing only one company for a configuration is therefore unproblematic. Interestingly, in the truth tables for the variant without STRU (Appendix Tables B.6 and B.7), a total of six rows are occupied by two observed firms. This is more likely here because the theoretically possible number of configurations decreases with fewer levers.

(3) Some firms were part of both analyses, the one for agility and for non-agility. This may very well be the case in fsQCAs.

In summary, the truth tables seem appropriate to move to the next analysis step.

6.3.3 Complex Solution

The fsQCA algorithm summarises the edited truth table via logical minimisation to develop a *complex solution* considering only empirically observed configurations. This was done with the STRU lever (Table 6.6) and as variation without STRU (Table 6.7). In practice, these complex solutions provide little value for sufficiency analysis. They merely summarise the observed, whereas the value is created in the following steps.

TABLE 6.6: fsQCA Complex Solution (Including Structures)

| | Config. | Levers | | | | | | Config. Statistics | | |
		CULT	LEAD	STRA	TECH	LINK	STRU	Cons.	R. cov.	U. cov.
Agility	**C1**	⊗		●		●	⊗	0.88	0.54	0.02
	C2	●	●	●		●	●	1.00	0.44	0.05
	C3		●	●	●	●		1.00	0.54	0.07
	C4	●	⊗	●	●		●	1.00	0.39	0.05
	C5	⊗	⊗	●	⊗		⊗	0.95	0.44	0.02

Solution consistency: **0.92;** *Solution coverage:* **0.83**

	Config.	CULT	LEAD	STRA	TECH	LINK	STRU	Cons.	R. cov.	U. cov.
non-Agility	**C6**	⊗	⊗	●	●	⊗		0.94	0.44	0.06
	C7	⊗	⊗	●		⊗	⊗	0.94	0.44	0.00
	C8	⊗	⊗	●	⊗		⊗	0.84	0.47	0.00
	C9	⊗	●	⊗		●	⊗	0.89	0.50	0.03
	C10	⊗	●	⊗	⊗	⊗	⊗	1.00	0.26	0.06
	C11	⊗	⊗	⊗	⊗	●	●	1.00	0.26	0.06

Solution consistency: **0.88;** *Solution coverage:* **0.82**

Following Ragin (2008): ● = lever (present); ⊗ = lever (absent); empty = does not matter
Abbreviations: Cons. = Consistency; R. cov. = Raw Coverage; U. cov. =Unique coverage

However, these complex solutions can be used to decide whether to focus on the model with or without STRU. The quality parameters for the alternative models are similar: Model consistency (how consistently 'correct' the model describes the outcome) for the outcome agility is higher for the model containing STRU (0.92 vs. 0.82), whereas its coverage (the fraction of the outcomes it describes) is slightly lower (0.83 vs. 0.88). For the outcome non-agility, the model with STRU has slightly lower consistency (0.88 vs. 0.92) but considerably greater coverage (0.82 vs. 0.67). Given these high values, both variants are very satisfactory. This leaves the choice with the author. He decided focusing on the

TABLE 6.7: fsQCA Complex Solution (Excluding Structures)

	Config.	Levers					Config. Statistics		
		CULT	LEAD	STRA	TECH	LINK	Cons.	R. cov.	U. cov.
Agility	**C1**		●	●		●	0.96	0.66	0.07
	C2	⊗	⊗	●	⊗		0.87	0.49	0.02
	C3	●	⊗	●	●		1.00	0.41	0.02
	C4	⊗		●		●	0.78	0.61	0.00
	C5			●	●	●	0.90	0.66	0.02

Solution consistency: **0.82**; *Solution coverage:* **0.88**

	Config.	CULT	LEAD	STRA	TECH	LINK	Cons.	R. cov.	U. cov.
non-Agility	**C6**	⊗	⊗	●		⊗	0.94	0.44	0.06
	C7	⊗	●	⊗	⊗	⊗	0.94	0.44	0.00
	C8	⊗	⊗	⊗	⊗	●	0.84	0.47	0.00

Solution consistency: **0.92**; *Solution coverage:* **0.67**

Following Ragin (2008): ● = lever (present); ⊗ = lever (absent); empty = does not matter

variant with STRU because he felt that the interviewees had a strong need to talk extensively about this lever and because the resulting parsimonious and intermediate solutions for the variant with STRU do not become more complex (Tables 6.8 and B.8) – one might have expected this when incorporating more dimensions.

6.3.4 Parsimonious and Intermediate Solutions

Soda & Furnari (2012, p. 286) warn that "if we keep our eyes firm on what exists, our research is doomed to lag behind the past, limiting our potential to improve the future". Because the complex solutions consider only what exists, the next analysis step went further. To shorten the complex solutions, a *parsimonious solution* was developed by also including theoretically possible but not observed configurations (logical remainders/counterfactuals) as simplifying assumptions – namely these, that lead to a logically simpler solution (Ragin & Sonnett 2005). However, as parsimonious solutions often falsely eliminate individual levers necessary for every solution, Ragin & Rihoux (2009) recommend developing *intermediate solutions*. This research develops these by adding back to the parsimonious solutions the levers which are both (1) part of the related complex solution and (2) identified individually as necessary in Section 6.3.1 (i.e. easy counterfactuals) (Ragin & Sonnett 2005). As this re-runs the algorithm, some levers beyond that might

also be added when constructing an intermediate solution. Levers contradicting existing knowledge which are part of the complex but not the parsimonious solutions (i.e. difficult counterfactuals) are thus excluded in the intermediate solution. The parsimonious solutions' levers are called core conditions and considered more important; levers added in the intermediate solutions are called contributing conditions (Misangyi et al. 2017). This means that contributing conditions could only be removed by including assumption conflicting with existing knowledge (i.e. difficult counterfactuals). The outcome is presented in Table 6.8. The solution notation follows Fiss (2011), where black dots represent a condition's presents and empty dots with a cross inside represent its absence. More specifically, ● marks a present core condition (here: lever); ⊗ marks an absent core lever; ● marks a present contributing/peripheral lever; ⊗ marks an absent contributing/peripheral lever (see Section 4.5.3). By removing the contributing levers from the intermediate solution, the parsimonious solution can be derived. Empty spaces mark levers whose presence/absence is irrelevant for a certain solution to occur.

The solution Table 6.8 shows that three different intermediate solutions emerge for agility (C1–C3) and three for non-agility (C4–C6), which proves equifinality. While for selecting the configurations to include into the algorithm in the truth tables (6.4 and 6.5) a very rigorous consistency threshold was used ($\geqslant 0.85$), the requirements for consistency of the solution model and its sub-solutions are relaxed ($\geqslant 0.8$). This still meets the consistency suggested by Ragin & Rihoux (2009). Both the models for agility and non-agility meet this threshold with values of 0.81 and 0.88 respectively. Likewise, all individual intermediate solutions (C1–C6) meet this threshold with the lowest consistency score at C1 with 0.82. One could argue that this also follows Crilly et al.'s (2012) recommendation to find a natural cut-off point. Since no large gap prevails in the consistencies (Table 6.8) ranging from 0.82 to 1.00, any cut-off would be arbitrary.

Applying Ragin & Rihoux (2009), this research mainly interprets the intermediate solutions as it allows "to unleash the generative potential of organization design in its strongest sense, i.e. design as the discovery of not yet existing, but potentially more effective, organizational configurations" (Soda & Furnari 2012, p. 286). The author uses fsQCA for both, examining the factorial logic (i.e. what levers matter) and the combinatorial logic (i.e. how are these related via substitution and complementarity) (Park et al. 2020). Very evident is that for all solutions leading to agility, STRA must be present and for all solutions leading to non-agility, CULT must be absent. Despite STRA in C3 being only a contributing lever, this fully confirms the earlier necessity analysis and is clear

TABLE 6.8: fsQCA Intermediate Solution (Including Structures)

	Config.	Levers						Config. Statistics		
		CULT	LEAD	STRA	TECH	LINK	STRU	Cons.	R. cov.	U. cov.
Agility	**C1**			⬤		⬤		0.82	0.90	0.20
	C2			⬤	⊗			0.83	0.59	0.02
	C3	⬤		•			•	1.00	0.51	0.02

Solution consistency: **0.81**; *Solution coverage:* **0.95**

	Config.	CULT	LEAD	STRA	TECH	LINK	STRU	Cons.	R. cov.	U. cov.
non-Agility	**C4**	⊗	⊗			⊗		0.90	0.56	0.18
	C5	⊗	⊗	⊗	⊗			1.00	0.32	0.03
	C6	⊗			⊗		⊗	0.87	0.59	0.21

Solution consistency: **0.88**; *Solution coverage:* **0.82**

Following Ragin (2008): ⬤ = core lever (present); • = contributing lever (present)
⊗ = core lever (absent); ⊗ = contributing lever (absent); empty = does not matter

evidence of causal asymmetry: a lack of a supportive change-driven culture is a clear requirement of being non-agile, but the presence not required for being agile (but indeed an option as per C3) – i.e. there are options for being agile even when having no supportive culture, which was unexpected. Likewise, a sensing and seizing strategy is an absolute requirement for being agile, but a lack thereof is not required for being non-agile (but indeed an option as per C5) – i.e. there are ways of being non-agile even when having a favourable strategy. The evidence for the other two necessary levers is weaker: the presence of LINK is part of only one path to agility (C1) and the absence of LEAD is part of two paths to non-agility (C4 and C5). This shows that the fsQCA intermediate solution algorithm did not value these two levers' necessity highly enough to consider them necessary in every solution for agility respectively non-agility.

Subsequently, the six solutions respectively paths are looked at in more detail. It should be noted that since fsQCAs use fuzzy-values describing the membership degree (not boolean statements), it is entirely possible that one company's trajectory towards (non-)agility is explained by multiple paths and that some companies that are at the threshold of agility to non-agility (or vice versa) are explained by both agility and non-agility solutions.

Becoming agile:

Strategic partnering seekers (C1) combine two levers. They are agile companies

where a sensing and seizing strategy (STRA) complements good linkages (LINK). Consequently, they are capable to formally and informally establish such a strategy by cooperating internally across the teams and business areas, by cooperating with external parties like competitors, research institutes, customers, suppliers, but also by improving the own situation politically via lobbying. Rather than concentrating on an agile culture, the focus is on networking. This configuration has by far the largest raw coverage, meaning it is empirically the most frequently observed configuration. It also has the largest unique coverage, meaning, for 20% of all observed companies it is the only solution . In total, it explains the agility of the Companies 3, 4, 6, 7, 9, 10, 11, 13, and 15.

Strategic technology learners (C2) combine two levers. This solution shows that existing linkages can be substituted for missing technological skills – i.e. there is a trade-off. Interestingly, this means that the presence of a sensing and seizing strategy (STRA) can be combined with lacking technology capabilities ($\sim$TECH) for becoming agile. While this leaves much room for later discussion, it could be, for instance, that companies that yet have to learn dealing with new technology, but already have the necessary strategy, are in an especially nimble state with great strategic ambition to learn new technologies. This solution explains the agility of Companies 4, 10, 11, and 13.

Cultural strategy and structure adapters (C3) combine three levers. They have a change-driven culture (CULT) as most important core lever, which is supported by a sensing and seizing strategy (STRA) and decentralised structures with enabling bureaucracy (STRU) as contributing levers. To the decades-old debate about which comes first, strategy or structure (e.g. Chandler 1962), the answer would be neither, but culture. Thus, the agility concept must here be first and foremost embedded in the employees' mindsets before it becomes more formally part of the strategy and company structure. This configuration has the highest possible consistency (1.0), meaning it led to agility in every observed instance, which provides the greatest certainty that this pathway to agility actually works. Yet, as it has a lower raw coverage (0.51) than C1 and C2, it is rarely present. This could be because this path is harder to achieve or because it is less prominent and therefore rarely actively pursued. However, the latter seems unrealistic given the growing attention dedicated to culture, especially by practitioners. This solution explains the agility of Companies 1, 4, 9, and 12.

Becoming non-agile:

Culturally rigid loners (C4) combine three levers. They have a rigid employee mindset

(∼CULT) and lacking linkages (∼LINK) as core conditions, which are complemented by a non-supportive leadership mindset (∼LEAD). Therefore, such companies have a non-supportive cultural environment (employees and leadership), which in turn causes difficulties in developing good internal linkages on the one hand and effective external linkages on the other. The culture concentrates on providing stability and doing the old tasks with one's own team rather than developing through collaboration. This solution explains the lacking agility of the Companies 5, 8, and 13.

Cultural and strategic technology laggards (C5) combine four levers. They are firms with a rigid employee mindset (∼CULT) and lacking technology capabilities (∼TECH) as core levers, combining with a non-supportive leadership mindset (∼LEAD) and non-sensing and seizing strategy (∼STRA) as contributing levers. The implication is interesting because it shows how combining difficulties in (soft) mindset dimensions with difficulties in formally defining agility through (hard) strategy can lead to a company being unable to drive or even deal with new technologies. Since only one company follows this path (Company 2) it seems very specific; yet this makes it very consistent in leading to non-agility (consistency = 1.0).

Cultural and structural technology laggards (C6) combine three levers. They include a rigid employee culture (∼CULT) and lacking technology capabilities (∼TECH) as core levers, complemented by non-supportive structures (∼STRU). Practically, this means that such companies struggle to build agility informally into their employees' mindsets, but also formally into their corporate structure. These struggles then reflect in difficulties with being a driving industry force in technological progress. This explains the lacking agility of the Companies 10, 11, 13, and 14.

Results on cultural filtering effects: One interviewee from Company 10 clearly hypothesised that culture serves as a filter for how well other levers can be deployed: "So I think culture is the key to many, many other issues". However, the fsQCA tells a different story of this filtering effect. The paths to agility do not provide any support for CULT being a filter, because having an agile culture is only part of one solution (C3) and does not matter in C1 and C2. Yet, it can indeed be concluded that ∼CULT, by being always present in non-agile firms, impacts how other levers manifest negatively in the company. This becomes especially evident in C5/C6. While in C2, lacking technology capabilities (in combination with STRA) lead to agility, they lead to non-agility when combined with a fully non-agile culture of ∼CULT and ∼LEAD (with ∼STRA as contributing lever) in

C5 or with only a rigid employee mindset ∼CULT (with ∼STRU as contributing lever) in C6. Thus, although the filtering effect of ∼CULT and ∼LEAD cannot be fully isolated due to contributing levers, it is clearly suggested. When making the legitimate consideration of focusing exclusively on the core levers (i.e. those from the parsimonious solution) as most important levers, it can be concluded by comparing C2 with C5/C6 that the impact of lacking technology capabilities (∼TECH) on agility is fully reversed when substituting the presence of a sensing and seizing strategy (STRA) with a rigid employee mindset (∼CULT). Therefore, for utilities, STRA seems like a filter for agility and ∼CULT for non-agility. Since STRA is more formal and CULT more informal, one could further infer that the presence of a supporting formal aspect is central for agility, while non-agility usually depends on the absence of a positive informal aspect. The first point in particular, which again demonstrates that culture is not necessary for agility, is surprising.

6.4   Analysis and Findings Summary

In this analysis and findings chapter, the results of both (1) the qualitative investigation of the shortlisted agility levers and (2) the quantitative-like fsQCA based on these qualitative results were presented. In the first step, examples were used to illustrate how particularly positive or negative manifestations of a lever look in practice. In the second step, the chapter led through all fsQCA stages and justified the decision to ultimately include the STRU lever. It showed three alternative pathways to agility and three to non-agility. Furthermore, it found that a cultural filter effect only exists for non-agility, while a strategic filter effect might exist for agility.

