Changing Organizational Routines

Antecedents, Processes, Outcomes

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1 Introduction

This dissertation examines the antecedents, processes, and outcomes of organizational routine change and argues that organizational context is underappreciated in routine research. Context matters because it helps explain when, why, and how routines change. Organizational routines represent the primary means through which organizations perform and prevail, and can be found in such diverse tasks as hiring new employees (Rerup and Feldman, 2011), assembling cars in automobile plants (Adler, Goldoftas and Levine, 1999), and conducting surgery in hospitals (Edmondson, Bohmer and Pisano, 2001). Changing organizational routines has implications for the efficiency, quality, and flexibility of an organization's production and service-delivery processes (Becker et al., 2005). Therefore, changing routines is a matter of interest to management scholars and practitioners alike, as documented by recent bestselling books (Duhigg, 2012) and a steady annual increase in research publications[1] and recent special journal issues (e.g., D'Adderio et al., 2012; Felin et al., 2012). Change in routines touches on strategic, organizational, and behavioral issues. To address these levels of analysis, I have organized the chapters of this dissertation as five self-contained studies rather than a single-study monograph. While each chapter may therefore be read as a distinct research effort, the common thread among them is the enabling and constraining role of context in organizational routine change. They theoretically argue and empirically demonstrate that routines change within an organizational context and that these contextual antecedents influence processes and outcomes of routine change itself. This first chapter will introduce organizational routines by providing an overview of the historic development and current streams of routines research. Building on this literature review, I will demonstrate that current empirical routine research largely neglects the role of context when examining routine change. To highlight how each subsequent chapter addresses this research gap, I conclude the introductory chapter with a brief outline of the research presented in the following five chapters.

[1] Web of Science (2013) lists 830 relevant publications between 1974 and 2013, with approximately two-thirds of this research being published within the last ten years and a peak of 74 publications in the year 2012. My search was based on the keywords "routin*" and "chang*" in the title or topic and drew on three citation databases (Science Citation Index Expanded, Social Sciences Citation Index, and Arts & Humanities Citation Index). To exclude publications irrelevant to this thesis (e.g., in civil engineering), I refined my search to the categories management, business, economics, operations research management, and sociology.

1.1 History of Routines in Organization Research

Organizational routines are usually defined as repetitive and recognizable interdependent activities involving multiple actors (Feldman and Pentland, 2003; Parmigiani and Howard-Grenville, 2011). This short definition provides criteria for identifying the phenomenon we call *organizational routine*. However, it does not provide an explanation of when, why, and how organizational routines change. In order to answer these questions, a theory of organizational routines is required (Sutton and Staw, 1995; Feldman and Pentland, 2003). Throughout the history of organization research, scholars have agreed on the vital importance of routines for organizations (Stene, 1940; Cyert and March, 1963; Thompson, 1967; Nelson and Winter, 1982). However, their assumptions and interests in studying this phenomenon have differed fundamentally in the past (Cohen et al., 1996; Lazaric, 2000) and continue to differ in present research (Felin and Foss, 2011; Winter, 2013). This disagreement has created a fruitful cornucopia of economic, sociological, and psychological theories on organizational routines (Parmigiani and Howard-Grenville, 2011) while also severely hampering our progress in developing a common theory of organizational routines (Becker, 2005a; Feldman and Pentland, 2008a; Winter, 2013). The present chapter reviews the historical development of the routine concept. My review of the historical routine literature serves two purposes: One, it documents the central role of organizational routines in the twentieth century core readings on organization theory. Two, it demonstrates when, why, and how organization research shifted from a notion of habit and custom emphasizing change and flexibility to a notion of organizational routines emphasizing inertia, inflexibility, and the need for exogenous routine change. I elaborate on these two aspects because these developments bring forward two distinct perspectives on organizational routines to which this dissertation will contribute.

1.1.1 Habit, Custom, and the Emergence of the Routine Concept

Organizational routines emerged from the concepts of *individual habit* and *collective custom* (Hodgson, 1999; Becker, 2002; Cohen, 2007b). Individual habit and collective custom are repetitive and recognizable (interdependent) human activities (Camic, 1986; Biggart and Beamish, 2003) and have been studied in philosophy (e.g., Hume, 1777; Kant, 1787; Hegel, 1830) and social theory (e.g., Durkheim, 1893; Veblen, 1899; Weber, 1922). The implications of habit and custom for human conduct were of particular interest to the pragmatist movement in philosophy (e.g., James, 1890; Dewey, 1922; Commons, 1934; Peirce, 1934). For example, Dewey emphasized the distinction between lively habits that grow "more varied, more adaptable by practice and use" and pathological "dead habit"

which captures rote activity and mindless repetition (1922: 71, 72). The pragmatists more generally emphasized that individual habit and collective custom change through their performance, due to the reciprocal interplay of human action and perception (James, 1890; Dewey, 1922; Neal, 2008). For these forefathers of routine research, individual habit and collective custom are therefore neither unitary nor inherently stable entities. As I demonstrate below, early organization researchers (e.g., Simon, 1947) referenced the work of Dewey (1922) and James (1890), but understood habit and custom in quite different ways (Cohen, 2007a). Only recently have these original thoughts been revitalized in the generative-systems perspective on organizational routines (e.g., Birnholtz, Cohen and Hoch, 2007; Cohen, 2007b; Winter, 2013).

As precursors of organizational routines, habit and custom were also analyzed in the context of organizations (Camic, 1986; Biggart and Beamish, 2003). These attempts were made by early social theorists interested in studying the societal implications of industrial production. For example, Weber employed habit and custom in his studies on discipline and obedience in large-scale economic organizations (Weber, 1922; see also: Weber, 1995) while Veblen (1898a; 1899) analyzed changes in productive activity habits. While both researchers explore the economic implications of habit (Camic, 1986), Veblen elaborates in detail on the role of habit in evolutionary economic change (Veblen, 1898b; a; 1899). Veblen's ideas later found their way into the influential work of Nelson and Winter (1982) on organizational routines as genes (Hodgson, 1999). The habits and customs of workers also became the subject of popular management concepts (Becker, 2002). For example, Taylor (1911) adopted an extreme behavioristic notion of habit in the popular concept of Scientific Management. He had observed that the working habits of many blue-collar employees were guided by "rule-of-thumb methods" and represented a major source of inefficiency in production processes (Taylor, 1911: 16). While Taylor emphasized that workers should be encouraged to "suggest improvements," he also made clear that "the workman is not allowed to use whatever implements and methods he sees fit in the daily practice of his work" (1911: 128). Instead, he suggests that changing working habits required exogenous interventions by knowledgeable engineers. Obviously, Taylor's (1911) rote conceptions of habit are in clear contrast to the inherently dynamic concepts of habit explored earlier by the pragmatists (e.g., James, 1890; Dewey, 1922). While Taylor (1911) had established patterns of (inter)action as unit of analysis in organizations, the term *organizational routine* only began to diffuse in the literature after the First World War (Becker, 2002). In the initial phase of this diffusion, researchers did not develop an explicit theo-

ry of organizational routines, but integrated the term in their theories of executives (e.g., Barnard, 1938) and economic change (e.g., Schumpeter, 1926).