Chapter 7: Discussion

This chapter conflates this thesis' empirical findings with the existing literature. Therefore, Section 7.1 reminds of the research questions. Next, Section 7.2 discusses the findings and solutions (C1 – C6) in the context of existing research. Then, Section 7.3 discusses the filtering effects and 7.4 further delves into the energy industry and highlights what the findings mean for the industry and managerial actions. Finally, Section 7.5 summarises this chapter.

7.1 Addressing Research Objectives

General industry developments, COVID, and the Russo-Ukranian War put the German energy industry under perilous pressure to change and become agile. Yet, it remained to be adequately understood which overall levers contribute to energy companies being agile or non-agile, and whether culture through mindsets exerts a filtering effect. Consequently, the holistic aim of this research was to understand agility in the German energy industry. Specifically, it aimed to investigate three research questions from a critical realism (CR) perspective:

1. *What* levers contribute to (non-)agility in the German energy industry?
2. *How* do these levers interdependently contribute to (non-)agility?
3. *How* does organisational culture affect these levers' contribution to (non-)agility?

The received results confirm that the levers of employee (CULT) and leadership mindsets (LEAD), strategy (STRA), technology (TECH), linkages (LINK), and structure (STRU) contribute to agility, respectively non-agility, in the German energy industry. Yet, Nejatian et al. (2019) identify agility levers as strongly related and Shams et al. (2021) as well as Cunha et al. (2020) criticise levers' individualistic consideration, calling for an interdependent perspective of how agility lever interdependencies impact agility. Therefore, the unique fsQCA method allowed identifying different combinations of subsets of these

levers that each can lead to (non-)agility. Hence, the study shows that these levers do no exert additive impacts, but they substitute and complement each other. The analysis supports that culture could serve as filter for non-agility but not for agility. Rather, it suggests strategy as filter for agility. The related findings of this study are partly surprising and will therefore be discussed below in the context of existing research.

7.2 Interpretation

The new findings counter existing research that uses large lever frameworks (Section 3.2) by showing that rather specific combinations of different levers allow understanding energy companies' agility and non-agility. With these findings, it appears less problematic that mindsets have long been ignored in ambitions to understand agility: Given that only one path to agility considers agile mindsets necessary, Eilers et al.'s (2022) criticism that academics ignore this lever might be of little relevance. Yet, one must also consider that lacking agile employee and leadership mindsets seem to be strong levers for non-agility. The specific solutions are discussed subsequently.

7.2.1 Pathways to Agility

First and foremost, it became clear that no single lever was sufficient for agility. Rather, it was the interaction of different levers creating agility, making the chosen configurational perspective invaluable (Furnari et al. 2021). All paths to agile utilities strongly build on strategy, which enables performing in unstable environments by following multiple sub-strategies, giving the flexibility to switch agilely among tasks and nimbly leverage short-term opportunities (Sherehiy et al. 2007, Worley & Lawler 2010). This finding, which is closely related to Chakravarthy's (1982) adaptability, describes the ability to identify and process environmental stimuli. In times of COVID, energy transition, and Ukraine crisis, these stimuli for energy companies are manifold. Accordingly, this work confirms academics' recent focus on strategic agility, which gained momentum with the California Management Review special edition introduced by Weber & Tarba (2014) and builds on the more established research on DCs, absorptive capacity, and foresight. The observed agile utilities tend to focus on strategic proactiveness in a confined regional or technological area, rather than trying to change everything. They are also reactive and have defined conceptual/strategic transformation plans that solve their dependency on

large, rigid assets in the long run, and they have developed a toolkit for both change and stability. This confirms Strode et al. (2022), who show that strategic agility requires balancing the tension of a strategy focusing on transformation but also business as usual. To give their areas strategic leeway, some energy companies therefore defined decentralised area sub-strategies. Thence, they display strategic ambidexterity, confirming Armstrong & Manitsky (in press) and Clauss et al. (2021), who show that the interaction of strategic agility and exploitation positively impacts competitive advantage. Thereby, utilities can be nimble while also satisfying the energy industry's requirement for long-term investments and planning. Interestingly, many agile firms leveraged recent re-organisations (e.g. acquisitions, mergers, carve-outs) as opportunity to define a radically new agile strategy. Confirming Heiligtag et al.'s (2015) paper on agile utilities, both adequate sensing and proactive seizing were observable as part of strategic agility.

However, at the same time, contrary to what has been expected, employee culture was only found as part of one path to agility. This refutes for instance Eilers et al.'s (2022) hypothesis that agility is mostly a mindset instead of a formality. Rather, this thesis identifies alternatives to agile employee mindsets for utilities to become agile. Similarly, Lewis et al. (2014) ascribe leadership mindset a central role to achieve to agile strategies. However, this does not reflect in the fsQCA results, as leadership was not identified as part of any path to agility. This appears controversial and does certainly not mean that energy companies should hinge to their traditional leadership mindsets, which stand in conflict with agility. However, it shows that it is not the leadership practices like decision power sharing that enables such firms to become agile, but first and foremost their strategic ambition and a good implementation of this ambition. Clearly, the latter requires strong leadership endorsement. After considering the special role of strategy and the overestimated role of culture, the individual solutions are discussed subsequently.

Strategic partnering seekers (C1)

The first solution is broadly supported by existing research. Rather than concentrating on an agile culture, this type of agile utility focuses on networking and strategic DCs. Namely, Teece et al. (1997) define DCs as ability to acquire external resources and knowledge, and integrate and reconfigure existing internal resources and capabilities via internal cooperation. Following Cohen & Levinthal (1990), Fergnani (2022), and Brannen &

Doz (2012), strategic agility therefore develops absorptive capacity, foresight, and ultimately strategic alternatives to quickly make well-grounded, thoughtful decisions instead of lengthy alignment processes. This sensing and seizing strategy complements good internal and external linkages. Hence, this kind of utilities develop their agile strategy by leveraging insights sensed from partners. Mueller & Jungwirth (2022) indeed verify that cooperative relationships offer the knowledge to adjust strategies. Next, these firms seize the gained insights to implement its formally defined agile strategy via cooperating externally and internally – the latter requiring internal linkages. This is in line with Yang & Liu (2012) concluding that belonging to a strong network of external players provides access to the resources to translate agile strategies into performance. Indeed, Bottani (2010) already proposed collaborating as key to achieving strategic agility and Gunasekaran's (1999) review article identifies partnering/alliances as sub-strategy. Similarly, Troise et al. (2022) find clear quantitative evidence that being able to establish and maintain internal and external relationships enhances a company's strategic leeway and thus strategic agility. Such companies can leverage partners' knowledge and achieve ambidexterity (Troise et al. 2022). Especially smaller firms can therefore use external resources to compensate for lacking internals (Troise et al. 2022), but this size-argument seems less relevant for large utilities.

Energy companies good with linkages were found to institutionalise and support internal linkages for instance by adopting the principle of One P&L or via cross-area project teams. This enables them to align internally along the value chain. Further, Heiligtag et al. (2015) recommends utilities external linkages to abandon their 'fortress mentality' and remove barriers mitigating talent and knowledge-sharing with partners and customers. This thesis found that utilities have linkages to increase their impact with politics and to receive preferential treatment through suppliers and to achieve agile supply chains (Crocitto & Youssef 2003). For the question of which of these two external linkage types matters more, Zhang et al. (2022) find quantitative evidence for a positive impact of both external business and political linkages on agility. They identify business linkages as more important than political linkages, unless the company operates in very competitive environments. While the German energy industry left its former monopoly setting, it certainly still lacks full competition. However, given the recently large regulatory interventions, political linkages must not be neglected to improve the company's situation and enable the strategy – despite not being suggested by Zhang et al. (2022). In fact, the interviewees stressed the importance to be active in energy industry groups and lobbying to

impact the regulatory framework, which directly mirrors Battistella et al.'s (2017) finding that networking and linkages enable to implement changes within the broader network. Thence, linkages serve not only to implement the strategy internally, but also to shape the external environment so that it can accommodate this strategy. In line with Eilers et al. (2022) and Nambisan (2002), the results further show that integrating the customer via external linkages allows sensing and interpreting external changes more accurately, making customers a source for innovation and a partner for developing and testing new services.

Contrary to Sambamurthy et al. (2003) and Sherehiy et al. (2007), who recommend long-term external linkages, the results recommend energy firms a balance of situational and long-term linkages and of informal and formal linkages to deal with all long- and short-term changes. This thesis therefore disagrees with El Idrissi et al. (in press), who find no support for their hypothesis that many agile partnerships assist companies to respond agilely to crises. However, their study focuses exclusively on the COVID-crisis, where the use of existing external and internal linkages was difficult due to individuals' isolation. This seems less relevant for other crises, such as the financial, Fukushima, or Ukraine crisis for German utilities. All these points also reflect in Wang & Ahmed's (2007) absorptive capability of external knowledge-, capability-, asset-sharing and -acquisition, as well as subsequent assimilation with internal knowledge to create new knowledge and capabilities/core competences (see also Sambamurthy et al. 2003, Crocitto & Youssef 2003). Specifically for energy firms, Heiligtag et al. (2015) note the requirement for rapid learning, adaptability, cooperation and all other key outcomes of agility, while the IRENA (2019) highlights the demand for agile cross-technology coordination and extensive partnerships, including joint product/service development with peers and suppliers.

Strategic technology learners (C2)

The second solution appears more controversial and partly conflicts with existing research. Namely, strategic technology learners substitute the existing linkages from C1 for missing technological skills. Hence, these utilities successfully combine the presence of a sensing and seizing strategy with lacking technology and technology-related capabilities for becoming agile. While the supportive nature of agile strategies has been elaborated earlier, technology's negative manifestation requires elaboration. Considering Bottani's (2010) statistical evidence for a positive impact of technology on agility, the

opposite could have been expected. Heiligtag et al. (2015) argue that since the energy industry is evolving from a commodity-driven to an information-driven industry, employees must develop digital capabilities. During this study, utilities with low technology fuzzy-scores were found to struggle with IT, lacking both qualified IT staff and capable users. Old, deeply embedded IT environments make any changes complicated and complex. Furthermore, some energy companies experience asset-driven path dependencies. Investors prefer maintaining existing plants for their stable return, and many older employees prefer continuing to operate their plants. While some companies are developing conversion concepts to break these dependencies, they are not yet implemented. Considering these observations, it initially surprises that low TECH fuzzy-scores together with agile strategies result in agile utilities. To explore this, IT and asset technology are discussed separately below, but together with strategy.

(a) Strictly speaking, energy companies' information systems must be divided into operational technology (OT), i.e. systems for operating the assets, and information technology (IT), i.e. systems connecting and administering the wider organisation (like SAP, HR systems, cybersecurity) (Garimella 2018). This paragraph focuses only on the latter, since OT is part of the asset technology described in (b). Indeed, the agile IT literature mostly argues that agile IT alone or together with strategy supports agility. Fink & Neumann (2007) and Panda & Rath (2017) conclude that IT staff's capabilities and general human IT infrastructure capability support strategic agility. Weill et al. (2002) suggest the appropriate IT infrastructure as requirement to achieve an agile strategy and Sambamurthy et al. (2003) state that IT investments support agile strategies. Lu & Ramamurthy (2011) find that high IT investments can negatively impact agility, meaning a negative 'IT investment impact' is indicated. But they proceed saying that when combined with the required IT capabilities, which are also part of TECH, IT investments support agility (Lu & Ramamurthy 2011). Thence, this source cannot explain the finding. Further, IT was found to increase the information-base by generating, analysing, and leveraging real-time data, hence supporting knowledge exchange, responsiveness, and structural adaptiveness (Breu et al. 2002, Lu & Ramamurthy 2011, Tallon & Pinsonneault 2011). Most concretely speaking about how combining strategy and IT generates (non-)agility are Tallon & Pinsonneault (2011). They show that the positive impact on firm performance from aligning IT with strategy is fully mediated by agility, suggesting that aligning IT with strategy works best in agile firms.

However, some IT researchers question if agile IT alone or in combination with agile

strategies leads to organisational agility. Liu et al. (2013) find no significant positive relation between flexible IT infrastructures and supply chain agility. Also Al Nuaimi et al. (2022) identify no support for their hypothesis that strategy moderates the relationship between digital transformation and agility. Finally, there is no statistical evidence for Tallon & Pinsonneault's (2011) hypothesis that committing to strategies via large strategic IT investments diminishes agility, which indicates rigid IT commitments are *no* hurdle for strategic agility.

(b) Nonetheless, since most agile IT literature deems the presence of new IT and IT capabilities as conducive to agility, the explanation why a negative manifestation of this lever together with agile strategies was found to contribute to agility should rather be sought in utilities' other technology dimension, the assets. For assets technology's (like power plants including OT) impact, the literature base nearly lacks. Teece (2007) comes closest to justifying this configuration. He argues that based on the 'sensed' insights, top managers must make conclusions and predictions while considering limiting path dependencies. Hence, when the strategy is good at sensing, managers can act agilely even with technological path dependencies. Moreover, even if dependencies remain unresolvable, managers can consider them in planning. Yet, to really understand this finding, some conjectures are necessary. Three explanations suggest themselves:

(1) Synergy effect: Large rigid assets as path dependencies can be potentially dealt with differently than IT. Utilities that bring new, more flexible assets – like smaller power plants – into their portfolio, can combine these with existing, large rigid assets and even create synergies, as suggested by interviewees. In contrast, maintaining old rigid IT, while adding new IT, will certainly lead to confusion and worse performance. Utilities could benefit greatly from retaining large old plants by creating synergies, where old, large, inflexible but efficient plants cover the stable baseload power profile and smaller, flexible plants cover the peak demand. Agile strategies, in turn, which preach ambidexterity, exactly demand utilities to maintain their stable 'cash cows' (which are typically managed by people lacking agile technology capabilities), while aiming to add new, more agile assets via different business units. Heiligtag et al. (2015) even suggest utilities to actively balance new high-risk high-return assets with older low-risk moderate-steady-return power plant investments to prepare for changing market conditions. Thence, one could partly justify why having people lacking technology capabilities and maintaining large rigid assets in the portfolio benefits agility. However, this could only work if the company *also* possesses people and technologies that are more agile. This is underlined

by Teece (2007) arguing that strategy's seizing addresses opportunities through investing in new technologies and designs, meaning that with agile strategic seizing, new technology investments can work, even if old path dependencies remain.

(2) Motivation effect: Alternatively, one could imagine that utilities which yet must learn dealing with new technology, but already possess the necessary strategy, are especially nimble and motivated with great strategic ambition to learn new technologies (these utilities developed concepts to break path dependencies) and thereby do everything to cope with their limited technological resources.

(3) Irrelevance effect: Finally, one could consider lacking technology capabilities as simply not large enough of a hurdle for agility, being counterbalanced by agile strategies. However, given the energy industry's technology-intensiveness, and given that the fsQCA algorithm specifically identified this configuration as path to agility, this imaginable explanation appears least realistic.

Ultimately, it must be noted that a positive manifestation of this technology lever was indeed not found as detrimental to agility, so the reverse interpretation that a positive manifestation leads to non-agility would be misguided. Future research should investigate why Eilers et al. (2022), contrary to this research, find that strategic agility promotes or coincides with new technology and that a combination of both results in agility. Importantly, Eilers et al.'s (2022) have no industry focus. Therefore, it should be considered that this thesis focuses on the energy industry which puts high importance on assets aside from IT – thus technology here goes further beyond IT than in other industries.

Cultural strategy and structure adapters (C3)

In the early days of agility research, Crocitto & Youssef (2003) criticised that it ignored contextual factors like culture. While mindset levers indeed were not found to shape all paths to agile utilities, there was one configuration where at least employee mindsets appear highly relevant. This third path seems most expected considering the increasing evidence of mindsets as heart of agile organisations and mindset changes as basis of agile cultural transformations, enabling adjusting tangible agility levers like strategy (Brosseau et al. 2019, Kroll 2017, Teece et al. 2016). Hence, such utilities achieve agility through informal change-driven employee mindsets which reflect in formal agile strategies and structures. While agile strategies have already been discussed in this chapter, the agile employee mindsets and structures are discussed subsequently.

Two seemingly opposing approaches for achieving high employee mindset scores were found. One way is aiming for a joint employee mindset (e.g. aligning mindsets via a One-P&L approach). Worley & Lawler (2010) agree that such a shared mindset and feeling of belonging guides changing organisations by providing a shared identity. The alternative was deliberately separating business areas with the intention to establish different mindsets with either a stability- or change-focus. Moreover, utilities also successfully leveraged one-off opportunities from restructurings or being entirely newly founded to establish more change-driven employee mindsets.

Utilities successful on the structural dimension were found to possess decentralised structures but simultaneously actively mitigate silos (e.g. via cross-company teams), which otherwise could result from decentralisation and lead to lacking alignment. This confirms Harsch & Festing (2020), Teece (2007), and Zhang & Sharifi (2007), who contend that company structures should be decentralised to abandon pyramid structures that result in structural silos and hinder crucial cross-team communication. Moreover, it confirms Fourné et al. (2014) and Tallon & Pinsonneault (2011), who recommend flexible and adaptive-modular company structures consisting of short-term projects and teams. Yet, interestingly, also high-scoring energy companies mostly lacked enabling bureaucracy, especially incentives on employee-level or common guiding goals, which meant that no perfect STRU scores could be achieved. Hence, Brown & Eisenhardt's (1997) recommendation to use loose structures via simple agile high-level rules and goals to help employees making sense of the environment was not followed; neither was Heiligtag et al.'s (2015) advice that utilities should use stable core values as guiding framework. As per Doz & Kosonen (2010, p. 378), this prevented companies to fully overcome the inertia of existing structures and beliefs (employee mindsets), failing to provide "a deeper meaning to organizational members". Nonetheless, as with agile strategies, it was observed that companies undertaking restructuring (merger, spin-off, etc.) successfully use it to define new, more agile structures. An alternative approach in utilities seems maintaining separate areas for stable and for innovative business, which closely relates to the aforementioned strategic ambidexterity (O'Reilly & Tushman 2013). Indeed, March (1991) and Teece et al. (2016) suggest independent divisions with different mandates and Christensen (2013) specifies that the innovative areas should maintain a different culture to drive new initiatives. Many observed energy companies are already applying this by placing their traditional power plant business in one division and their renewables in a separate division with much younger staff.

Bringing together employee mindsets, strategy, and structure, the results reveal that *cultural strategy and structure adapters* have a change-driven employee mindset as central core lever, being supported by a sensing and seizing strategy and decentralised structures with enabling bureaucracy as contributing levers. Yet, in the existing research, two perspectives prevail on the question of which lever is really the core of this configuration. On the one hand, the DCs perspective sees sensing and seizing strategies as core. Namely, agile organisations with DCs are in an evolutionary strategic state (Teece 2007), which is achieved through redesigning routines by recombining and reconfiguring assets, structures, business models, and culture, thus enabling 'seizing' and breaking path dependencies (Teece 2007). This suggests that a sensing and seizing agile strategy is important to establish agile structures and mindsets. On the other hand, culture could form the core of this configuration, which is also suggested by the fact that strategy was only identified as contributing lever by the fsQCA. While Eilers et al. (2022) argue that individuals' mindset role on strategic agility remains underresearched, they do find that change mindsets promote personal strategic sensitivity (i.e. sensing) and taking strategic action (i.e. seizing), which aligns well with C3. Similarly, Cunha et al. (2020) show how new employee mindsets are required to strategically sense and interpret market changes. Groysberg et al. (2018) more generally state that culture should foster the strategic company goals. Likewise, some research identifies an impact of mindsets on decentralised structures. Worley & Lawler (2010) underline that agile firms need shared identities providing guidance within agile structures. Yet there could also be reverse relations because Harsch & Festing (2020, p. 50), by considering agility even primarily as mindset, find that agile mindsets, as culture's embodiment, must develop from visible "firm-internal agility differentiating factors" like structures and strategies. Overall, the evidence for employee mindset as core of C3 is more evident. Thus, the agility concept in such utilities must embed in employees' mindsets and then become more formally part of strategy and company structure. Interestingly, the leadership mindset was not found to be decisive for this solution.

7.2.2   Pathways to non-Agility

The utilities observed as non-agile often do recognise the need for agility, but then their employees lack the courage to implement radical changes. This confirms Haeusling & Kahl (2018), who find that to establish changes, firms need an organisational culture of

open dialogue, trust, and change – if this culture lacks, firms become non-agile. These utilities lack the positive excitement of unsteadiness, newness, and ambiguity (Harsch & Festing 2020, Nemkova 2017). In agreement with Groysberg et al. (2018), these companies attract, select, and retain employees that already match this mindset while nonconformers leave, leading to a negative self-reinforcing pattern. Accordingly, these incumbents were found as slow to react and not proactive in driving industry change. Agility could only be implemented by externalising activities to consultancies or by establishing spin-offs for new topics. Thus, these energy companies lack trust in their employees.

In existing literature, the evidence on **non**-agility is scarce, yet Eilers et al. (2022, p. 2) show that "actors' internal structures (e.g. beliefs, attitudes, or dispositions) are often major obstacles for implementing agility". Armstrong & Manitsky (in press) are the first really focusing on **non**-agility. Interestingly, they describe struggles achieving a mindset that manages the tension of change and continuity (i.e. ambidexterity) as key challenge for agility. This aligns well with the findings from this thesis. A non-agile mindset forms part of all paths to non-agility and also failure in being ambidextrous reflects in nonsupportive strategy and structure. Eilers et al. (2022) further identify mindsets as hurdles for implementing other aspects of agility, suggesting a mindset filtering effect on other levers' good or bad implementation. Following Gunasekaran (1999), mindsets rejecting change and adjustments to hard agility levers will make agility therefore unfeasible. Holbeche (2018) concludes that agility could hence be rejected by stability-driven mindsets. Such employees respond defensively and neglect ambidexterity's explorative side. As a result, people perceive achieving the own and the company goals as unsolvable contradiction (Armstrong & Manitsky in press).

The three solutions for non-agility, which all include these rigid employee mindsets, are subsequently discussed.

Culturally rigid loners (C4)

Culturally rigid loners have rigid employee mindsets and lacking linkages as core conditions, complemented by a non-supportive leadership mindset. Therefore, such utilities suffer from a non-supportive, stability-driven, hierarchical cultural environment (employees and leadership), leading to difficulties in developing both effective external linkages and good internal linkages, because the preference is doing the old tasks with one's own

team. The three elements unsupportive staff and leadership mindsets and missing linkages are subsequently discussed, followed by their interplay within this configuration.

First, the results show that energy companies lacking change-driven employee mindsets are accustomed to stability and thus struggle with the nimble agility. Especially in operations, where tenures were found to be very long, employees feared change. Failed past change efforts reinforce this fear. This goes so far that employees with a strong aversion to change cause spillover effects on others who would be more willing to change. This raises the question of such mindsets' origin. Interestingly, the analysis attributes a lacking cultural change mindset to seemingly rational arguments like the obligation for stable energy supply, but also to more emotional arguments like personal preference to continue the stable past. However, Handscomb et al. (2019) counter that utilities' and even their operations' mindsets can indeed become agile when setting clear boundaries. With that consideration, the argument of stable energy supply seems more like an excuse than a valid justification for rigid cultures. Therefore, insufficient change mindsets could be summarised as misguided personal preference (Handscomb et al. 2019).

Second, lacking shared and developing leadership mindsets in utilities emerge from leaders' lacking trust in their employees to cope with the responsibility in an agile enterprise. These leaders fail even to meet Haeusling & Kahl's (2018) expectation to communicate agility's cause and impact. Crocitto & Youssef (2003, pp. 392–393) note that "both managers and nonmanagers may have to accept a more participative decision making style". This is interesting because the interviews show that in some utilities not only leaders struggle sharing power, but also employees struggle taking responsibility. While leaders receive support to change their mindsets, they fail applying what they learn. Thence, leaders struggle to fulfil their task to patronise agility as new status quo (Crocitto & Youssef 2003). Further, utilities' leaders are often tenured subject matter experts (rather than trained managers), incapable to develop employees and uncomfortable with sharing their decision power. They develop employees with a one-size-fits-all approach, which no longer reflects today's reality.

Third, energy companies struggling with linkages are unable to quickly form new external linkages. Further, external unbundling regulations and GDPR limit external linkages. This confirms Dyer & Singh's (1998) seminal work which criticises both the resource-based view (Barney 1991) and the industry-based (five forces) view (Porter 1980) on competitive advantages because both neglect that companies create no value alone, but, for competitive advantage, they strongly rely on external partners. These

partners create a 'relational rent' by providing assets, sharing knowledge, offering complementary resources and capabilities, and providing effective and consequently cheaper governance (Dyer & Singh 1998). Thus, firms lacking such linkages also lack these benefits and consequently suffer from isolation. Internally, if utilities' divisions receive individual KPIs, internal cooperation tends to diminish. Further, both COVID, which resulted in little informal exchange, and insufficient English-speaking capabilities harm internal linkages. All this reflects in people's fear to ask the 'wrong' person. Ultimately, this solution confirms Mueller & Jungwirth (2022) in showing that lacking linkages mean lacking resources for becoming agile.

Bringing together the three levers, especially Eilers et al. (2020) confirm their relation. They trace agility to the co-existence of doing agile and being agile – else a knowing-doing gap occurs. While knowing relates to external work structures in form of agile methodologies and leadership (i.e. agile leadership mindset), doing concerns internal processes of an employee in form of personal thinking and mindset (i.e. agile employee mindset). Also shared/participative leadership relates to doing agile and is the enabling counterpart to an empowered employee. Eilers et al. (2020) extract a positive relation between shared/participative leadership and employees' work satisfaction, as well as between employee development and commitment to the company. Since they apply linear regression analysis, it can be concluded reversely that insufficient empowering and developing leadership negatively impacts employee satisfaction and commitment – i.e. generating insufficient employee willingness to change. Doz (2020) further argue that traditional leadership mindsets identify shared leadership as threat to personal esteem and Holbeche (2018) summarises that when new values and culture are not lived by leaders, employees will neither understand nor live them.

Aside from the relation among leadership and employee mindsets, Eilers et al. (2022) further show that agile mindsets support (1) attitudes for internal exchange and tools that in turn support collaboration across locations and departments and (2) external linkages with customers. Also Aghina et al. (2017) arrive at the conclusion that firm-internal cooperation promotes creativity and flexibility. This thesis identifies no such positive mindset-linkages relation, but it indeed shows that lacking agile mindsets lead to insufficient internal and external linkages and, as can be concluded from Aghina et al. (2017), lacking internal linkages contributes to lacking employee mindsets of creativity and openness for change. This is in line with Eilers et al.'s (2022) linear regression models. Therefore, this

article clearly confirms this thesis' view on the importance of combining knowing and doing, the impact of failing doing so, and the relation between lacking supportive mindsets and linkages. Unfortunately, they narrowly consider organisational agility mostly as agile working methods, which this thesis firmly refutes.

Cultural and strategic technology laggards (C5)

Cultural and strategic technology laggards are the most comprehensive configuration with four levers. Such non-agile energy companies have a rigid employee mindset and lacking technology capabilities as core levers that interact with a non-supportive leadership mindset and a non-sensing as well as non-seizing strategy as contributing levers. The general aspects of unsupportive mindsets have been discussed in Section 7.2.2, the aspect of non-agile technology and related capabilities in Section 7.2.1. These negative lever manifestations are in combination with non-agile strategies. While the strategy aspect was the core to all paths to agility, it seems less relevant for non-agility. However, C5 shows that lacking an agile strategy can still contribute to a non-agile utility. The observed utilities struggling with strategy either have yet to define their USP or at least have to improve individual strategic aspects like sensing and seizing. Yet, what all these energy companies share is that they focus conservatively on exploiting their current power generation assets and other resources, failing to explore new opportunities and achieve ambidexterity (Armstrong & Manitsky in press, Clauss et al. 2021, Stettner & Lavie 2014). This exploitation focus leaves no doubt why these utilities also struggle with the technology lever: Due to their employees' and leaders' rigid mindsets, these utilities possess a high risk-aversion and their large technology assets (i.e. power plants, grids, pipelines) represent path dependencies limiting their strategic leeway. This in turn makes committing to new, short-term strategic seizing opportunities difficult. Lee et al. (2021) therefore build on the COVID-crisis to argue that strategies and the related technology investments should also consider the near future, rather than locking companies in for the upcoming decade. Clearly, this presents a challenge for energy companies that must invest billions in new hydrogen production, wind farms, grids, and pipelines with long amortisation times. Nonetheless, their short-term flexibility must be considered. Unfortunately, Braun et al. (2017) advocate that lacking resilience to change on an individual level (as per C5), which reflects through a self-protective mechanism in the employee and leadership mindsets, prevents employees and leaders to advocate short-term change and flexibility of other aspects like strategy or

technology.

Related to this, Eilers et al. (2022) recently argue that companies with agile employee and leadership mindsets are open to deal with new technology, but no identified path to agility could verify this. However, it was indeed found that companies failing to develop such mindsets very likely fail in the area of new technology (consistency = 1.0). Applying Eilers et al. (2022, p. 10), this could be since they lack inspiration and drive to develop new digital knowledge and technology skills, and therefore do not "transfer this knowledge to their own work and thus promote the process of digitalization in their organization". This concurs with Lu & Ramamurthy (2011), who show that unless combined with such profound IT capabilities and related mindsets to leverage them, IT structure investments hinder agility.

The conclusion from this solution is twofold: First, it demonstrates how combining difficulties in (soft) mindset dimensions with difficulties in formally defining agility through (hard) strategy can lead to a utility being unable to deal with new technologies. Second, it shows that lacking technology and related capabilities, contrary to C2, can also result in a non-agile company.

Cultural and structural technology laggards (C6)

Cultural and structural technology laggards combine a rigid employee culture and lacking technology capabilities as core levers with non-supportive structures as contributing lever. Therefore, such companies struggle to build agility informally into their employees' mindsets, but also formally into their corporate structure and technology. The interviewed companies with low structure scores typically have a combination of rigid decision centralisation and uncoordinated decentralised operational silos. While the former means these utilities are slow to decide, the latter prevents critical coordination and alignment across areas. An interviewee from Company 5 noted regarding silos that "as long as I can serve my own business field with the topics, I don't think there are any problems [from silos] [...]. But since we have a lot of businesses running procedurally across different business areas, such decentralisation [in silos] is of course more of a hindrance". Unfortunately, these energy firms also lack enabling bureaucracy which could provide informal support to overcome the issues from too much centralisation and decentralisation. In fact, Strode et al. (2022) note that when areas act relatively decentralised and lack macro-level goals as form of enabling bureaucracy, decentralised structures are harmful for agility.

Gunasekaran (1999) further find that unfamiliarity with technologies impairs the communication critical for agility. This means that lacking IT and technology asset capabilities limit the alignment across utilities' decentralised structures, which surprises, as especially then knowledge sharing would be valuable. Due to this negative impact from technology, the uncoordinated decentralisation becomes even more harmful.