Following the formation of organization research as a distinct field of scientific inquiry during the Second World War, an increasing number of scholars attempted to develop a theoretical model of organizational routines. Extant literature attributes to Stene (1940) the first work that explicitly incorporates routines into an organization theory (e.g., Gersick and Hackman, 1990; Feldman and Pentland, 2003). Stene (1940: 1129) defines organizational routines as "[…] that part of any organization's activities which has become habitual because of repetition and which is followed regularly without specific directions or detailed supervision by any member of the organization." He conceptualizes routines as coherent and inherently stable entities that are changed by mechanisms exogenous to the routine. Stene (1940) makes a sharp distinction between organizational routines and actions governed by deliberate decisions, an understanding that subsequently took hold in the literature (e.g., Katona, 1946; Machlup, 1946; Penrose, 1952). These researchers conceptualized routines as inflexible action patterns that stood in contrast to "genuine business decisions" (Katona, 1946: 46) which are based on "careful calculations of differential revenue and cost" (Machlup, 1946: 524). In the following four decades, two important theories of the firm placed organizational routines front and center, with one approach applying a behavioral perspective (Simon, 1947; March and Simon, 1958; Cyert and March, 1963) and the other an evolutionary one (Nelson and Winter, 1982). Both reinforced the connotations of organizational routines as naturally "unitary and unchanging" (Feldman and Pentland, 2003: 97).

1.1.2 Behavioral Theory Approaches to Organizational Routines

The book *Administrative Behavior* (Simon, 1947) is the first encompassing publication setting an agenda for a behavioral research program on organizations, later followed by *Organizations* (March and Simon, 1958) and *A Behavioral Theory of the Firm* (Cyert and March, 1963). These works together became "tremendously influential" for later organization research (Gavetti, Levinthal and Ocasio, 2007: 523). While most research at that time focused on describing organizations or diagnosing their inefficiencies (e.g., Gulick and Urwick, 1937), Simon (1947) identified decision making as the central explanatory element in organization theory (see also: Barnard, 1938; Stene, 1940). Drawing on psychology and sociology, the research advanced by *Administrative Behavior* and the subsequent works *Organizations* and *A Behavioral Theory of the Firm* shares a common interest in "the 'limits to rationality' with which the principles of administration must deal" (Simon, 1947: 40). These limits emphasize that adminis-

trative decisions follow less from calculation and distant forecasts and more from proximate feedback and past experiences (Gavetti et al., 2012). To process proximate feedback, store past experiences, and economize on scarce cognitive resources, Simon (1947: 100) introduces organizational routines as an *artificial* organizational counterpart of individual habit. In developing his notion of organizational routines as artificial habits, he references the work of the pragmatist philosophers Dewey (1922) and James (1890), yet at the same time significantly deviates from pragmatist conceptions of habit (Ansell, 2002; Cohen, 2007b; a). While Dewey (1896; 1922) emphasized the inherently dynamic and manifold nature of habit, Simon (1947: 88) emphasizes that artificial habits are not "objects of reconsideration." This understanding entrenched the idea that routines are unitary entities that save scarce cognitive resources and substantially influenced to routine concept in *Organizations* and *A Behavioral Theory of the Firm*.

Organizations (March and Simon, 1958) and *A Behavioral Theory of the Firm* (Cyert and March, 1963) introduce *performance programs* (programs) and *standard operating procedures* (procedures) as observable manifestations of Simon's (1947) inherently stable and coherent organizational routines. In these models, organizational routines (i.e., programs and procedures) primarily "serve to economize on bounded rationality" (Gavetti et al., 2007: 527). Accordingly, programs and procedures are "most likely to be treated as fixed" because they "give stability to the organization and direction to activities that are constantly recurring," such as "How does the part get fabricated?" and "How are the books kept?" (Cyert and March, 1963: 103). Similar to the notion of organizational routines advanced in *Administrative Behavior*, programs and procedures allow organizations to execute complex actions without any apparent effort spent on searching for alternatives, solving problems, or deliberating over choices (March and Simon, 1958; Cyert and March, 1963). For example, Simon and March (1958: 160) theorize that if environmental stimuli have frequently been experienced in the past, the stimulus will evoke little "computational activity" (ibid: 161) in the organization. Instead, the organization will select an appropriate response from the program repertory, and execute the response along the lines of the selected program. While programs and procedures are embedded in the minds of organization members, the employees' discretion in responding to the stimulus remains a function of the specificity, form, content, and completeness of the program or procedure, thus deemphasizing the agency of routine participants (March and Simon, 1958; Cyert and March, 1963). Accordingly, the behavioral theory approaches to organizational routines emphasize the importance of routines for organizations to function while also reinforcing the notion that organization

members have little discretion in executing programs or procedures. Routine change and routine execution are conceptualized as strictly separate processes.

While these researchers consider programs and procedures to be inherently stable, they acknowledge that organizations can change routines based on an adaptive-rational process (March and Simon, 1958; Cyert and March, 1963). This process promotes and reinforces routines that achieve or exceed aspiration levels, while routines that fall below aspiration levels are scrutinized by the organization. More specifically, when a program or procedure fails to achieve an expected outcome, the organization initiates a search process for alternatives and replacement becomes more likely (Cyert and March, 1963; for an early empirical investigation, see: Manns and March, 1978). Such adaptive-rational processes provide a foundation to organizational learning based on proximate performance feedback (Fiol and Lyles, 1985; Levitt and March, 1988; Greve, 2003). Learning operates on routines as entities, either by recombining programs or procedures that are already in existence or by elaborating new programs or procedures (March and Simon, 1958; Cyert and March, 1963). However, as exemplified by statements such as "planned search is relatively unimportant in inducing changes in existing solutions that are viewed as adequate" (Cyert and March, 1963: 121), the behavioral theory in general conceptualizes a comparatively passive model of organizations (Rerup and Feldman, 2011). These works contributed much to the "crystallization" (Becker, 2002: 253) of organizational routines as unitary and unchanging entities. However, the behavioral theory did little to explore the mechanisms that cause organizational routines to be inherently stable and relegated exogenous routine change to adaptive "firefighting" mechanisms. The mechanisms causing routine stability and exogenous change are elaborated in more detail in Nelson and Winter's (1982) treatment of organizational routines as genes in *An Evolutionary Theory of Economic Change* published over three decades after *Administrative Behavior*.

1.1.3 Evolutionary Economics Approaches to Organizational Routines

The behavioral perspective outlined above views organizations as decision-making units tied to established organizational routines (Simon, 1947; March and Simon, 1958; Cyert and March, 1963). Nelson and Winter's (1982) *An Evolutionary Theory of Economic Change* also assumes that organizational routines capture the regular and predictable behavior of a firm. However, their work shifts the focus from intra-firm decision-making routines to populations of organizations with heterogeneous routine repertoires. In doing so, Nelson and Winter (1982: 134) describe organizational routines as "genes" that are carried by organizations. Companies with a superior set of organizational routines will do better

than other companies with inferior organizational routines (Nelson and Winter, 1982). Organizational routines become (imperfectly) replicated across organizations while the organizations' competitive environment selects routines that foster evolutionary fitness (see also: Aldrich, 1979; Nelson and Winter, 2002; Hodgson and Knudsen, 2004). Overall, these researchers emphasize the active interplay between the external organizational context and internal organizational routines as constituents of an evolutionary process of economic change (Hodgson, 1999).