Also the lacking change-driven employee mindsets contribute. Doz (2020) argue that mindsets can constrain agile structures. These mindset and structural struggles then reflect in difficulties with being a driving industry force in technological progress. Eilers et al. (2022) agree that in technology-driven contexts, people need a new agile mindset. If this lacks, driving the technological development becomes unachievable. This overall combination of three reinforcing levers is also a valid recipe for non-agility.

7.3 Filtering Effects

Already in 1999, Anderson suggested exploring organisations as nonlinear and complex by focusing on levers' interaction in creating organisational outcomes. Therefore, following Furnari et al.'s (2021) NCT terminology, a cultural filtering/contingency effect was expected – i.e. other levers being contingent on culture in producing agility. The results could not fully confirm this idea, but offer additional insights on agile strategies as filter.

7.3.1 Culture Filtering non-Agility

The results suggest that culture's role as filter for agility may have been overestimated recently, as the analysis revealed pathways to agility for which the presence or absence of supportive employee and leadership mindsets are irrelevant. In contrast, employee mindset's filtering role for non-agility is being wrongfully ignored, as mindsets could prevent more tangible change (Dauber et al. 2012). The findings indeed illustrate that if a company does *not* have a fully unsupportive employee mindset and, mostly, an unsupportive leadership mindset, it is unlikely to be non-agile – these mindsets are prerequisites for non-agility. This cultural filtering effect for non-agility is confirmed by Eilers et al. (2022), who identify undesirable mindsets as hurdles for implementing other aspects of agility, resulting in non-agility. Therefore, energy companies with broad non-agile employee and leadership mindsets (i.e. not merely in some operational areas like old power plants) will fail implementing more formal agility levers.

Haeusling & Kahl (2018) and Harsch & Festing (2020) suggest that unsuitable mindsets can hinder other agility levers' application, as they are hidden forces or anchors that integrate them. Groysberg et al. (2018, p. 47) agree that non-agile mindsets are typically associated with certain other levers: "Those [cultures] that favor stability tend to follow rules, use control structures such as seniority-based staffing, reinforce hierarchy, and strive for efficiency". Brosseau et al. (2019) further imply that other levers of (non-)agility might fail when steered or filtered by a non-agile mindset. This filtering effect in energy firms can be shown by considering only the core levers, where it becomes evident how the impact of a lacking supportive technology lever fully switches: While it leads to agility when combined with an agile strategy (C2), it leads to non-agility when combined with a non-supportive employee mindset (C5 and C6). This again illustrates causal asymmetry and encourages utilities with agile ambitions first to adjust their formal strategy and implement this adjustment. While non-agile energy companies suffer from absent supportive employee mindsets (and many also from absent supportive leadership mindsets), these firms can become agile without an especially agile mindset, just by becoming 'neutral' on employee and leadership mindsets. This is a valuable insight, considering utilities' difficulties in developing such mindsets among their often tenured employees and leaders. Large utilities should be more accustomed to strategic changes after the many recent industry transformations.

7.3.2 Strategy Filtering Agility

Interestingly, strategy seems to be a filter without which other levers' presence/absence becomes irrelevant for becoming agile. Heiligtag et al. (2015) argue that utilities must improve their strategic sensing to develop an agile information-seeking attitude and combine that with other levers like agile decision-making produces. Weber & Tarba (2014, p. 7) support this by identifying the agile strategy as critical for "adapting the necessary organizational configuration for successful implementation". Despite other researchers falling short of identifying such an effect, this means an agile strategy must provide the guidance to successfully implement and justify changes to other agility levers. This is encouraging for energy companies, as both strategy development and strategy implementation can be formally supported by internal programmes and external consultancies, making strategies easier to adapt than vague cultural levers. If cultural adjustments across the entire workforce could be avoided (esp. in the very traditional power plants), utilities' management

could dedicate its limited capacities to areas over which it has more direct control than employees' mindsets. One such area identified was building external linkages and collaborations to achieve the strategy (C1). Consequently, it is important to remember that an agile strategy alone is necessary, but not sufficient for agility. Furthermore, mindset is not per se irrelevant for agility. If an energy company can indeed establish supportive employee and leadership mindsets, it will not fall into the scope of C4 – C6, which explain most cases of non-agility (model coverage = 0.82) and it could develop the configuration C3, which led in every observed instance to agility (solution consistency = 1).

7.4   Implication – Solutions' Practical Application

This section concretises the results' application for utilities' managers. The obvious question is what path to agility shall managers choose for their company. Two starting points are considered below.

(1) *The company is neither fully non-agile, nor fully agile:* Utilities differ in their current setup and thus in the solution advisable for them to become agile. For instance, a utility already possessing an agile strategy, which was anyway identified as prerequisite for agility, might be well advised to develop good linkages (C1) rather than go through an arduous cultural transformation along with a new structure (C3). The combination of a sensing and seizing strategy together with being non-good with technology (C2) is probably least advisable, as it seems like a compromise that also results in agility, but which certainly triggers struggles on the longer term: considerable technology asset rigidity and losing touch to new IT developments would both become increasingly harmful.

Ultimately, however, even companies from the same energy industry must consider their own capabilities, weaknesses, and uniqueness to understand whether basing agility on linkages (together with strategy) is really viable. For instance, vertically integrated companies which today and in the future operate large generation assets (be it nuclear power plants or offshore wind farms), grids, and energy trading might benefit more from agile structures and abandoning the archaic leadership styles as well as traditional stability mindsets of people in power plants (C3). In contrast, less vertically integrated grid operators with confined value chain coverage are potentially more dependent on external parties. They could benefit stronger from focusing on especially linkages with external parties like neighbouring grids' operators or energy producers, with whom they must align for grid stability. This directly reflects in the finding that three out of four companies

occupying C3 are large, vertically integrated utilities, while C1 is strongly occupied by either smaller locally focused utilities or such focusing only on one value creation step. Interestingly, the companies occupying C2 have a diverse focus, again proving that this solution is more of a compromise than a recommendable solution that should be actively pursued.

(2) *The company is fully non-agile:* Such companies should investigate what path to agility is easiest to achieve considering (a) their unfavourable lever setup and (b) their company type (e.g. vertically integrated vs. grid operator). While the solutions for agility show alternative paths to agility, these for non-agility rather allow understanding why a company is currently not agile and what this means for becoming agile. If a non-agile utility at all desires agility, it should identify its optimal path. For instance, if it currently struggles with the technology lever (especially C5), C2 might be an interesting option, while this solution would be clearly not advisable if the company is already good with new technology. In case of C5, current struggles with employee and leadership mindsets would not matter to achieve C2, where only the strategy requires adjustments, and this can be done in a formal strategy design process with subsequent strategy implementation support. Alternatively, a company that currently lacks an agile employee mindset and supportive structures (C6) would have a long way to achieve C3, which demands a positive score on these dimensions. Rather, such a company would benefit from C1 and C2, for which these dimensions' negative rating would not matter. For a company in C4, struggling with both mindset levers, also C1 and C2 might be advisable, as it would not need to put its main focus on changing its culture.

These paragraphs show how strongly the suitable agility solution depends on an energy company's current strengths and weaknesses.

7.5 Discussion Summary

This chapter reviewed the findings in the broader context of existing research. To conclusively answer the RQs, it revealed that all six levers included in the final conceptual framework (Figure 5.1) to some degree contribute to German energy companies' agility or non-agility. It further discussed the three identified solutions of interdependent levers for agility, respectively the three for non-agility. In line with the configurational perspective, it therefore discussed alternative paths to the same outcome. As per critical realism, these paths can be considered alternative "window[s] on to that blurry, external reality"

of agility or non-agility (Sobh & Perry 2006, p. 1199). This chapter then discussed the identified cultural filtering effect for non-agility, and the surprising strategic filtering effect respectively the lacking cultural filtering effect for agility. Finally, it showed how the results can be practically applied. Overall, the findings are mostly consistent with existing research, but especially the logic behind C2 seems controversial, requiring additional research. Likewise, additional general research to capture non-agility seems required. This would help understanding why some utilities remain unable to become agile and why, for some, agility might not even be advisable. The next chapter concludes this thesis.

Chapter 8:   Conclusion

This thesis investigates pathways to energy companies' agility and non-agility. Existing research introduces levers for agility, but also criticises the inadequate (i.e. lacking) understanding of these levers' interdependent impact (see Cunha et al. 2020, Misangyi et al. 2017, Walter 2021). Especially regarding culture's potentially central role, further investigation has recently been called for. To approach these gaps, the thesis identifies agility's lacking foundation in organisational theory and introduces NCT as solution. NCT aligns well with an fsQCA research strategy that can solve the above-mentioned issue by collecting qualitative data, identifying themes, transferring these into fuzzy-values, identifying agility lever configurations using fsQCA, and interpreting all jointly with existing research. This research strategy builds on top-tier journals (Misangyi & Acharya 2014, Misangyi et al. 2017, Vergne & Depeyre 2016) and concurs with the chosen CR perspective (Tóth et al. 2017). Based on the initial qualitative thematic analysis and subsequent quantitative-*like* fsQCA of agility levers in 15 large German energy companies via 36 interviews, it can be concluded that alternative paths to (non-)agility exist. All paths (i.e. configurations) to agility presuppose a sensing and seizing agile strategy but not necessarily an agile mindset, while all paths to non-agility build on a strongly non-agile employee mindset and often also leadership mindset – hence, these levers could be considered as filters. Of the three strategy-dependent paths to agility, one builds on being good connected, one on having insufficient technological capabilities but presumably a great improvement spirit, and one on agile employee mindsets coupled with decentralised structures. Of the three employee mindset-dependent paths to non-agility, one builds on being insufficiently connected and lacking supportive leadership, one on lacking technological capabilities together with lacking supportive leadership and strategy, and finally one on lacking technology capabilities reflecting also in inadequate structures. The filtering effects of strategy for agility and culture for non-agility are particularly evident when comparing solutions C2 and C5/6, where the impact of lacking technological capabilities fully inverts when swapping a supportive strategy for a non-supportive culture (focusing on the core levers). This final chapter now considers both contributions and implications

for theory and practice. Further, it explores inherent limitations and additional avenues for future research and offers a final reflection on this research.

8.1 Contributions

This research offers a wide array of contributions. It extends practitioner literature on agility in the energy industry with academic rigour and it expands the general literature on the energy industry by departing from the outdated view that this industry is incompatible with agility – this view must be discarded, because the formerly stable energy industry is no longer static. The industry incumbents can rely ever less on their former oligopolistic position. Their new role widely exceeds (1) generating energy for local demand via large nuclear/coal-fired plants at the lowest possible cost and minimal unavailability and/or (2) distributing power in their delineated local region. Given this shift and the imperative to understand agility in that context, this thesis treats academic-scientific shortcomings and addresses pervasive managerial issues. It pioneers by combining academic and practitioner agility research to develop an actionable yet also academically profound agility understanding.

8.1.1 Academic Contributions

Academically, this research offers theory elaboration by extending existing research on agility levers with other conceptual ideas of NCT (Bluhm et al. 2011). It addresses a void by analysing agility levers' interplay in generating agility, which, although hinted at (Shams et al. 2021), remains underresearched (Cunha et al. 2020, Walter 2021). Further, it discards academics' manufacturing-bias (Walter 2021) and incorporates culture through mindset levers. Embedding agility research in organisational theory via NCT, following Misangyi et al.'s (2017) recent call for configurational (i.e. NCT) research through QCA, provides an esteemed theoretical basis, raising the attractiveness for future research. This could pave the way for the highly topical agility discipline into top-tier management journals, which usually demand such an esteemed theoretical basis. By discarding the tradition of rigid agility lever frameworks in favour of configurations, each providing an alternative narrative for (non-)agility, a completely new approach to researching agility is proposed which enables exploring levers' 'real' role. In general, this thesis contributes to the strategic management literature by considering structure and strategy, supporting the

claim that dynamic capabilities (DCs) form part of agility rather than vice versa. But it also offers insights for HR literature by incorporating mindsets (i.e. culture) and showing that these are indeed not always a central/filtering lever, and for the IT and even manufacturing agility literature by incorporating technology. With these contributions, this work is an early consistent deployment of Furnari et al.'s (2021) proposed theorising process comprising (1) identifying relevant factors, (2) linking them, and (3) finally naming these configurations and describing their narratives. From a philosophy perspective, this consideration of alternative paths/configurations confirms the suitability of CR, which recommends investigating generative mechanisms and their interplay (Edwards et al. 2014, Tóth et al. 2017), for researching agility.

8.1.2 Practical Contributions

Practitioners benefit from this thesis by better understanding levers' role and how they jointly relate to agility. Strode et al. (2022) argue that practitioners seek concrete paths to agility rather than yet another theoretical model they cannot practically apply. The former is exactly what this research provides: it creates a practical understanding of being non-agile or becoming more agile. Given resource limitations (e.g. management resources, cash, time), utilities could hardly approach all levers at once, especially in case of urgent ad hoc changes. Thus, it is important for them to know what alternative lever combinations are sufficient to achieve agility. Since utilities differ, their managers should select from these alternative equifinal configurations the most viable one considering the existing company setup (i.e. current lever manifestations and what these levers do in interaction) and future ambitions. Practically, this means that for a successful agility implementation, both the concept of agility (including alternative paths) and one's own company (including employees) must be understood. A powerful duo here could be (external-)consultants offering the former and company managers providing the latter – each group on its own would likely fail. This is illustrated in Figure 8.1. Managers should make these considerations before implementing far-reaching changes – especially, they should consider whether a solution that requires an arduous cultural transformation (i.e. C3) is really necessary for them.

Further, the findings for strategy's filtering effect demonstrate that managers under any circumstance must develop and establish an agile strategy. This means that strategic
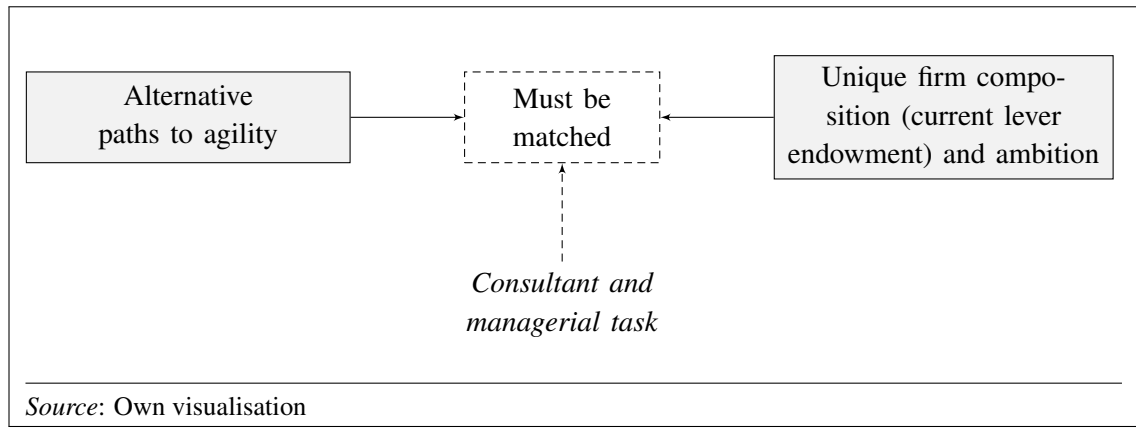
FIGURE 8.1: Considerations for Practitioners

higher-level DCs must always be present to extend energy companies' traditional zero-level capabilities which merely 'keep the company going' (Winter 2003). Simultaneously, to forestall falling into the non-agile category, energy companies should avoid fully non-agile mindsets.

8.1.3 Methodological Contributions

Methodologically, the thesis introduces a strategy for analysing interview data both qualitatively and quantitative-like via fuzzy-analyses. This reflects agility's depth and complexity, but also the systematic lever interrelations. Bluhm et al. (2011, p. 1869) note that research can contribute by advancing "methods in terms of research design and analysis by either setting a high standard [...] or pushing the boundaries into novel or relatively unfamiliar techniques". Furthermore, Bluhm et al. (2011) emphasise the potential value of transferring suitable methods from other research fields to organisational research. Both thematic analysis, with its origin in psychology (Braun & Clarke 2006), and fsQCA, with its origin in country-level research (Ragin 2008), are such methods that are more firmly anchored in organisational research through this research.

Further, this research is an early study to empirically refine the GMET, whose rigour and transparency in deriving fuzzy-values from qualitative themes seems unmatched even in top-tier journals (e.g. Crilly et al. 2012, Vergne & Depeyre 2016). The researcher found it time consuming to fill in this 1-2 page template for each single fuzzy-value (i.e 105 times, resulting from measuring six levers plus agility at 15 energy companies) and there was no shortcut. However, since the necessary time was available, the resulting transparency and reliability outweighed this effort. The quantitative anchor question in the GMET was helpful to check whether the participants really understood the topic.

8.2   Limitations

Despite these contributions, this work encountered general and methodological limitations, which are addressed below. The potential researcher bias limitation is explored in Section 8.4.

8.2.1   General Limitations

The element of ***time and events*** generates limitations. Since change is the essence of agility, also the role of levers might change over time. Consequently, this research should be repeated after some time. Moreover, the data collection (i.e. interviewing) took place between mid-2021 and early-2022. The large external shock that the Russo-Ukranian War with its financial consequences and shortage of cheap natural gas brought to the energy companies thus occurred after the last interview, which means that the resulting experiences and reactions are not reflected in the interviews. Nevertheless, considering the many other changes in recent years, the interviews should reveal the utilities' ability to cope with change.

Another issue is ***generalisability***. By investigating only one industry, theoretical cross-context generalisability is sacrificed for observing how companies facing similar challenges respond differently – i.e. (not) becoming agile and by what means. Although an industry was chosen that should be exemplary for other industries (or at least for other countries' energy industries), it should be clearly recognised that the greatest benefit of this work is indeed for the German energy industry. Nonetheless, with due caution, results could indeed be transferred to other contexts such as other industry sectors or countries. A first approach would be seeking German contexts facing similar issues as the energy industry. Other energy-, CO_2-, and large asset-heavy traditional sectors likewise experience regulatory constraints, are exposed to black swan events, and accordingly face transformation requirements. Examples are the German steel, chemicals, and oil industries. A second approach would be transferring the German findings to the energy industries of similar countries. Especially states with comparable challenges (like the rapid expansion of renewable energies and hydrogen, coal phase-out, and LNG build-out) lend themselves to this. As a starting point, countries should be selected that resemble Germany in dimensions such as their political system, Hofstede's (2022) cultural dimensions, or through

geographic proximity. For instance, transfers to the Dutch, Belgian, or Polish energy industries should be readily possible. Taking into account the impact of partially different geographies and cultural values, further transfers to southern European states like Spain, Italy, or Portugal could be viable. Ultimately, a researcher or manager wishing to make a meticulous transfer to a particular company ought to juxtapose the organisational profile with those covered in this thesis. Despite opportunities for such 'manual' findings transfers – manual in the sense of circumventing to repeat the research – it must be noted that the literature review identified further potential agility levers. These may well more relevant in other sectors, although excluded from this study because of their identified limited impact on the investigated industry.

Further limitations concern the ***research participants*** (energy company top managers) and their selection via purposive sampling. One could expect that mostly managers that are proud of their companies' agility would agree to participate, leading to bias. However, the interviewees were indeed very critical of their firms, so this seems to be no issue as shown especially in the results regarding non-agility. Potentially more critical is that the respondents were selected through existing contact networks. Such access to top managers is almost without alternative, but could lead to a perceived participant obligation. To mitigate bias, the researcher highlighted the voluntary participation. Further, this study relies on the assumption that top managers know and especially understand their company. And indeed, they were comfortable answering all question areas. Still, future research might also include a wider participant group. Finally, there is a risk that corporate responses to Black Swans are being rationalised post hoc by managers (Taleb 2008), meaning they do not explain their firm's general approach to dealing with change but the reaction to a single event. The author mitigated this by explicitly focusing on change in general rather than one specific event. Here, it might even be beneficial that the very specific Ukraine crisis did not yet dominate participants' minds.

A further area of limitations concerns the ***selection and definition of agility levers***. Indeed, many more levers could have been selected for the analysis (e.g. the levers of processes or company purpose from Section 3.3.1). However, the author had to make a pre-selection to give this study focus and to achieve sufficiently detailed results. Therefor he made a pragmatic pre-selection by conducting upstream interviews with industry experts. This limits the generalisability, but makes this thesis very valid for the chosen industry. Further, the broad levers (like structure or strategy) potentially involve many sub-dimensions (Fiss 2011), making it challenging tailor them to agility. Here, the author

chose to identify lever manifestations associated with agility in existing literature – e.g. a sensing and seizing strategy or a decentralised structure.

8.2.2 Methodological Limitations

Also some methodological limitations exist. First, *fsQCA* cannot prove causal relations, but identifies them – proof must come from theory and qualitative evidence (Greckhamer 2016). However, both the thematic analysis and literature review provided such background and mitigated this limitation. Second, the *GMET*, as new tool, must still be established, fine-tuned, and possibly simplified. Yet, the pilot showed that this tool indeed allows structured derivation of fuzzy-values. While its application was time-consuming, it delivered satisfying results. Third, another reservation is the potentially *subjective* determination of fuzzy-scores from qualitative data by the author. While this could not be completely prevented, it was mitigated by (a) the inclusion of a quantitative anchor question for each lever, (b) the very purpose of the GMET to provide transparency, and (c) a random check of some GMETs by a fellow researcher. Fourth, *only 15 organisations* were interviewed (with 36 individual interviews), which is a relatively large number for a qualitative data study, but too few for classical statistical analyses and hypothesis-testing. fsQCA as compromise between qualitative and quantitative could solve this problem. However, as the research field matures, truly quantitative research designs could be used (e.g. moderation models could be explored despite some challenges).

8.3 Future Research

Based on these limitations, opportunities for future research arise. Future research might transfer the findings to other national and industry contexts as described in Section 8.2.1. As this research only covers the energy industry's levers, future work should examine whether other levers (from Figure 3.4) must be shortlisted for other sectors. However, it would also be interesting to dedicatedly explore the implications of the Ukraine crisis on German utilities' agility levers. Further research potential lies in the perspective on agility levers. In line with its practice-oriented DBA character, this thesis adopted a perspective on levers for agility that is known to practitioners but also recommended by academics:

organisational dimensions like strategy or culture. An alternative, more abstract perspective would be performing this research using Teece's (2007) DCs (sensing, seizing, transforming) respectively Baškarada & Koronios' (2018) extended list (sensing, searching, seizing, shifting, shaping) as agility levers. After investigating this second, completely different perspective, a next step could aim to conflate the two approaches in one framework. Beyond that, there is potential for both quantitative and qualitative research. On the one hand, future research could take a more quantitative stance and work with hypotheses to confirm the findings after this thesis paved the way. In this case, random sampling could be used instead of the purposive sampling used here. On the other hand, qualitative deep-dives into the individual solutions could offer additional details. Especially for the arguably controversial findings that culture is not a necessary lever for agility and that lacking agile technology and technology capabilities as part of C2 contribute to agility qualify for further exploration. Finally, longitudinal research could explore in what order firms need to adjust the levers described in the individual solutions.

8.4   Reflexivity

Despite the clearly outlined process, as critical realist, the author openly admits that his own consultant experience with agility and in the energy industry might bias his understanding of agility. Given his experience, he arrived at the conclusion that agility is more than a mere strategy-driven dynamic capability as suggested by Teece et al. (2016), since he learnt agility to be a much wider concept. His daily work evolves around practical topics concerning dimensions like organisational structure, culture, strategy, and leadership. While these have been unequivocally identified as agility levers by existing research, the author's closeness to these dimensions might have led him to focusing on these rather than on even more abstract factors like sensing, seizing, transforming. Nevertheless, this more practical perspective (e.g. focusing on strategy rather than sensing as lever) offers greater value to practitioners, which aligns well with this DBA programme. Simultaneously, the rigorous scientific examination of the energy industry taught the researcher to perform his consulting role in this sector even more objectively and pragmatically.

Appendix A: Figures

Research Information Sheet

Exploring Levers for Agility in the German Energy Industry

Tobin Maurer (Doctoral Candidate)

Edinburgh Business School, Heriot-Watt University

Thank you for participating in the research study as part of my doctorate. This information sheet outlines your involvement and rights. Please read it carefully and then sign the separate consent form. This interview is not about financial data and any information you provide will be anonymised so that neither you nor your company can be identified. Your contribution to this project is valuable, even if you would not necessarily classify your company as agile.

1. What will your involvement be, and do you have to take part?

You will be invited to a virtual interview (60 minutes) about your experience of how your organisation uses (or not uses) 'levers' to become agile. Of course, participation is voluntary. I will ask you to sign the consent form (editable PDF) with your initials and return it (via email) before the interview.

2. How can you withdraw from the study?

You can withdraw from the study at any time. If you withdraw, I will not include the information shared so far unless you agree for me to do so. If you feel uncomfortable with any questions, you do not have to answer them.

3. Will your taking part and your data be kept confidential? Will it be anonymised?

To enable accurate transcriptions, the interview will be audio-recorded. The recording will be transcribed and anonymised. The data will be used for my doctoral thesis, for a possible publication, and for the executive-style summary. Neither you nor your organisation will be identifiable from it. Your data will be anonymised - your name and organisation will not be used. All files, transcripts and summaries will be given pseudonyms and stored separately from names or other direct identifiers. Your participation will remain secret - also from your own organisation.

8. Research Ethics and Data Protection

The data will only be stored on my encrypted laptop and on secure university servers. Following the *University Research Ethics Policy*, data will be stored for the defined minim period of five years, after which it will be deleted. For the purpose of automatised (machine-based) transcriptions, the interview recordings will be temporarily stored on the encrypted servers of *audiotranskription* – an academic transcription tool with German-based servers. After my encrypted download, all data will be automatically deleted from its servers. I will be the only person with access to the recordings and the interview transcripts.

The legal basis used to process your personal data is informed consent. To request a copy of the data held about you please contact me: **Tobin Maurer** (*tm280@hw.ac.uk*).

The *Heriot-Watt University Research Ethics Policy* can be found here: *https://www.hw.ac.uk/documents/research-ethics-policy.pdf*

The *Heriot-Watt University's Data Protection Policy* can be found here: *https://www.hw.ac.uk/documents/heriot-watt-university-data-protection-policy.pdf*

9. What if you have a question or complaint?

FIGURE A.1: Information Sheet (1)

If you have questions regarding this study, please contact me: **Tobin Maurer** (*tm280@hw.ac.uk*).

If you have any concerns or complaints regarding the conduct of this research, in the first instance please contact my supervisor: **Prof. Dr. Stefanie Kisgen** (*S.Kisgen@hw.ac.uk*).

If you are dissatisfied with the response from my supervisor, please contact the Heriot-Watt School of Social Sciences Research Officer: **Dr. James Richards** (*j.richards@hw.ac.uk*).

If you are happy to take part in this study, please sign the enclosed consent form.

FIGURE A.2: Information Sheet (2)

FIGURE A.3: Consent Form

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Interview Guide

Important: This version of the interview guide has been trimmed down to the mandatory questions. The full version, which contains a large number of potential follow-up and second priority questions in case one of the mandatory questions does not elicit the expected response, would have been far too long to be included in this thesis.

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************************************** *
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Turquoise text → mandatory open question   *
Blue text → mandatory rating question   *
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************************************** *
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Interviewee Details
Name. Position. Tenure.

Introduction
- Welcome. Introduction.
- My research project. Definition of agility. Output of the project.
- Focus on the company (not own unit).
- Focus on strategic level (i.e. not individual projects/initiatives) to really learn for the industry. Absolute openness and reflectiveness important - only focussing on what is going well does not help my research.
- Confidentiality agreements/confidentiality.
- Permission for audio recording.
- At the beginning often a rating question on a scale 1-5 where 5 is high.

Understanding agility
- How relevant is the topic of change (in the business environment) in your industry - e.g. also in relation to regulatory intervention?
- On a scale of 1 to 5 (where 1 is very low and 5 is very high), how well is your company prepared for such changes?
- Can you describe how efficiently your company recognises and responds to (or adjusts to) unpredictable changes in order to take advantage of (or recover from) them - e.g. Fukushima (competition/demand/technology)? (reactive/responsive)
- Can you also say to what extent your company proactively initiates (triggers) and drives change/transformation in the industry? (proactive)

Employee mindset: Change-driven org. culture

Interview Guide   1

FIGURE A.4: Interview Guide (1) – Mandatory Questions Only

- On a scale of 1 to 5, how open and willing do you feel your staff and organisational culture are to change?
- How would you describe your organisational culture: Is it geared towards providing stability and continuity or is it change-driven and geared towards dealing with profound changes - why is that?

Leadership mindset: Integrative & developing leadership

- On a scale of 1 to 5, how much does the leadership culture in your organisation actively promote/enhance agility (with topics such as participative/developing leadership)?
- Where do you stand, what role does participative/shared leadership (sharing decision-making power with staff) play in your organisation - is it widespread and wanted to be widespread or not?
- Can you briefly elaborate on the understanding of leadership in your company: To what extent do the leaders in your company feel more responsible for the further development of others (role model function & promotion) vs. traditional leadership responsibility (making decisions etc.)?
- What role does personal development play for your managers and is it expeted (to be able to recognise developments/changes in the market and adapt the company accordingly)?

Sensing and seizing strategy

- On a scale of 1 to 5, how capable do you think your strategy is of achieving both (i.e. dealing with the following paradox): continuity and at the same time the ability to react to change/handle different developments?
- Where do you stand, to what extent is your strategy geared towards identifying (sensing) and anticipating new developments and opportunities/threats?
- Does your strategy allow you to implement changes resulting from new developments and opportunities/threats (seizing) - e.g. by having several strategic options "ready" to change (flexible)?
- How do changes in the external environment affect your strategy - does your strategy change regularly?

New technology

- On a scale of 1 to 5, how ready and competent do you see your company in adopting new technologies and digitalisation?
- What role does technology (non-IT) play in your company when it comes to reacting to or initiating change (power generation/supply/O&M, ...)? Is this rather limiting (path dependencies) or helpful for change?
- How much do you see your staff and organisation being able to use new IT (quickly, to its full extent)? Is IT a barrier to dealing with change?

Strong and diverse linkages

- On a scale of 1 to 5, how well connected would you consider your company to be on average (internally and with external business and supply chain partners and customers)?
- Internal: How are internal connections lived/how is your company internally networked (internal cooperation)? How does your company practice internal cooperation?

FIGURE A.5: Interview Guide (2) – Mandatory Questions Only

- **External:** To what extent and for what purpose do you maintain formal relationships with other actors? To what extent do you cooperate with your customers and other partners in innovation, development, research, or sales (suppliers, research institutes for break-through innovations, government for funding, ...)?

Decentralised structures achieved via enabling bureaucracy – more formal

- On a scale of 1 to 5, how decentralised would you rate your organisational structure?
- What is your perception, how rigid or loose would you characterise the boundaries between functions, units, and divisions in your organisation? And why?
- Moving down to the working level, how cross-functional and (non-)hierarchical are your teams?
- Where and how do you have/use informal structures (enabling bureaucracy) to balance (de)centralisation?