Nelson and Winter (1982) develop their routines concept based on an analogy to individual skill. By individual skill, they mean "a capability for a smooth sequence of coordinated behavior that is ordinarily effective relative to its objectives, given the context in which it normally occurs" (Nelson and Winter, 1982: 73). Examples of skills are the ability to play tennis well or to evaluate job candidates (ibid). Skills incorporate tacit knowledge (i.e., intuitive knowledge acquired by practical experience that cannot be communicated), which introduces rigidity into the behavioral repertoire of individuals (Polanyi, 1958; 1967). Once individuals have acquired a skill, reflections on and conscious interventions in skill-based performances become harder (Bargh and Chartrand, 1999; Squire, 2004). Analogous to the skills concept, organizational routines may contain a significant level of tacit knowledge that constrains the extent to which they can be changed, replicated, or copied by other organizations (Nelson and Winter, 1982). However, because routines are collective phenomena, they also go beyond the analogy to individual skill. More specifically, organization members with potentially divergent interests must be motivated to participate in an organizational routine (see also: March and Simon, 1958: 84-136). Nelson and Winter (1982: 107-112) bypass this motivational issue by postulating that routines are "organizational truces." They argue that any attempt to break such truces may cause larger latent conflicts among organization members to reemerge, causing a "fear of breaking the truce" that disciplines routine participants (Nelson and Winter, 1982: 112). Therefore, organizational routines are considered to be largely self-enforcing, self-sustaining entities. Due their deep embeddedness in the internal organizational context, routines as conceived by Nelson and Winter (1982) are inherently difficult to change (Pierce, Boerner and Teece, 2002). On a more general level, Nelson and Winter (1982) metaphorically (by introducing the notion of routines as genes) and theoretically (by emphasizing mechanisms such as truces) enforce the notion of organizational routines as inherently stable entities.

However, Nelson and Winter (1982) also significantly advance our understanding of the directed and undirected mechanisms through which organizational rou-

tines can change. Considering the impact of individual routine participants and undirected change, they highlight that the loss of an employee with idiosyncratic skills and knowledge may cause an undirected routine change. With regard to directed change, Nelson and Winter (1982: 116) acknowledge that a routine participant "trying to do a better job can presumably accomplish something more than 'undirected change,'" thus acknowledging the agency of routine participants. However, given that a single routine participant will most likely lack a comprehensive understanding of the whole organizational routine and (inter)dependent entities, beneficial directed change by a single individual is highly unlikely. As a result, control processes in organizations tend to resist most attempts at endogenous routine change (i.e., routine change caused by the routine participants). So while Nelson and Winter (1982) theoretically introduce endogenous routine change to their model, they remain highly skeptical that it is empirically feasible by routine participants. Instead, most routine change will be directed from the organizational level.

More specifically, Nelson and Winter (1982) propose that higher-level search routines can cause intentional mutations in the organization's repertoire of organizational routines in order to strategically position the organization in a dynamic environment. Enacting such search routines may uncover routine modifications or new routines in the environment that may yield higher anticipated profits. The authors (1982: 17) highlight search routines conducted selectively by departments for market analysis, and operations research, or any organization member that from time to time "may engage in scrutiny of what the firm is doing and why it is doing it, with the thought of revision or even radical change." They suggest that routines on the operating level ought to be considered as a means to achieve stability and reliability, while search routines on the strategic level of the firm ought to be considered as means to achieve directed change in operating routines. In contrast to behavioral theory concepts of routine change that emphasize feedback-triggered problem-solving and incremental learning (Simon, 1947; March and Simon, 1958; Cyert and March, 1963), Nelson and Winter (1982) argue that organizations may intentionally affect their evolutionary development and long-term survival by strategically altering their operating routines over time. Herein lies one major contribution of Nelson and Winter (1982): While organizations are constrained in their ability to evolve, they may also intentionally seek out routine change. Organizations pursue exogenous routine change while also implementing mechanisms that prevent routine participants from initiating endogenous routine change.

In concluding this historical review, I want to highlight how past organization research has conceptualized organizational routines as inherently stable and coherent entities. Core readings in organization theory have associated routines with artificial habits (Simon, 1947); performance programs (March and Simon, 1958); standard operating procedures (Cyert and March, 1963); and genes (Nelson and Winter, 1982). Such unitary-entities approaches emphasize that organizational routines require an exogenous mechanism to change (Meyer, 1982; Pentland and Feldman, 2005). Building on these notions of routines as unitary and unchanging entities, studies have demonstrated that organizational routines contribute to organizational inertia (Hannan and Freeman, 1984), suppression of deliberation in novel circumstances (Gersick and Hackman, 1990), and mindlessness (Ashforth and Fried, 1988). Around the end of the twentieth century, such unitary-entities approaches had become the dominant conception of organizational routines (Pentland and Feldman, 2005; Salvato and Rerup, 2011). In the subsequent chapter, I demonstrate how empirical findings caused some researchers to question this established understanding of routines. I present current research on routine formation, contingencies of endogenous routine stability and change, and organizational outcomes of routines. This review provides the foundation for exploring the neglected but relevant impact of context on organizational routine change addressed by my thesis.

1.2 Contemporary Research on Organizational Routines

Contemporary research encompasses two distinct streams of work on organizational routines (Pentland and Feldman, 2005; Parmigiani and Howard-Grenville, 2011; Rerup and Feldman, 2011): the *unitary-entities* perspective and the *generative-systems* perspective. Each stream pursues distinct interests and explanations in their study of organizational routines and draws on different concepts from the history I have outlined above. On the one side, organizational economists tend to conceptualize routines as unitary entities (Hodgson and Knudsen, 2004; Salvato and Rerup, 2011). This perspective falls into the tradition of Simon (1947) and the behavioral theory of the firm, later substantially refined by Nelson and Winter (1982). These researchers focus on the firm level, and are mainly interested in organizational outcomes of routines, such as their impact on company-level performance (e.g., Zollo, Reuer and Singh, 2002; Bottazzi et al., 2010; Romme, Zollo and Berends, 2010). On the other side, organizational sociologists and psychologists are more interested in studying how organizational routines operate in practice and how stability and change emerge endogenously from what routine participants actually do (e.g., Feldman, 2000; D'Adderio, 2003; Turner and Rindova, 2012). While this latter perspective shows great ontological and epis-

temological heterodoxy, it mainly conceptualizes routines as generative systems (Rerup and Feldman, 2011). In the following chapters, I briefly introduce each of the two perspectives, as this dissertation contributes to both streams of research.

While the conception of routines as *unitary entities* largely emerged from theoretical work (e.g., Nelson and Winter, 1982), the routines as *generative-systems* conception emerged from empirical observations of how individuals perform organizational routines (Becker, 2004). In organizational settings that seemed to foster organizational routines of "mind-numbing stability" (Feldman and Orlikowski, 2011: 1244), researchers revealed routines that were not mind-numbing but effortful accomplishments of routine participants (Pentland and Rueter, 1994; Lazaric and Denis, 2005; Turner and Rindova, 2012) and that exhibited endogenous routine change (Feldman, 2000; D'Adderio, 2008; Anand, Gray and Siemsen, 2012). For example, Feldman (2000) conducted a longitudinal case study on the hiring, training, budgeting, and move-in routines in the residence halls of a large university. She found that routine participants changed routines when routine outcomes fell short of ideals or when undesired outcomes resulted. Her findings suggest that the impetus for routine change results not from exogenous triggers, but rather comes about from performing the routine by the participants. These exploratory research efforts suggest that the agentic nature of routine participants should be moved to the foreground (Pentland and Rueter, 1994; Feldman, 2000). In exploring the implications of these emerging perspectives, some researchers have begun to question the *unitary-entities* perspective for ignoring the internal structure and dynamics of routines (Feldman and Pentland, 2003; Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011) and have brought forward consistent qualitative and quantitative evidence that organizational routines provide the potential to generate both stability and change, making them a *generative system* (e.g., Feldman, 2003; Howard-Grenville, 2005; Pentland and Feldman, 2008a; Pentland, Hærem and Hillison, 2010).