Lever interrelations

- To what extent would you say your concrete, current culture affects strategy, technology, linkages and structure, positively or negatively (in a positive and negative sense when we look at agility) – i.e. the more formal levers we talked about afterwards?

Closing

- How strong/able do you see your organisation to overcome the limited flexibility resulting from large investments (generation sites/power plants, grids, customer base...)?
- What other dimensions that we haven't covered would you see as critical to agility/responding to change?
- Is there anything else you would like to say/comment on?

Interview schedule

3

FIGURE A.6: Interview Guide (3) – Mandatory Questions Only

Appendix B: Tables

TABLE B.1: Agility Concepts Combined

Source	Agility journey
Zhang & Sharifi (1999, 2000)	... combine the three agility concepts in a process for manufacturing firms: Firms face unique sets of agility drivers. By evaluating these via turbulence scores, they can identify their agility need. Next, firms must determine their current agility level and compare this to the desirable level to find the agility gap (Sharifi & Zhang 2001). To approach this gap, agility levers help developing agility capabilities. In their case study of 12 firms, Zhang & Sharifi (2000) find statistical evidence. Nonetheless, their framework remains limited to very specific agility levers: agile practices, methods, and tools. Presumably, this is due the model's pure manufacturing focus.
Tseng & Lin (2011)	... refine this model. To account for agility's fuzziness and multidimensionality, they replace numbered scales by linguistic expressions. "Experts can easily differentiate between high, medium and low. However, it is difficult to judge whether a value (e.g., 0.2) is low or another value (e.g., 0.3) is also low. Therefore, it is easier to use linguistic terms to measure ambiguous events" (Tseng & Lin 2011, p. 3701).
Jackson & Johansson (2003)	... propose an initial step to analyse the external perspective – i.e. the agility need from market turbulence (like Zhang & Sharifi 2000). This discloses "areas where change competency could be important" (Jackson & Johansson 2003, p. 484). The second step seeks internal improvement areas with the highest potential/need for agility given the identified external trends and the firm's strategy. The third step determines the agility capabilities needed for these improvements. Unfortunately, no guidance is given on how to obtain these agility capabilities via agility levers. Also, the model includes no mechanism to connect the steps, making the initial steps seem superfluous as they do not formally influence the outcome.

TABLE B.2: Exemplary GMET – Company 13 – Sensing and Seizing Strategy (1)

Company:	Company 13
Lever:	**Sensing and Seizing Strategy**
Overall case description from lever perspective:	The company has a relatively agile strategy that balances continuity and guides change by giving employees some orientation. Nonetheless, its focus on stability and efficiency remains too large, leading to sometimes missed opportunities. Another limiting aspect is that the strategy is very long-term, limiting the leeway for short-term agile moves. However, by being somewhat unspecific, it still leaves sufficient leeway for agile strategic moves (i.e. it can be easily extended). The strategising process is non-continuous, which is not good for being agile, but which seems necessary to not lose credibility with customers due to too many strategy change. Despite some outlined issues, the strategy is good in sensing the markets for new opportunities and develops creative responses. However, in seizing these identified opportunities, the company partly struggles, as the environment and the faced challenges are so complex that seizing becomes difficult, and it becomes difficult to generate willingness among part of the workforce.

Dimensions:	Context-specific description	Direction/effect on membership	Intensity/relative importance	Illustrative quote(s)
New strategy good balancing guiding change (i.e. guiding people) and keeping continuity	The company strategy provides the employees guidance where they should work towards and rethinks existing business (supports change) while it does not just abandon the existing (i.e. good balance of change and continuity)	Positive	Very high	"on the one hand, [strategy] does of course enable, as we have a clear purpose and so on. We have clear core objectives and clear targets." "We must [...] completely rethink, find new business models in many areas [...] and we must enter into new cooperations. That's why I think our strategy is already geared towards this and also, I would say, very strongly supports this change." "ok, of course we still have to make sure that the targets are met here and so on and so forth'. That means just shutting down everything and building anew on the basis of renewable electricity - that's not going to happen, of course." "I think [balancing stability and change] is good with us. I find that really good"
Strategic focus on efficiency and availability (old business model)	The lived strategic focus on stability and security of supply is too large, resulting partly missed opportunities and a too strong focus on old business models – but this seems to be no problem occurring everywhere	Negative	Medium	"Well, our strategy is relatively simple. We have to generate CO2-free heat and electricity by 2040, and we have to do it in growing markets and as profitably as possible. ()" "in terms of stability and availability, which, in my opinion, is still too important in some cases. I believe that because of this focus on availability, we sometimes do not perceive certain chances and opportunities properly and perhaps we are still too rigid." "also with regard to new business models or new technologies. That we are sometimes too fixated on old models."
Long-term strategy, but...	The strategy has a long-term focus which might limit the leeway on the short-term for agile moves – but this is unavoidable in this industry, still...	Negative	Low	"But the basic idea is that we want to grow long term. We want to grow in the long term, as, let's say, the outstanding CO2-free energy producer. So our strategy is geared towards the long term, not the short term." "In the long term. So all strategy papers and all the cooperation agreements, they are always 2030, 2040, 2050 - in other words, for the next two or three years, that's not very promising for an energy supplier."
... new strategy can be extended with as it leaves leeway (making fast decisions)	... the strategy defines a general direction (e.g. for new investment types), but leaves leeway for agile strategic moves as it is sufficiently unspecific to be extendable with new opportunities/projects	Positive	Medium	"the trick is, or the concept behind it, that the strategy as such means ‹strategy slogan›'. So, that means that this is first of all very generalistic [...] and what that allows is that you can interpret this as North Star, this guiding principle, in different ways."

TABLE B.3: Exemplary GMET – Company 13 – Sensing and Seizing Strategy (2)

Non-continuous strategising (meaning too rigid for changing environment)	The company has only an annual strategy review (i.e. non-continuous) which is fine for some areas where credibility would be lost with too regular strategy change, but which is too rare for more dynamic areas	Negative	Medium	"But if you classify it accordingly and say okay, '<strategy slogan>' and you have a new project, yes, then see how that fits into the strategy and that is always such a checkpoint. Well, you just integrate a new project into a corresponding strategy. But that works well." "No, this is a normal [strategy] review, annual review." "That means that the strategy is being reviewed and is being checked and adapted accordingly. [...] This is an [annual] rolling procedure" "I think that when it comes to my area now, yes, [the annual strategy review] is quite sufficient. I believe that if this were to change even more, we would also lose certain credibility, also vis-à-vis our stakeholders." "In various other areas, especially when it comes to developing new digital solutions or any other additional services, for example, implementing smart technologies and smart devices, it would probably make more sense to adapt the strategy to new trends and new market situations."
Good sensing the market and creativity for responses	The company has active sensing as part of its strategy implemented and hence seeks for new markets as new opportunities – thus, it has good ideas where to go next	Positive	High	"So the strategy, of course there is a strategy that means 'we look into the market, we look at competitors', of course that happens." "of course there is something like a strategy department and of course you look at new business areas" "So of course we are already looking at the markets, so for example we are also trying to look at what other markets, sales markets we have." "So there are enough ideas about what you could do, what direction you would go in"
Careful in seizing as leeway limited (complexities and regulation)	Seizing works less good than sensing as developing products/services from the sensed is not yet really good and as the environment is so complex that seizing is difficult, and it becomes difficult to generate willingness	Negative	High	"To really use that [sensed] in terms of further development, i.e. in the sense of I'll look at what I can do, what I have and try to develop new services, new products from that', that doesn't happen particularly structured and is accordingly not particularly strategic." "we want to go green now, our clear strategy, which means we have to generate various new generation facilities. There are given so much in complex challenges." "But the willingness to implement these new business areas with the corresponding entrepreneurial will is usually where it ends."
Supporting quantitative data	3.5 (on scale with 1 to 5 where 5 is highest)			
Set membership in 6-value fuzzy set	0.6 ('more in than out')			
Reason for fuzzy-set attribution score	There is a combination of positive and negative dimensions with an overall positive tendency. Most importantly positively, the company has an agile strategy balancing change and continuity. However, a negative dimension outlines a caveat as the company is still keen on stability. The next negative dimension of having a long-term strategy seems to have only a low negative impact since the subsequent positive dimension shows that the firm still has enough strategic leeway for agile moves. In contrast, the following dimension on non-continuous strategising might really have a negative impact by being insufficient for dynamically changing areas. The dimensions on sensing and seizing are interesting: While a positive dimension shows that sensing works very well, a negative dimension argues that the company partly struggles with seizing. In total, the overall strategy seems agile with smaller caveats, whereas the sensing-seizing dimensions draw a mixed picture. As also the average quant. rating for the question on the sensing and seizing strategy is 3.5 (on the 1 to 5 scale), which rather high, but clearly on the lower side for the strategy dimension compared to the other firms, it was decided that the company is 'more in than out' (0.6) of the set of organisations with an agile sensing and seizing strategy.			

TABLE B.4: Lever calibrations (1)

	0.0	0.5 (*max. ambiguity*)	1.0
Agility	The company is neither good at reacting to unpredictable sudden and predictable long-term changes, nor is it able to proactively drive change for the industry. Hence, the firm is simply inflexible.	There is a certain balance between dimensions that indicate an agile company and such that indicate a non-agile company (see the calibration of this lever for 0.0 and 1.0).	The company excels at both, reacting to the change it faces (be it sudden or long-term) and proactively triggering change itself.
Culture (CULT)	The culture focuses more on stable energy supply (i.e. stability) than on delivering change (often two conflicting ends). Many employees have a long company history, meaning they are still used to the former, stable monopoly situation. Thus, neither employees' personal mindsets nor the mindset conveyed by the company are change-driven.	There is a certain balance between dimensions that indicate a change-driven and those speaking for non-change-driven employee mindsets (see the calibration of this lever for 0.0 and 1.0).	Employees do both, they understand the requirement to change, and they are willing/enthusiastic and able to live and shape this change. Therefore, employees offer a personal/intrinsic drive for change which combines with a change mindset embedded in the company itself.
Leadership (LEAD)	The leadership mindset counters company change efforts. Traditional, directive, top-down leadership still dominates, there is little evidence of developing leadership, and leaders themselves are hardly developed to face the unstable future.	There is a certain balance between dimensions that indicate shared and developing leadership mindsets and such that do not (see the calibration of this lever for 0.0 and 1.0).	Leaders are open for change and do act upon it. They share their (decision-)power where possible/appropriate and develop and coach their employees. Finally, there are both corporate programmes and a personal drive by leaders to develop themselves further.
Strategy (STRA	The strategy is not geared towards change and a flexible future. It struggles with sensing changes and seizing changes (pro-)actively. The strategy development happens rigidly at predefined points in time without reviews in between.	There is a certain balance between dimensions that indicate a sensing and seizing strategy and such that do not (see the calibration of this lever for 0.0 and 1.0).	The strategy allows for combining change with continuity. It actively senses for change and seizes such changes to achieve an own competitive advantage. The strategy is continuously under review and development.

TABLE B.5: Lever calibrations (2)

	0.0	0.5 (*max. ambiguity*)	1.0
Technology (*TECH*)	Remaining path dependencies from current assets mean that the firm struggles developing new technology capabilities and transforming its asset portfolio to become future-ready. Further, the firm struggles with new IT applications and digitalisation in general – i.e. it is at best an IT adopter.	There is a certain balance between dimensions that indicate strengths with asset technology and IT and such that indicate difficulties (see the calibration of this lever for 0.0 and 1.0).	The company breaks asset path dependencies by divesting or converting the current assets and by adding/developing new assets – i.e. it drives industry-wide change in this regards. The company introduces new IT solutions with ease and its employees are willing and capable using them.
Linkages (*LINK*)	The company finds it difficult to maintain linkages with external partners and quickly establish new ones when needed. Internally, the divisions are isolated as they hardly collaborate and coordinate on issues that are relevant to several divisions.	There is a certain balance between dimensions that indicate good external and internal linkages and such that suggest difficulties (see the calibration of this lever for 0.0 and 1.0).	The company is embedded in a wide network of external partners (peers, suppliers, politics, customers) and, if required, it can quickly establish new linkages. Internally, the areas are well aligned and cooperate across the internal value chain.
Structures (*STRU*)	Decision power and organisational structures in general are centralised, denying areas the leeway to act upon their individual challenges. Simultaneously, structural silos prevail (although this seemingly conflicting with centralisation). There is no enabling bureaucracy like financial incentives available to substitute insufficiently formal agile structures.	There is a certain balance between dimensions that indicate decentralised formal structures and enabling bureaucracies and such that indicate difficulties (see the calibration of this lever for 0.0 and 1.0).	The business areas can act agilely upon their individual challenges; the company centre rather takes a supporting, coordinating role. There are no harmful silos. Enabling bureaucracy complements these formal agile structures.

TABLE B.6: fsQCA Truth Table for Agility (Excluding Structures)

CULT	LEAD	STRA	TECH	LINK	Agility	Raw cons.	Cases
0	1	1	1	1	1	1	Company 6 & 15
1	1	1	1	1	1	1	Company 3 & 9
1	0	1	1	0	1	1	Company 1
1	1	1	0	1	1	1	Company 4
1	0	1	1	1	1	1	Company 12
0	1	1	0	1	1	0.94	Company 10
0	0	1	0	1	1	0.90	Company 11
0	0	1	1	1	1	0.86	Company 7
0	0	1	0	0	1	0.86	Company 13
0	1	0	0	0	0	0.78	Company 14
0	0	0	0	1	0	0.73	Company 2
0	0	1	1	0	0	0.69	Company 5 & 8

Comment: Only the black lines meet the consistency threshold (consistency $\geqslant 0.85$)

TABLE B.7: fsQCA Truth Table for Non-Agility (Excluding Structures)

CULT	LEAD	STRA	TECH	LINK	~Agility	Raw cons.	Cases
0	1	0	0	0	1	1	Company 14
0	0	0	0	1	1	1	Company 2
0	0	1	1	0	1	0.94	Company 5 & 8
0	0	1	0	0	1	0.86	Company 13
1	0	1	1	0	0	0.82	Company 1
0	1	1	0	1	0	0.81	Company 10
0	0	1	0	1	0	0.81	Company 11
0	0	1	1	1	0	0.77	Company 7
1	0	1	1	1	0	0.69	Company 12
0	1	1	1	1	0	0.67	Company 6 & 15
1	1	1	1	1	0	0.61	Company 3 & 9
1	1	1	0	1	0	0.60	Company 4

Comment: Only the black lines meet the consistency threshold (consistency $\geqslant 0.85$)

TABLE B.8: fsQCA Intermediate Solution (Excluding Structures)

		Levers					Config. Statistics		
	Config.	CULT	LEAD	STRA	TECH	LINK	Cons.	R. cov.	U. cov.
Agility	**C1**			●		●	0.82	0.90	0.15
	C2			●	⊗		0.83	0.59	0.02
	C3	●		•			0.96	0.61	0.02
	Solution consistency: **0.80**; *Solution coverage:* **0.95**								
non-Agility	**C4**	⊗	⊗			⊗	0.90	0.56	0.29
	C5	⊗	⊗	⊗	⊗		1.00	0.32	0.06
	C6	⊗		⊗	⊗	⊗	1.00	0.32	0.06
	Solution consistency: **0.92**; *Solution coverage:* **0.68**								

Following Ragin (2008): ● = core lever (present); • = contributing lever (present);
⊗ = core lever (absent); ⊗ = contributing lever (absent); empty = does not matter

Appendix C: Qualitative Analysis

This appendix provides supportive interview extracts, which have been excerpted from Section 6.2 for ease of reading.

C.1   Supporting Material for CULT

Low CULT rating

Company 5:

These quotes show regulatory issues, reflecting in the culture, which are common in traditional German industrial companies:

> "Yes, but from cultural perspective, we are more stability and continuity driven against the backdrop of security of supply, issues like that."

> "The issues of governance and guidelines and regulations [for co-determination] mean that a tanker [...] like an energy supplier is difficult to turn around."
>
> — Company 5

The following interview passage comments on employees' personal worries with change:

> "But many also have a capacity to persevere as they have worries and needs and fears and insecurities associated with leaving the comfort zone."
>
> — Company 5

This snippet illustrates how employees become tired of change:

> "When you talk to staff here 'yet another restructuring' or 'yet again we have to work differently', 'yet again we have to change something'. It's just perceived as a big burden and not as a necessity."
>
> — Company 5

Company 8:

This interviewee explains that change-driven employees are stalled by others:

> "Even if the people, that 60% [...] who want [change] make the whole team, the team structure is not right then, because maybe the manager is among that 40% [who do not want change] [...]. That means no change happens."
>
> — Company 8

The upcoming quotes reveal similarities between company 5 and 8 regarding their low CULT ratings:

> "If you do the same thing for 30 years and someone comes and says 'actually you have to do it differently, this is better', [you are reluctant], that just has to do with you've done it all this time, you've done it this way for 30 years."
>
> "We are a system-critical company, [...]. If something goes wrong here, the power goes out [...]. Stability is very important."
>
> — Company 8

This interviewee statement suggests the company's risk-aversion as reason for its excessive planning:

> "And as we don't take any risks, we try planning everything 1000 times and planning it better [...], there is no room for creativity, [...] since you want to do [...] everything perfectly, it always must be checked by 1000s of people."
>
> — Company 8

High CULT rating

Company 3:

The following excerpt shows how the change culture is both formally defined and lived:

> "And the willingness [...] is very high, because for many there is an understanding of the need existing in the energy industry to change and a willingness to contribute to actively shaping this change process."
>
> — Company 3

These interview extracts describe the engineering focus and the 'One P&L' approach:

> "We are naturally change-driven and also curious about change, which is also reflected in our very strong engineering focus."
>
> "The '<interviewee's company> way' is [...] an overall P&L. [...] That motivates and helps to be faster, as everyone thinks about the big picture."

184

— Company 3

The upcoming quotes criticise some employees' fear of job loss, even in companies that rather have a change culture:

> "We certainly still have people who, [...] because it's about their own job, their own future, perhaps have a certain attachment to the old ways."

> "If someone works in a coal-fired plant in Germany's middle of nowhere, they either work in that plant or nowhere else in the energy industry."

— Company 3

Company 4:

This statement describes how employees and their culture live ambidexterity:

> "But they are also very willing to jump between the spaces [of change and stability]. And that has changed a lot in the last [...] years."

— Company 4

These quotes outline why some employees develop no change culture:

> "There are just <xxx> people with great jobs and more to lose than to gain."

> "We achieve our [...] shareholders' expectations, [...] so there is less reason to say 'we urgently need to change'."

— Company 4

This interview extract explains how a change mindset is currently further establishing:

> "The willingness to change has become greater in recent years [...] because the organisation has of course learnt that it CAN change things."

— Company 4

This participant describes how inappropriate success monitoring for innovative areas partially limits their potential:

> "We have boards for our start-ups, and the financial controller sits there [...] and tells them 'I don't like what you're doing on the EBITDA side at all'. [...] That describes it well, which worlds collide there. And that is flawed."

— Company 4

C.2   Supporting Material for LEAD

Low LEAD rating

Company 5:

These excerpts depict the company's efforts to improve the leadership mindset and management's support in this process:

> "There are many cultural initiatives underway addressing precisely this issue, i.e. the leadership change [...] and how to accompany this."

> "Signs of the times are recognised early on at high management level [...] and actions are aligned accordingly."
>
> — Company 5

These quotes outline the dominant non-shared leadership and its impact:

> "Despite knowing better or being asked to, a strongly hierarchical leadership of a top-down decision-making culture remains."

> "At middle management level, it delays or even prevents agility because people cling to their fondly held competences and power structures."
>
> — Company 5

This extract criticises that the insights from leadership trainings are not practically applied:

> "It is not that offers for [...] training in leadership or development of other leadership cultures are not used, but that they are not implemented."
>
> — Company 5

Company 8:

This quote lists existing efforts to establish agile leadership:

> "Leadership receives a lot of training, is supported by coaches, external coaches, HR, change managers or whatever."
>
> — Company 8

This interviewee complains about leaders' lacking role modelling:

> "What one tries to propagate, what would be useful to achieve business agility, doesn't happen as it is not exemplified, or it is not allowed."

— Company 8

These quotes show that neither is leadership development tailor-made, nor do leaders leave enough room for development:

> "Employee development [...], how do I make my people better, is at a very low maturity. [...] In terms of budgets, we go around with a watering can."

> "The head of HR development forbade her own employees to come to my training, even though she had the training specially designed for her staff."

— Company 8

This participant notes the inappropriate development of leaders:

> "So far [leadership development] is left to oneself. Obviously, you can go to HR and say 'hey, this is super important to us', [...] but no one will approach you and say 'hey, you must do some training or something in this area'."

— Company 8

High LEAD rating

Company 3:

The excerpts highlight the existent agile leadership which is, however, partially constrained by financial bottlenecks:

> "The leadership [...] contributes to bringing about a culture of change."

> "There is, I think, much more of a balancing act between what is desirable and what is, let's say, financially feasible."

— Company 3

This interview section praises that developing leadership is well implemented:

> "This [coaching leadership] is also one of the factors repeatedly asked in [...] annual employee surveys [...]. And these are very positive evaluations."

— Company 3

This quote mentions that shared leadership is well implemented and lived:

> "In this respect, the [participatory leadership] is, I would say, unavoidable, or simply provided for and established in the process."

— Company 3

This extract explains that despite shared leadership, the major decisions are still made centrally:

> "The overarching guidelines and so are very clearly decided centrally."
>
> — Company 3

These sections describe the current developing leadership efforts which, however, lack some practical enforcement:

> "Development, there are many initiatives. It is an essential part of all our management approaches."
>
> "There is a lot of lip service [regarding developing leadership]. [...] There is still a lot of room for change and improvement."
>
> — Company 3

Company 14:

The upcoming quotes outline the limitations of some managers and the lacking alternatives to replace these managers with:

> "With our power plant managers in Germany, for example, I see clear limitations. Yes, they grew up in such a hierarchical world."
>
> "I could say, I'll switch these [managers], [...] that's always very difficult, [...] it's even more difficult to answer the question 'yes, who will do it then'."
>
> — Company 14

This quote depicts how the company lives shared leadership despite its safety requirements:

> "Safety thinking in the plants [...] is strong, but for me that is not in conflict [with shared leadership] since the thinking employee [...] thinks himself about how to implement HSE (Health, Safety, Environment) every day."
>
> — Company 14

The following sections elucidate how both some lower-level leaders cling to their power and how some employees are unwilling to take additional responsibilities:

> "I discussed with a plant manager [...] if I [as CFO] should lead a certain area or he should continue. It was important for him to manage it."
>
> "Not every employee can be reached [with shared leadership]. Then we come back to the fact that some are preparing for retirement."

— Company 14

This interview extract praises how power plant leads interpret their role as coaches:

"I think the power plant heads see themselves in this coaching role."

— Company 14

The quote below demonstrates a misperception around leadership development which exists among few lower-level leaders:

"I have sometimes had the experience that people always look at leadership in terms of what good possibilities their own superiors do not use and do not think much about 'I am also in the leadership role, what could I do'."

— Company 14

C.3   Supporting Material for STRA

Low STRA rating

Company 2:

These excerps elucidate the firm's risk-aversion and exploitation strategy:

"We are in a wait-and-see position and look 'is this concrete enough for us to move'? I think that's also a bit of a weakness [...]. We are very risk-averse."

"So, all new business models, [...] at least in the short term, in the medium term, yield much less results than existing business models. And clearly, we try making best possible use of existing business models."

— Company 2

The following statements reveal the weakness in sensing and struggles with seizing:

"But there is no methodical sensing or anything like that, even though we have tried various approaches there so far."

"Since we do [...] a lot in parallel, and [we have] very, very scarce personnel resources, there is the danger things don't get implemented, or too slowly."

— Company 2

The ensuing quotations indicate that the company is fast after having made a commitment:

> "Until we get to the point where we must change, it's relatively slow, but when we get to [...] saying [...] 'we have to do it', then it goes quickly."
>
> — Company 2

These excerpts express how no strategic alternatives are considered:

> "We are absolutely convinced of our thematic fields, so that we do not even talk about strategic options for the time being."
>
> — Company 2

Company 14:

This quote identifies the shareholder's non-strategic thinking as central issue:

> "Our strategy's limitation is our shareholder [...]. Because unfortunately we have shareholders who think very unstrategically."
>
> — Company 14

The excerpts exemplify that the company is still good at sensing:

> "Despite our only <less 1000> employees, we've a broad network, we actively follow market trends. We are connected politically, so we've possibilities."
>
> "Employees were also very surprised at the speed with which we were able to develop these site concepts [for our site conversions]."
>
> — Company 14

The subsequent lines identify the shareholder as bottleneck to implementing an agile strategy through seizing:

> "Implementation [...] does not fail due to our people, [...] but it fails afterwards, since our shareholder does not give us clear guidance here."
>
> — Company 14

These extracts identify external factors and lacking manpower as further reasons for weak seizing of change:

> "We are very strongly inhibited by the coal phase-out. We can't concentrate on our business alone, work step-by-step, only market-driven, but we have tough legal requirements."
>
> "We lack the resources [for seizing and partly sensing]. It's of no use just hiring 10 or 20 more people, but finding the RIGHT people. [...] So, we have great ideas, but we are still struggling to get the horsepower on the road."
>
> — Company 14

High STRA rating

Company 12:

These quotes provide evidence how a recent acquisition enabled an agile strategy and how the company now balances continuity with change:

> "The [long-term strategy] was unclear before the [new acquisition] [...] – both on the power plant side and in terms of personnel (laughter). That's over."

> "The balance – i.e. we want to generate energy sustainably – is very strongly anchored in that we respectfully look back at our roots but know that we have to move forward. [...] This is very well reflected in the new strategy."
>
> — Company 12

Quote showing the decentralised continuous strategy development:

> "Going forward, we'll have a [...] focus point in the year for an overall strategic process, but nevertheless the OpCos will still have to plan continuously."
>
> — Company 12

This quote gives insight into how the company strategy excels at sensing opportunities and translating these into actions:

> "We have a very strong focus in our strategy on actively playing the market. This includes observing the market and following trends."

> "The growth strategy is backed by clear figures [...] to grow in renewables and drive decarbonisation [...]. We must identify massive opportunities, translate them into projects, and so on. [...] All this is anchored in the strategy."
>
> — Company 12

These excerpts outline the firm's strength seizing and the required financial resources:

> "In execution [...] we are fast, after identifying something, full speed ahead."

> "The capital markets are also convinced, we're definitely liquid to implement the growth path - keyword strategy 'going green' - there."
>
> — Company 12

The ensuing quotes criticise the struggles with some investors and asset path dependencies – yet, both is mitigated by the decarbonisation strategy:

> "There is a growing trend for activist investors to buy in and exert pressure."

> "[Our strategic focus is] long-term. [...] The energy industry must take a long-term view anyway. All with significant CAPEX commitments, you have an assetlife time of 25-35 years, so quarterly orientation / that doesn't help."

> "Well, we have a clear decarbonisation path that fundamentally re-structures the company's portfolio."

> — Company 12

Company 15:

These examples show the decentralised continuous strategising and the supportive central coordination:

> "[Strategising happens] more in the individual areas, [...] which are driven forward individually and are actually updated continuously."

> "Through the strategy area we try coordinating [...] just a little bit, so that it doesn't run completely apart."

> — Company 15

This interviewee praises the good sensing:

> "[Sensing] is pronounced. [...] The regulations and work in associations, this is future-directed. [...] With this process, we know early what the framework conditions might be and can align ourselves accordingly."

> — Company 15

This snippet show the successful work with scenarios:

> "We work with scenarios, we have a scenario setup that we use, monitor, review and also develop further, and accordingly anticipate the development and then make strategy adjustments based on it."

> — Company 15

These passages demonstrate the strategic flexibility resulting from working with scenarios and the resulting accelerated implementation speed:

> "By considering so many variants and then narrowing down, we always have other options available before making the final decision [...]. That's why we can look back relatively quickly and say 'what would plan B have been'?"

> "I would say that our implementation in the last two years is proceeding at an insane pace and is being pursued very stringently."

— Company 15

These statement describe the benefit of the new owner's strategic thinking but also the partially resulting path dependencies:

"Because we are now city-owned and have different return requirements than [...] in the private sector, profit maximisation is no longer the primary goal, but to [...] decarbonise the entire city [...] we are very long-term oriented."

"[We are bound long-term] simply because the construction projects take so long anyway [...], we actually have to look very long term."

— Company 15

C.4 Supporting Material for TECH

Low TECH rating

Company 14:

These extracts show how the company owner limits the firm's technological leeway:

"We can't [divest existing assets] at all. Yes, since our current investors would [...] pull all our money out [...]. And in this respect, we can only do what we do with these assets and on the basis of these assets."

— Company 14

The following snippet describes the company efforts to break the path dependencies:

"We have worked out corresponding conversion projects – of course we are still working on some parts, but we are very, very far along conceptually."

— Company 14

These passages explain the long way to really implement the conversion projects:

"We certainly know that we have to go further [with these concepts] in the next step [...]. So we are thinking about it, but we are still a long way off."

— Company 14

This quote refers to the lack of experts within the workforce for new IT:

"As small firm we lack the right people. [...] For every IT infrastructure, you need not only IT specialists, but also business people. We lack both."

— Company 14

These statements ultimately identify the company as mere IT adapter, rather than an IT innovator:

> "In the digital age, [...] you either require sufficient competences yourself, or simply the size to buy them in accordingly. We are actually adopters. I don't even want to say we're early adopters. Yes, we simply adopt what we have."

— Company 14

Company 10:

The upcoming interview statements show the general struggles with new technologies and the many older employees, which prefer continuity, as central issue:

> "So [with new technology we are] at most at a two [out of five], since change processes are [...] not welcomed. [...] There are reservations against change."

> "There are others [...] saying '[the new technology] doesn't interest me, [...] this is the plant I've been living for 20 years and if it runs for the next 15 years, that's my thing [...] but I don't have to be part of this development'."

— Company 10

These snippets identify the capability to extend existing assets, but also the still remaining overarching inability to fundamentally change the asset portfolio:

> "We [...] took a stake in a start-up to link small plants, small PV and wind parks with our large power plants. [...] And that's where we're really good."

> "The problem is that we have grown historically and we are asset-based. Yes, so in this respect, we can't just say 'we'll get rid of it'."

— Company 10

These extracts outline the successful development of new additional assets by 'internal externalisation' into a new business area:

> "We have founded a small engineering subsidiary that is now doing this project development in renewables. [...], when the projects are finished, they hand it over to us, and we then operate and market it [...] and it works great."

> "[For the new technology areas] you tend to find younger colleagues who think 'that's exactly my thing, I want to be a part of that, that's the future'."