To explain both stability and change as properties of organizational routines, researchers have drawn on diverse literatures, including Dewey's (1922) notion of habit and custom, Giddens' (1979; 1984) structuration theory, and Bourdieu's (1977; Lave, 1988; 1990) concept of habitus (e.g., Pentland and Rueter, 1994; Feldman, 2000; Birnholtz et al., 2007). These literatures differ considerably in their assumptions and interests. However, the routine research that emerged from these efforts commonly distinguishes between a level of action and a level of representation that constitute every routine (Becker, 2005a; Cohen, 2012). Similar to other phenomena (e.g., human language), organizational routines are therefore comprised of an unobservable generative structure (e.g., knowledge about gram-

mar) and observable expressions (e.g., utterances) (Pentland, 1995; Miller, Pentland and Choi, 2012). For example, Feldman (2000) introduced the distinction between the ostensive (i.e., representative level) and the performative (i.e., action level) aspect of organizational routines. The performative aspect represents "specific actions, by specific people, in specific places and times" while the ostensive aspect represents an "abstract, generalized idea of the routine" (Feldman and Pentland, 2003: 101). The performative and the ostensive aspect of a routine are mutually interdependent. Following the notion of agency, the performative aspect creates, maintains, and modifies the ostensive aspect, while routine participants use the ostensive aspect to guide, account for, and refer to the performative aspect (Feldman and Pentland, 2003). Through the mutually constitutive relationship between the ostensive and performative aspect "*the development of the routine occurs through the enactment of it*" (Feldman and Orlikowski, 2011: 1245, original emphasis).

Research following the generative-systems perspective emphasizes how organizational routines operate internally (Parmigiani and Howard-Grenville, 2011). Previous research employing laboratory studies (e.g., Cohen and Bacdayan, 1994; Egidi and Narduzzo, 1997; Loch, Sengupta and Ahmad, 2013), qualitative (e.g., Feldman, 2000; Howard-Grenville, 2005) as well as quantitative (e.g., Pentland et al., 2010; Pentland, Haerem and Hillison, 2011) field studies, and simulation models (e.g., Miller et al., 2012; Pentland et al., 2012) has provided evidence on processes that operate inside routines. However, given that organizational routines operate within organizations, this begs the question when, how, and why organizational routines bring about relevant organizational outcomes (Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011). Addressing these meso-level outcomes seems pertinent, since the *unitary-entities* perspective provides convincing empirical evidence that organizational outcomes, such as the competitive advantage of companies, are affected by organizational routines (Adler et al., 1999; Rindova and Kotha, 2001; Helfat et al., 2007). Because of these incomplete understandings, in the following subsections I first review research from the generative-systems perspective on the formation and endogenous dynamics of organizational routines. I establish an argument that routine participants and organizational context may foster endogenously stable organizational routines. Building on this notion, I then present research from the unitary-entities perspective on organizational outcomes of routines.

1.2.1 Formation

To observe the formation of an organizational routine, we have to observe the formation of repetitive and recognizable interdependent activities that involve

multiple actors (Feldman and Pentland, 2003; Becker, 2005b). Interdependent activities become recognizable when single interdependent actions form a coherent sequence. Interdependent activities become repetitive when a similar sequence of interdependent actions occurs across more than two observations (Pentland et al., 2010; Pentland et al., 2012). The conceptual literature suggests that organizational routines form as a "natural product of action" (Feldman and Pentland, 2003: 98) when multiple actors face the challenge of solving similar and recurring tasks using coordinated interaction. Given that organizations avoid "enact[ing] routines with no attention to the purposes of the work […]" (Birnholtz et al., 2007: 328), organizations enable some actions and constrain others, making it more likely that routine participants execute some actions while avoiding others (cf. Adler and Borys, 1996; Faraj and Xiao, 2006). Artifacts, such as information and communication technologies, may serve as channels that shape the interactions among routine participants (D'Adderio, 2003; Lazaric, Mangolte and Massué, 2003; Pentland and Feldman, 2007). Patterns of interaction will form as routine participants choose to take the easier actions and avoid actions that seem harder (Feldman and Pentland, 2003), thus reinforcing memory of specific patterns of interaction.

Empirical research recognizes that "the emergence of routines is difficult to observe and has only rarely been examined" (Loch et al., 2013: 100). Accordingly, the literature provides little empirical evidence on routine formation (Lazaric and Denis, 2005; Dionysiou and Tsoukas, 2013). However, established organizational routines have been observed in diverse settings, addressing a broad spectrum of simple and complex as well as rare and frequent tasks. Examples include municipal solid-waste collection (Turner and Fern, 2012; Turner and Rindova, 2012) and medical-service units (Edmondson et al., 2001; Faraj and Xiao, 2006), where tasks arise daily or weekly, and other settings, such as summer camps (Birnholtz et al., 2007) or university housing (Feldman, 2000; 2003), where tasks recur annually. This research implies that organizational routines may form under a considerably broad spectrum of conditions addressing tasks of strikingly different frequency and complexity—depending on the structures and resources the organization provides for the execution of recurring interdependent tasks (cf. Pentland and Feldman, 2008a).

Whether the formation of organizational routines does depend on the nature of tasks performed is subject to ongoing debates (e.g., Pentland, 2011; Felin and Foss, 2012; Pentland et al., 2012; Winter, 2013). However, recent simulation studies substantiate the claim that organizational routines may form around any recurring interdependent task. Miller et al. (2012) conducted an agent-based sim-

ulation study where routine participants with heterogeneous skills coordinate to solve a series of problems. The nature of tasks is exogenous to the model and varied from a series of identical problems to completely random problems across time. This study was complemented by Pentland et al. (2012) in another simulation study. They modeled tasks as completely endogenous, based on a history matrix incorporating prior task experiences and varying degrees of random variation. While both simulation studies show that organizational routines may form without further consideration of the nature of tasks (Pentland, 2011), they also emphasize that organizational routines only form when task experiences are memorized (Pentland et al., 2012). Three types of human memory—declarative, procedural, and transactive—are involved in the process of routine formation (Cohen, 2012; Hecker, 2012; Miller et al., 2012). Together, they can be considered approximations to what some researchers taking a generative-systems perspective label the *ostensive aspect* (Miller et al., 2012). Below, I briefly describe how routine formation impacts each type of human memory, as the following subsection builds on this differentiation.