— Company 10

These lines identify the employees' emotional attachment to old IT systems as problem:

> "[IT competence] is rather an obstacle as people would very much like to continue doing what they have always done. That's just the DNA."

> "We have people who have been working in the system for 20 years. When we say, 'hey, the system no longer exists [...]'; so it first has to click, and that's not quite so easy."

> — Company 10

The ensuing excerpts argue that the pandemic supported the firm's digitalisation to some degree, but also that the firm still leverages only little of the potential offered by digitalisation:

> "Just because of the change pressure of the pandemic, we have actually become used to virtual conferences [...] relatively easily. That went pretty quickly."

> "Our assets are equipped with so many sensors and information providers that generate a huge amount of data. [...] You could get much more out of this."

> — Company 10

High TECH rating

Company 1:

Subsequently, it is shown that the employees understand the need for new technology and IT and are willing to use it:

> "Technology is THE driver, that's understood. That means that the worker who has been sitting in front of his beloved ISU system for perhaps 20 years – i.e. a traditional SAP system – has also understood that's not the future."

> "Willingness to use or invest in new technologies is high."

> — Company 1

This example illustrates that the a few employees lack the capabilities to fully apply the new technology:

> "But in implementation, it is SOMETIMES extremely difficult, [...] because perhaps the right competences are not there, [...] where I say: 'recognised, decided correctly to do something. Implementation could have been better'."

> — Company 1

These extracts demonstrate that IT systems were a hurdle to one acquisition integration, but also that since COVID-19, the company is continuously improving in the area of new IT:

> "In the context of [our acquisition's] integration, [...] it's simply not possible to boot the new staff into the systems in a way that functions seamlessly."

> "[During COVID, IT was] really strong, helpful and also [...] tool landscape, Teams, Miro, whatever, the workers have that / that runs very well."

> — Company 1

Company 9:

The ensuing snippets reveal that the company successfully breaks asset path dependencies by finding a buyer for these assets:

> "But basically, once we have invested in a technology in our field, [...] we usually (laughter) talk about very long-term financial or investment decisions."

> "In the examples I've seen, the plants were sold / somehow natural gas filling stations were sold. Exactly, it seems that we've always found someone."

> — Company 9

This quote explains positive learning effect from past successful IT introductions:

> "I believe that with the experience gained from the introduction of new systems and so on, the willingness to adopt new systems grows."

> — Company 9

This short quote highlights the support provided by the IT department:

> "... internally, automation and the introduction of new IT, that is always accompanied quite well by the IT department and also works wonderfully."

> — Company 9

The following example admits that also this firm sometimes fails with its IT efforts:

> "That doesn't mean our IT projects all run smoothly. There are experiences that I'd rather not describe now, since they are so sobering and sad."

> — Company 9

C.5   Supporting Material for LINK

Low LINK rating

Company 5:

These lines demonstrate that the company is a good at having both formal and informal (trust-based) external linkages:

> "Both. Well, there are joint ventures [...] and joint organisations. But there are also initiatives, esp. in association work, [...] it's more on a trust basis."
>
> — Company 5

This snippet criticises a prevailing aversion against non-in-house work, which is only slightly improving:

> "In-house was best, and everything you did yourself was the best anyway, [...] so that's getting better right now – it's improvable, but it's getting better."
>
> — Company 5

This interview fragment illustrates the company's strong ties with the home region:

> "We are a very regional company and quite anchored in the region, in <home region> [...], being honest we are very well connected there."
>
> — Company 5

These passages reveal the negative effects on internal linkages from switching to virtual meetings during COVID:

> "[Internal networking], though, has seen a weakening due to COVID."
>
> "It's different speaking with Teams than to meet in person. There's little time for personal exchange, for getting to know each other, for questioning."
>
> — Company 5

This brief extract shows how the work with individual area KPIs counters internal linkages:

> "Everyone thinks of KPIs, of course, which normally means that everyone thinks in their own area."
>
> — Company 5

Company 13:

These statements explain the limitations to internal linkages from insufficient internal cooperation and interestingly from laking English-speaking capabilities:

> "We need this larger international coherence. We may have an international organisation, but we still have our borders. [...] It is important that we continue to promote this internationalisation, this exchange."

> "Although we have English as corporate language, [...] to expand [internal linkages], English skills in Germany should expand much more. That everything is only in English and employees can exchange information."
>
> — Company 13

The ensuing lines show how the company still overall achieved good internal linkages from diverse efforts:

> "In addition, we have various programmes, but also various events, to build up such networks internally."

> "I have a contact person for every topic, [...] for wind energy, other renewables, battery storage, hydro, even the nuclear guys [...]. All this is possible, and as a rule it is also promoted, especially through corresponding programmes."
>
> — Company 13

This extract illustrates the overly cautious and slow formation of new external linkages:

> "Larger linkages, of course, are a bit more time-consuming. It's always a question of where's the journey going, how much effort to put in at the start."
>
> — Company 13

This interview statement notes how differently capable the company departments are to establish external linkages:

> "Yes, being networked to the outside, that's another cultural story and it also depends VERY much on the individual departments."
>
> — Company 13

This citation mentions the positive exception in this company's mostly bad external linkages; namely, political linkages:

> "We're doing well in the area of politics, as we are very strongly regulated. [...] At federal or state level, we have our networks there."
>
> — Company 13

High LINK rating

Company 3:

This excerpt explains the external linkages to counter the negative impact from regulations and politics:

> "Political exposure is very high. We've very intensive contacts with political stakeholders. [...] We actively shape this, but [...] you also see the will of politicians to be in dialogue with us."
>
> — Company 3

The following justifies the close collaboration with suppliers:

> "We also work very closely with OEMs, the [...] Lead Engine Concept, we provide our machines for OEMs to experiment on them [...], so we have a head start of one or two years [before the innovation becomes broadly available]."
>
> — Company 3

These snippets shed light on how the company balances situational vs. long-term and formal vs. informal external linkages in a flexible manner:

> "Both [...] we have long-standing partnerships with [our OEMs] [...] but for innovation, we join forces with someone who is dealing with the question [...]. That is somehow a situational question."

> "[External linkages] are mostly set up formally due to [...] very strict compliance requirements [but] [...] trust-based and informal in a regular exchange with people [...] on some topic in some association or interest group."
>
> — Company 3

These interviewee statements argue for supportive internal linkages du to the 'One P&L' approach; these linkages have been limited by COVID but are now formally supported:

> "Our 'One P&L' promotes, forces close internal cooperation because [...] this requires a commitment from at least three, four core neighbouring areas."

> "Certain things have changed with Corona, because exchange was easier. [...] That doesn't work today, [...] we really haven't found a solution yet."

> "We support cross-functional exchange through benchmarking, etc., institutionalised functions, [...] which ensure that the exchange exists, that transparency is created, for example, in quarterly meetings."

— Company 3

Company 4:

These lines exemplify the diverse application of external linkages:

"[We are] very well connected with other energy suppliers, but also with other players in the infrastructure market."

"[We use linkages for] recognising trends and also using the trends for us to set strategy points."

"One is superbly externally linked to associations, politics, and regulation."

— Company 4

These extracts give insight into the required improvements to linkages outside from Germany:

"What needs improvement is looking into international business. [...] We are very German and underestimate what's going on in other European countries."

"But [do we] know a company like Octopus for example, except for a few people, yes, which actually has a huge footprint in the UK? Less."

— Company 4

This quote points to the the inadequacies of the operational units' internal linkages:

"Where it could be better, [...] cooperation at the operational level, there should be much more going on, it should be more loose than rigid."

— Company 4

C.6 Supporting Material for STRU

Low STRU rating

Company 8:

These extracts allude to insufficient cross-functional teams and inappropriate structural project setups for agile work:

"So even in IT there are no cross-functional teams; or sometimes developers work on ten projects simultaneously."

"We do classic annual [project] budgeting and there are resource negotiations. Well, who is allowed to work where, how, with which project."

— Company 8

The ensuing statements provide positive examples of conducive structures for decentralisation:

> "There is a very, very large innovation department with many decentralised and, yes, freely operating centres of excellence."

> "Heads of department, they are responsible for [project] implementation, and that is bottom-up."

— Company 8

Company 13:

These snippets outline the ambition but also the failure of efforts to establish decentralised decision structures:

> "There are very clear value limits [for decentralised decisions] - that is, on the one hand, risks [...] or it is a decision of particular consequence."

> "Personally, I sometimes have the impression that too much ends up at the top, that the value limits [of the DoAs] are sometimes too low."

— Company 13

These citations argue how structural silos combined with rigidly centralised decisions result in insufficient coordination; but, positively also allow to addressing very different customer needs:

> "It would make more sense not to be so siloed to coordinate how best to generate and deliver a service or product for the customer."

> "It's good to be independent, because everyone should [...] act for themselves to exploit the different markets' potentials best [...]. Because, as I said, there are also different customers, there are different stakeholders or regulations."

— Company 13

The following excerpt identifies the current structure as too complex for the current business environment:

> "Perhaps you could also call it a mismatch between the complexity of the business and the organisational structure."

— Company 13

These extracts comment on the failure to leverage the motivating effect of financial incentives as informal structure:

> "We do have certain incentives now. But [...] not at the lower staff level, that has even been abolished. We used to have a certain variable remuneration."

> "But it is the positions that really matter, like senior power plant or maintenance managers, for whom the incentive system does not fit at all."

> — Company 13

High STRU rating

Company 4:

This interview snippet exemplifies that its sometimes the employees that are not fully ready for decentralised decisions:

> "It has happened that the board said, 'Well, yes, that's interesting, but you could have decided that yourself'. People THINK it still must be so formal."

> — Company 4

This quote introduces the central support offered:

> "But that can also be, e.g. [...] a centrally located unit that takes care of digital technologies [...] And that tends to be more centralised."

> — Company 4

This extract criticises that financial incentives are limited to the leadership levels:

> "In the management area, we have a variable share, which is also based on various topics, [...] but it is not yet broken down to the operational level."

> — Company 4

This passage explains the broad lack of further enabling bureaucracy:

> "There are [formal] guidelines, a company agreement, a collective agreement, a / well, we don't work with agile topics like INFORMAL structures yet."

> — Company 4

Company 5:

The following lines demonstrate that the new structural decentralisation has great advantages but also leads to some silos:

> "You have all necessary for individual business units to react quickly and adequately. They have the competences and possibilities to react."

> "Due to [...] silo thinking, we can't get into such a [...] procedural mindset to tackle the issues quickly and back them up with clear responsibilities."

— Company 5

The ensuing interview statements identify differing salary structures as hurdle to fully abandon/bridge silos:

> "We are trying to make ditches smaller and smaller as organisation and to build many bridges to cross so you don't have the hard edges anymore."

> "We must eliminate these conditions, e.g. different wage structures, preventing us from working together in cross-functional teams permanently."

— Company 5

This quote notes that despite existing structural decentralisation, the central decisions are still centralised:

> "Despite knowing better or being asked to do so, a strongly hierarchical leadership of a top-down decision-making culture remains [for main decisions]."

— Company 5

C.7   Supporting Material for Agility

Low Agility rating

Company 5:

This excerpt reveals the lacking shared understanding of agility as central issue:

> "With agility, [...] are we now talking about agile collaboration, which differs from agile project management, which again differs from agile organisation. We don't have common images there. Hence, we often talk past each other."

— Company 5

These brief quotes identify both the inability to be an industry-wide driver of change, but also the mitigation strategy of focusing on being proactive in small areas:

> "So I think we are [...] not always at the front of the chain, at the top."

> "We then try, I would say, to [proactively] occupy niches in these topics."

<div align="right">— Company 5</div>

These interviewee statements illustrate the ambidexterity of measuring existing business along financial performance and giving new business leeway to deliver in the future:

> "The existing business is managed more in a performance-oriented manner and drilled for efficiency and stabilisation."

> "[New Business is] generating knowledge for these topics, such as e.g. H2, electro mobility, onshore, these are all topics that I think are very long-term."

<div align="right">— Company 5</div>

These snippets show the failure to make the required structural changes without externalising these changes through spin-offs:

> "Well, when it comes to changing the actual operational business, there are clearly high inhibitions about making these changes."

> "We founded start-ups or spin-offs to implement ideas. Why? (laughter) [...] That's a clear indication that we don't dare to change the organisation."

<div align="right">— Company 5</div>

Company 8:

These lines comment on the efforts to establish changeability and proactivity:

> "I think it was recognised that we would have to do a lot of things."

> "There's a very, very large innovation department with many decentralised and freely operating centres of excellence - so in very different areas [...] and we have a very committed team of [...] young innovation managers."

<div align="right">— Company 8</div>

The following citations identify why the employees do not like change and other hurdles to changeability:

> "People don't necessarily understand WHY [to change], because in the end it's also about jobs, and I don't think they are as open."

> "We're not adaptable, as we lack the internal processes, flexibility and mindset to do things differently and the conviction that we can continuously improve."

> "I must wait long for even the smallest decisions, which [...] delays topics."

<div align="right">— Company 8</div>

These quotes argue that the operational area is indeed open for change, but the management is reluctant to implement this change:

> "The area, I would say, where our core business is, has been recognised and is much more responsive than in the other areas."

> "The management is very open to these issues, but they are very, very, very careful about what they implement and what not. Because maybe the management is also afraid that they get backlash from the organisation."
>
> — Company 8

This short extract mentions the downside of externalising change and agile efforts:

> "Whenever you want to work in this [new, agile] way and do something new with the staff, we always say 'no, we have an external consulting firm'."
>
> — Company 8

High Agility rating

Company 9:

This passage explains the prevailing ambition to be a regional driver of change:

> "[We've a] regional [focus] since our business is regional. Hence, we can't fulfil any national or international needs, but [...] it's our <home> [...] where we try being a pioneer with our ideas and strategic initiatives [...]."
>
> — Company 9

This snippet identifies internal and external aspects that drive the company towards change:

> "It's political and social events that affect the company, but also within the company itself - strategy, strategy projects, strategic orientation, which then also give more drive."
>
> — Company 9

These quotes show the the company is good at recognising change but has some weaknesses to fully react then:

> "And I'd say [we're] good at recognising that change, good at analysing it."

> "There is room to improve, to become even more open, transparent, agile, to absorb the changes even more, without becoming arbitrary, without becoming erratic, without panting after every trend."

<div align="right">— Company 9</div>

Company 15:

The following interviewee statements provide evidence for the merger's benefits for agility:

> "We've been removed [...] from <former owner>, and much changed because decision-making paths became much, much shorter, the hierarchy flatter, and this has enabled much more agility."

> "That is one of the great advantages of the merger: There are new people who think differently, who are younger, who work differently."
>
> <div align="right">— Company 15</div>

This extract elaborates on the ambition to be the agile, driving force in a clearly delineated space:

> "We strongly believe that [our specific business] forms part of the strategy to decarbonise metropolitan heat infrastructures, and I think we have been quite a front-runner in that respect."
>
> <div align="right">— Company 15</div>

This snippet indicates that the the company considers all time horizons on which the company might require reactions to change:

> "You look in the short term that there are no problems now, then you look in the medium term that you procure replacement options, and then you look at the long-term things. I think we are doing very well here."
>
> <div align="right">— Company 15</div>

This interviewee notes that some individual employees are still surprised by the radical change:

> "[We were] very, very sluggish, very stable over a period of time, [...] now [with the energy transition], we have a change with a force that could have been foreseen - still, its explosive nature coming now surprises some."
>
> <div align="right">— Company 15</div>

This interview extract identifies the rigid assets as hurdle to an agile company transformation:

> "The [big obstacle to agility] is more in the operational areas due to the large assets that simply hold you back."
>
> <div align="right">— Company 15</div>

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