Humans use their declarative memory to store knowledge about facts, events, and propositions; knowledge that is frequently termed "know-what" (Tulving, 1972; Cohen, 1991; Edmondson et al., 2003). Accordingly, declarative memory allows humans to consciously recall specific experiences or general factual knowledge (Costello, 2008). Individuals use their declarative knowledge to make sense of situations, such as interpreting problems faced in an organizational routine and inferring appropriate responses (Weick, 1995b; Squire, 2004). In the process of routine formation, the routine participant's understanding of task sequences and goals of the organizational routine will develop (Feldman and Rafaeli, 2002; Miller et al., 2012). Routine participants may also develop accounts and labels for their activity (cf. Feldman and Pentland, 2003). Frequent repetition of a behavioral sequence is not necessary for developing declarative knowledge (Ofen-Noy, Dudai and Karni, 2003). For example, individuals usually understand that they should call the fire department in the case of a fire without ever having experienced such a situation before (Betsch et al., 2001). While individuals may draw on declarative knowledge learned prior to becoming routine participants, procedural memory is reinforced through repeating activity patterns.

Procedural memory is demonstrated in the performance of particular action patterns; knowledge that is frequently termed "know-how" (Tulving, 1972; Cohen, 1991; Edmondson et al., 2003). Previous research has demonstrated that procedural memory differs from declarative memory in important respects (Bargh and Chartrand, 1999; Squire, 2004). Procedural memory is less explicitly accessible,

less easily transferable to new circumstances and "less subject to decay" (Cohen and Bacdayan, 1994: 557). Therefore, routines primarily stored in procedural memory reside in the "organizational unconscious" (Cohen and Bacdayan, 1994: 556) and thus seem to mirror the notions of skill and tacit knowledge that characterize organizational routines described by Nelson and Winter (1982). In a classic laboratory experiment examining the emergence of routines, Cohen and Bacdayan (1994) found that organizational routines formed after actors repeated particular patterns of interaction in a card game. These patterns of interaction were (partially) stored across the procedural memories of individual routine participants. Due to the nature of procedural memory, routine participants found these interaction patterns comparatively easy (despite their potential complexity) and eventually had difficulty in articulating or deliberately changing them (Cohen and Bacdayan, 1994; Egidi and Narduzzo, 1997). While declarative and procedural memory pertain to the individual level, the formation of organizational routines may also entail transactive memory that is shared among routine participants and therefore resides at the group level.

Transactive memory situates the individual routine participants' knowledge in a social context; it stores knowledge on "who-knows-what" (Lewis, 2004; Ren and Argote, 2011). Contrary to declarative and procedural memory, transactive memory is a shared property among routine participants, which complements individual knowledge (Ren and Argote, 2011). Forming an organizational routine usually involves connecting and sharing information among routine participants, such as engaging with imposed knowledge structures, coordinating interdependent tasks, and sharing experiences (Feldman and Rafaeli, 2002; Jarzabkowski, Lê and Feldman, 2012; Turner and Rindova, 2012). In the process of routine formation, routine participants develop knowledge about the expertise or skills available in the proximate work environment and about the locations (i.e., individuals or knowledge-embedding artifacts) where particular expertise or skills are stored (Hutchins, 1995; Wegner, 1995; Hollingshead, 1998). Transactive memory forms the basis of collective knowledge and represents a supra-individual micro foundation for the formation of organizational routines (Hecker, 2012; Dionysiou and Tsoukas, 2013). Empirical research and simulation models have demonstrated the relevance of transactive memory in explaining the formation of organizational routines as mechanisms to achieve collective task performances (Pearsall, Ellis and Bell, 2010; Miller et al., 2012).

In conclusion, organizational routines form while routine participants accomplish recurring interdependent tasks in a purposefully designed organizational context. For example, modern automobile assembly routines are often based on product

designs and machinery that facilitate simple and highly repetitive activity patterns of routine participants, while physically constraining activities that would cause malfunctions in the final product (Flynn, Sakakibara and Schroeder, 1995; Coriat, 2000). As routine participants begin to collectively perform a task, the activities by which the task is accomplished become subject to retention in human memory (Miller et al., 2012; Pentland et al., 2012). Across the iterations of an organizational routine, patterns of interaction are retained and re-created based on the routine participants' declarative, procedural, and transactive memory. For example, a comparatively simple interaction pattern with limited interaction among routine participants will foster the formation of an organizational routine primarily stored in the routine participants' procedural memories (cf. Cohen and Bacdayan, 1994; Egidi and Narduzzo, 1997). The organizational context facilitates (formally or informally) specific repetitive and recognizable interdependent activities involving multiple actors. In the following section, I argue that the type of memory in which the organizational routine has been stored and the organizational context in which the routine is performed has implications for the emergence of endogenous stability and change in organizational routines.

1.2.2 Endogenous Stability and Change

Organizational routines have been characterized as endogenously stable (even when requirements change) or endogenously changing entities (even when requirements are stable) (Feldman and Pentland, 2003; Pentland et al., 2012). Previous research therefore suggests that established routines are "(n)ever-changing" (Birnholtz et al., 2007: 316), depending on the granularity and duration over which we observe the routine (Pentland, 2003; Becker, 2005a). The more we focus on the behavioral details of an established organizational routine and the longer we observe an organizational routine, the higher the likelihood that endogenous change can be observed (Birnholtz et al., 2007; Pentland et al., 2010). While such observations should caution us to consider different levels of analysis and observation timeframes, current empirical research provides clear qualitative and quantitative evidence supporting the notion that some organizational routines are more prone to endogenous stability and other organizational routines are more prone to endogenous change (Howard-Grenville, 2005; Pentland et al., 2011; Turner and Fern, 2012). However, current research has shown little interest in exploring the boundary conditions that may reconcile these divergent findings (Parmigiani and Howard-Grenville, 2011). This situation raises the question of which mechanisms will cause which routine dynamic to surface.

Recent work stemming from the generative-systems perspective argues that novel performances are stored in the (declarative, procedural, and transactive)

memory of the routine participants, thereby influencing future routine performances (Miller et al., 2012). This conceptualization implies that endogenous stability or change of organizational routines follows from processes of performative variation and selective retention (Feldman and Pentland, 2003). A recent simulation study by Pentland et al. (2012) explores this conceptualization. These researchers find that whether organizational routines exhibit endogenous stability or change is determined by the amount of variation introduced into the organizational routines, given that past experiences are memorized. For example, when routine participants introduce variation in their routine performance (e.g., by treating a patient with a new medication), such variation may become memorized and thereby alter the repertoire for potential future performances (e.g., future treatments of similar patients may eschew the old medication in favor of the new medication). In the following section, I build on these findings to differentiate between three configurations of effortful (drawing on declarative and transactive memory) and effortless (drawing on procedural memory) organizational routines weakly or strongly embedded in an organizational context.

Variation across routine performances becomes more likely when routine performances are effortful accomplishments and when the organizational routine is weakly embedded in an organizational context. Routines are effortful accomplishments when routine participants are mindful (Langer, 1992; Levinthal and Rerup, 2006) of their enactment of the organizational routine and primarily draw on their declarative and transactive memory when engaging in routine performances (cf. Hutchins, 1991; Pentland and Rueter, 1994; Feldman, 2000; 2003). Feldman (2000), in her studies on university-housing organizations, found that routine participants deliberated about whether the intended outcomes of the organizational routine were achieved, and whether and why unintended and undesirable outcomes were produced. Executing the annual move-in routine presumably included transactive memory, as routine participants engaged in outreach to other university departments and city officials. When engaging in routines as effortful accomplishments, routine participants may seek to deliberately introduce variations (Feldman, 2003; Miller et al., 2012). Accordingly, variations in routine performances may occur because the organizational routine is stored in consciously accessible declarative and transactive memory. Given that participants executing routines can access their declarative and transactive memories, their routine performances become mindful, they may care about the outcomes of routine performances, and in turn respond to problems or opportunities that were made evident from past performances (e.g., Lazaric and Denis, 2001; Rerup and Feldman, 2011; Turner and Fern, 2012).

That said, variation may be less likely to occur when routine performances are effortful accomplishments and the organizational routine is strongly embedded in an interdependent organizational context. Organizational routines are strongly embedded in an organizational context when variations caused by routine participants also impact other organizational structures. Previous research offers diverse motives for why routine participants deliberatively decide to reproduce past performances, such as routine participants striving to adopt specific patterns of interaction (Lazaric and Denis, 2005), avoiding political confrontations and striving for legitimacy (Feldman, 2003), maintaining an established truce (Nelson and Winter, 1982; Zbaracki and Bergen, 2010), and avoiding variations that could upset other interrelated routines (Howard-Grenville, 2005). To minimize variations across effortful accomplishments, organizations employ mechanisms and structures to keep patterns of employee interaction "on track" (Schulz, 2008: 228). Examples of such structures include trauma protocols in emergency rooms (Faraj and Xiao, 2006), software systems for enterprise resource planning (Pentland and Feldman, 2007), and written plans used in roadmapping routines (Howard-Grenville, 2005). Routine participants may therefore engage in effortful accomplishments to deliberately reproduce past performances, thereby reinforcing endogenously stable organizational routines (Feldman, 2003; Miller et al., 2012). In contrast, variation across routine performances is more likely to occur and cause endogenous routine change when routine participants have the ability to vary performances and perform their actions in weakly embedded routines (Howard-Grenville, 2005).

Finally, variation in routine performances becomes less likely when routine performances are effortless (i.e., mindless) accomplishments (Langer, 1992; Levinthal and Rerup, 2006). Previous research considers routines as effortless accomplishments when routine participants primarily utilize procedural memory while engaging in routine performances (Ashforth and Fried, 1988; Gersick and Hackman, 1990; Cohen and Bacdayan, 1994). While procedural memory allows routine participants to perform fast, complex patterns of interaction reliably, it is less explicitly accessible and less easily transferable to new circumstances. These characteristics of procedural memory limit possibilities to introduce variation in routine performances (Pentland et al., 2012) to the extent that organizational routines may even "misfire" when tasks change (Cohen and Bacdayan, 1994: 554). Egidi and Narduzzo (1997) provide empirical evidence on these phenomena. They conducted a laboratory study where pairs of test subjects first learned different routines to play a card game. Arguing that these routines emerged from the procedural memory of the routine participants, they found that after routine participants were led to favor a particular strategy in an initial round, they were

more likely to use the learned routine in a subsequent round, even when it proved less effective. Furthermore, Egidi and Narduzzo (1997) observed many instances where routine participants exclusively played using the routine they had initially learned. Additional anecdotal evidence on the endogenous stability of routines based on procedural memory is provided by Allison (1971) in his analysis of the Cuban missile crisis. To avoid detection, Russian soldiers dressed in civilian clothes prior to their landing in Havana. Once landed, however, procedural memory formed by repeated military drills overruled intentions—and they marched away in neat rank and file (cf. Cohen, 2012), thus aiding detection. Together, these findings demonstrate that organizational routines primarily stored in the distributed procedural memories of routine participants are likely to cause little variation in routine performances; that is, they are likely to demonstrate endogenous stability (Cohen and Bacdayan, 1994; Egidi and Narduzzo, 1997; Pentland et al., 2012).

In conclusion, these configurations effect different levels of variation in routine performances, and therefore produce endogenous stability or change in organizational routines. More specifically, organizational routines that are effortful accomplishments of routine participants (i.e., participation requires extensive use of declarative and transactive memory) and that are weakly embedded in their organizational context will lead to high levels of variation across routine performances (and hence, endogenous change). In contrast, organizational routines that represent effortful accomplishments of routine participants that are strongly embedded in their organizational context will foster low levels of variation across routine performances (and hence, endogenous stability). Organizational routines that represent effortless accomplishments of routine participants (i.e., participation is based on procedural memory) will foster low levels of variation across routine performances (and hence, endogenous stability), irrespective of the organizational context. Accordingly, whether organizational routines exhibit endogenous stability or change is substantially influenced by the type of memory they are stored in and the organizational context in which they become enacted.

1.2.3 Organizational Outcomes

Organizational outcomes of organizational routines, such as their impact on organizational performance, have mainly been studied by researchers conceptualizing organizational routines as *unitary entities* (e.g., Adler et al., 1999; Ethiraj et al., 2005; Drnevich and Kriauciunas, 2011). While theoreticians within the *unitary-entities* perspective on organizational routines increasingly acknowledge the importance of individual routine participants (Abell, Felin and Foss, 2008; Felin and Foss, 2012; Felin et al., 2012), empirical researchers within this perspective

mostly sustain the frames of their theoretical ancestors (e.g., Penrose, 1959; Nelson and Winter, 1982). In emphasizing that organizational routines "[…] partly serve the purpose of minimizing the need for agency on a continual basis, by providing order and stability" (Katkalo, Pitelis and Teece, 2010: 1179), these researchers largely assume that routines operate with little influence asserted by routine participants (Salvato, 2009; Parmigiani and Howard-Grenville, 2011). Following the framework I have elaborated above, such organizational routines are assumed to be reinforced through strong organizational embeddedness or largely draw on the procedural memory of routine participants. Such routines are considered to exhibit persistence and inflexibility, while also acting as contextually embedded repositories for tacit knowledge in an organization (Gavetti and Levinthal, 2000; Dutta, Zbaracki and Bergen, 2003; Gilbert, 2005). Against this backdrop, organizational routines foster heterogeneity across a population of organizations and may contribute to short-term beneficial organizational outcomes.

Routines that encompass high levels of tacit knowledge and that are deeply embedded in an organizational context cannot easily be imitated or transferred to other organizational settings (Dierickx and Cool, 1989; Ichniowski, Shaw and Prennushi, 1997; Rivkin, 2000) and were found to stick to their organizational context (von Hippel, 1994; Szulanski, 1996; Szulanski and Jensen, 2004). For example, Dutta et al. (2003) studied the pricing capability of a large manufacturing firm and showed that pricing incorporates nested routines, resources, and skills that influence whether a firm is able to create value through price setting. A company's pricing systems and processes are developed over time and are tailored to meet both the company's and its customers' requirements. Due to the tacit nature of organizational routines and their context-dependent development, imitating well-performing routines is likely to be error-prone or partial (Reed and DeFillippi, 1990; Zander and Kogut, 1995; Winter and Szulanski, 2001). This finding implies that organizations differ in their organizational routines in important and persistent ways. These differences in organizational routines in turn differently affect organizational outcomes. Given that it is difficult for competitors to imitate particularly well-performing routines, routines may provide a source of value and represent a firm's competitive advantage to achieve superior organizational performance over a certain period of time (Wernerfelt, 1984; Barney, 1991; Collis, 1994; Helfat, 2003).

Simply exploiting well-performing organizational routines, however, may not be sufficient to sustain competitive advantages over a longer period of time, because over time competition between companies usually erodes their value (March, 1991; Winter, 2003; Teece, 2007). While learning processes based on perfor-

mance feedback may gradually improve the fit of organizational routines to their environments in comparatively stable environments (Levitt and March, 1988; Huber, 1991; Argote, 1999; Greve, 2003), organizational routines may lock organizations into inflexible and unchanging patterns of action in highly dynamic, competitive environments. In such environments, core competencies may quickly turn into core rigidities (Leonard-Barton, 1992; Gilbert, 2005). Without any exogenous strategic intervention, organizational routines may become sources of maladaptation, inferior performance, and organizational demise in reasonably dynamic environments. Research based on the work of Nelson and Winter (1982) focuses on how meta-routines (i.e., routines for changing other routines) and operating routines interact to address the tradeoffs inherent in organizational outcomes of organizational routines, such as balancing flexibility and efficiency (Adler et al., 1999) or operational effectiveness and superior adaptation (Knott, 2001). For example, Adler, Goldoftas, and Levine (1999) explore why the Toyota Production System outshines those of other automobile companies in terms of efficiency and flexibility. These authors describe and contrast model changeovers using the Toyota Production System and those of US car manufacturers. They find that the Toyota Production System used highly efficient operating routines while also employing meta-routines that led to both change and stability and were deeply embedded in the organizational context. This suggests that low-level operating routines may help a company operate more efficiently, thereby exploiting the benefits of stability in organizational routines, while higher-level meta-routines apply exogenous change to operating routines and thereby assure long-term beneficial organizational outcomes (Teece, Pisano and Shuen, 1997; Winter, 2003; Teece, 2007).

In concluding my review of the contemporary research on organizational routines, I want to reiterate that while organizational routines have been of interest to organization researchers since the inception of this research field (e.g., Stene, 1940; Simon, 1947), the research on this phenomenon remains contradictory. This contradiction can be seen in the strikingly different conceptualization of organizational routines issued by two camps of routine researchers. While one camp conceptualizes organizational routines as inherently dynamic generative systems, the other camp sees them as "unitary and unchanging" (Feldman and Pentland, 2003: 97) building blocks embedded in larger organizational structures (Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011). Traditionally, each perspective grounds its theorizing in different assumptions about the inherently stable or changing nature of organizational routines (Parmigiani and Howard-Grenville, 2011). Building on recent research (Howard-Grenville, 2005; Miller et al., 2012; Pentland et al., 2012), I suggest an integrative perspective connecting different types of memory in routine participants and the organiza-

tional context in which the organizational routine is enacted. This integrative perspective on organizational routines acknowledges the internal structure and dynamics of routines found by research from the generative-systems perspective, while also allowing for endogenous routine stability central to the unitary-entities perspective. In doing so, my review proposes a common ontological ground to study strategic, organizational, and behavioral issues of organizational routines change. Given that organizational routines may exhibit either endogenous stability or change, depending on how routine participants and organizational context interact, organizational routines should be studied across organizational contexts. In the following chapter, I offer a critique of the present research and argue that context remains underappreciated in current empirical research studying organizational routines. Expanding on this critique, I provide a short overview of the contributions the following chapters make in studying context as an antecedent of processes and outcomes of organizational routine change.

1.3 Critique of Present Research and Thesis Outline

In recent years, conceptual research has fundamentally advanced our understanding of how organizational routines should be defined and why they change (Cohen et al., 1996; Feldman and Pentland, 2003; Cohen, 2007b). Researchers today largely agree that organizational routines should be defined as repetitive and recognizable interdependent activities involving multiple actors that change exogenously or endogenously (Feldman and Pentland, 2003; Parmigiani and Howard-Grenville, 2011; Dionysiou and Tsoukas, 2013). Organizational routines may change through exogenous efforts such as meta-routines and managerial intervention or through endogenous routine change caused by variations introduced by routine participants (Pentland and Feldman, 2005; Teece, 2007; Parmigiani and Howard-Grenville, 2011). While research on organizational routines has significantly advanced over the last decades, much work remains theoretical in nature. Parmigiani and Howard-Grenville (2011: 447), in their authoritative review of current routine research, concede that they "were rather surprised at the small number of empirical studies" they found. More generally, research progress on "how organizational routines emerge, how they change, and what impact they have on organizations" (Becker et al., 2005: 780) has frequently been found "frustratingly slow" (Cohen, 2007b: 774; see also: Pentland and Feldman, 2005; Peteraf, Di Stefano and Verona, 2013).

Empirical research has studied routines within diverse organizational contexts, including automotive plants (Adler et al., 1999; D'Adderio, 2008), meat-processing facilities (Lazaric and Denis, 2005), and football teams (Aime et al.,

2010). This research demonstrates that routines form and evolve within the specific context of an organization (Teece et al., 1997; Cohendet and Llerena, 2003; Becker, 2004), making context "fundamental" for understanding routines (Cohen et al., 1996: 662). While this research shows that routines are embedded in external (e.g., market dynamism [Winter, 2003]) and internal (e.g., organizational schemata [Rerup and Feldman, 2011]) organizational contexts, most empirical routine research fails to study routines *across* different external and internal organizational contexts (for exceptions, see: Edmondson et al., 2001; Howard-Grenville, 2005; Drnevich and Kriauciunas, 2011). I define context broadly as situational constraints and enablers that impact organizational behavior, thereby restricting the range of observable behavior, affecting base rates with which behavior occurs, and influencing how behavior and outcomes relate (Mowday and Sutton, 1993; Rousseau and Fried, 2001; Johns, 2006). Accordingly, external and internal organizational contexts represent relevant antecedents to processes and outcomes of organizational routine change (Levinthal and Rerup, 2006). Therefore, failure to study organizational routine change across different contexts seriously limits our understanding of processes and outcomes of endogenous and exogenous routine change (Barreto, 2010; Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011).

Organizational context impacts processes of *endogenous* routine change and its economic outcomes by offering or constraining resources to effect routine change (cf. Feldman, 2004; Howard-Grenville, 2005; Pentland and Feldman, 2008a). For example, routine participants may operate in an internal organizational context that welcomes or sanctions participants revealing problems in routine performances (Edmondson, 1999). Depending on such different climates of psychological safety, endogenous routine change may be encouraged or penalized (Nembhard and Edmondson, 2011). Organizational context also impacts processes of *exogenous* routine change and their economic outcomes, because organizational context induces or constrains the application of meta-routines or managerial interventions in operating routines (Nelson and Winter, 1982; Teece, 2007; Davis, Eisenhardt and Bingham, 2009). For example, meta-routines may contribute less to the economic performance of operating routines in an external organizational context exhibiting low levels of environmental dynamism due to meta-routines' high maintenance costs and limited effect in low-dynamic environments (Aragón-Correa and Sharma, 2003; Winter, 2003).

Despite the relevance of external and internal organizational context as an antecedent to processes and outcomes of organizational routine change, we currently lack empirical research that explores how the embeddedness of routines within

and across multiple levels and types of organizational context shapes and moderates processes and outcomes of routine change (Barreto, 2010; Salvato and Rerup, 2011; D'Adderio et al., 2012; Turner and Fern, 2012). Current research agrees that further empirical inquiry is required to develop a more-complete understanding of how external and internal organizational context impacts processes and outcomes of organizational routine change (Becker, 2005b; Barreto, 2010; Parmigiani and Howard-Grenville, 2011). I join earlier researchers (e.g., Cohendet and Llerena, 2003; Salvato and Rerup, 2011; Turner and Fern, 2012) when I argue that much progress depends on integrating external and internal organizational context more strongly into our empirical studies of organizational routine change.

My dissertation responds to this neglect of context by studying organizational routines within and across different external and internal organizational contexts. In my research, organizational context represents an antecedent that (qualitatively) shapes or (quantitatively) moderates processes and outcomes of organizational routine change. The following subsections provide a short summary of how the chapters of my dissertation relate organizational context to processes and outcomes of organizational routine change. Table 1 provides an overview of the focus of the subsequent chapters.

Table 1.1: Explanatory Focus of Chapters

Chapter	Antecedent: Organizational Context		Process: Routine Change and Stability		Outcome: Economic Impact
	External	*Internal*	*Exogenous*	*Endogenous*	
2	■	■	■		
3	■		■		■
4	■	■		■	
5		■		■	■
6	■	■	■		

Note: Greyed boxes indicate the explanatory focus of a chapter.

In the first subsection (1.3.1) below, I summarize the contributions of chapters 2 and 3 of my dissertation. Both chapters study processes of exogenous routine change that are accomplished through organizational meta-routines. Chapter 2 highlights how external and internal organizational context fosters the emergence of different types of these meta-routines in organizations. Chapter 3 tests the economic impact of meta-routines on operating-routine performance in high- and low-dynamic external contexts. In the second subsection (1.3.2) below, I provide an overview of chapters 4 and 5 that focus on endogenous routine change and stability. Chapter 4 explores configurations of external and internal organizational context that promote stability in organizational routines. Chapter 5 tests internal organizational contexts in which individual routine participants fail and suc-

ceed in generating novel and useful ideas that may lead to endogenous routine change. In the third subsection (1.3.3) below, I summarize chapter 6. This chapter presents a critical perspective on exogenous routine change driven by managerial interventions in organizational routines. More specifically, this research explores how managers account for intentional interventions in organizational routines using popular management concepts, while facing multiple and potentially conflicting demands from the external and internal organizational context.

1.3.1 Change Through Organizational Meta-Routines

Research taking a unitary-entities perspective on organizational routines has identified dynamic capabilities as a driver of sustained competitive advantage. Dynamic capabilities enable companies to constantly adjust inherently stable operating routines and adapt to changing environmental demands, thus allowing them to outperform their competitors (Teece et al., 1997; Winter, 2003; Helfat et al., 2007). Within the literature, specific organizational meta-routines (i.e., recurring action patterns allowing for a competitively adequate adjustment of operating routines and resources of the company) are considered the basis of such capabilities (Collis, 1994; Szulanski, 1996; Dosi, Nelson and Winter, 2000). While operating routines are geared towards the operational functioning of a company and thus describe the way a company operates day-to-day, dynamic capabilities focus on routines that are used to create, extend, and/or modify these routines (Winter, 2003). Today, the bulk of management research examines companies in contexts characterized by high levels of environmental dynamism (Keupp, Palmié and Gassmann, 2012), such as high-tech and IT industries, and few studies evaluate different environmental circumstances (e.g., Deeds, Decarolis and Coombs, 2000; Wu, 2007; Bruni and Verona, 2009). Despite researchers' growing attention to dynamic capabilities and their influence on change in operating routines, current research lacks empirical analyses about what types of dynamic capabilities cause change in operating routines in different external and internal organizational contexts (cf. Barreto, 2010; Di Stefano, Peteraf and Verona, 2010; Parmigiani and Howard-Grenville, 2011). Failing to consider different types of dynamic capabilities within different contexts hampers our theoretical understanding of dynamic capabilities and is unlikely to resolve some recent puzzling empirical results. For example, some researchers theorize that dynamic capabilities form only in rapidly changing environments (Teece et al., 1997), while others argue that dynamic capabilities "take on a different character" in moderately dynamic environments (Eisenhardt and Martin, 2000: 1106). The lack of empirical research exploring the connection between external and internal organizational context and types of dynamic capabilities has hindered a reconciliation of the fundamentally different and contradictory conceptualizations of dynamic capabil-

ities in the literature (Arend and Bromiley, 2009; Barreto, 2010; Vogel and Güttel, 2013).

In the **second chapter** (co-authored by Indre Maurer)[2], we explore how the characteristics of dynamic capabilities are contingent on external and internal organizational contexts. We use fuzzy-set Qualitative Comparative Analysis to analyze the frequency and formalization of dynamic capabilities that change the highly routinized purchasing processes of 103 small- and medium-sized enterprises in high versus low levels of environmental dynamism. Our findings reveal four different types of dynamic capabilities that equifinally cause change in operating routines: experiential, reactive, programmed, and analytic. Additional analysis reveals that each type corresponds to organizations with similar internal contexts, such as demographic characteristics and shared process innovation mindsets. While experiential, reactive, programmed-type dynamic capabilities change operating routines in high-dynamic environments, we find that analytic-type dynamic capabilities change operating routines in low-dynamic environments. A major contribution of this chapter is to advance a framework integrating different and seemingly contradictory types of dynamic capabilities based on external and internal organizational contexts. We therefore provide researchers with a more complete and accurate view of dynamic capabilities by advancing our theoretical understanding and empirical evidence of the balancing of stability and change of operating routines in present-day organizations.

The second chapter demonstrates that dynamic capabilities may take different forms depending on the external and internal organizational context. However, we do not address whether and when dynamic capabilities impact the economic performance of operating routines. While prior research studying change through dynamic capabilities found undisputed performance-enhancing effects of these meta-routines, the systematic investigation of the conditions under which dynamic capabilities lead to success is still in its infancy (Easterby-Smith, Lyles and Peteraf, 2009; Di Stefano et al., 2010; Vogel and Güttel, 2013). In particular, the impact of environmental dynamism on the performance effect of dynamic capabilities remains under-investigated (Wang and Ahmed, 2007; Barreto, 2010). Some authors find no moderating environmental effect on the potential performance implications of dynamic capabilities (Drnevich and Kriauciunas, 2011; Protogerou, Caloghirou and Lioukas, 2012), while others provide evidence for this relationship (Pavlou and El Sawy, 2006; Romme et al., 2010). Given that the

[2] An earlier version of the second chapter was presented at the 29th EGOS Colloquium 2013, Montréal. The second and third chapters rely on the same data set. Maren Schlömer was involved in collecting the data for chapter 2, but did not participate in developing this chapter.

progress of research on dynamic capabilities is seriously hampered by such inconsistent findings in empirical research (Barreto, 2010; Vogel and Güttel, 2013), the different contextual conditions of dynamic capabilities' impact on operating-routine performance deserve investigation to resolve inconsistent research findings and provide guidance for practitioners.

In the **third chapter** (co-authored by Maren Schlömer and Indre Maurer)[3], we continue investigating dynamic capabilities by hypothesizing and testing the impact that dynamic capabilities have on two different performance yardsticks of operating routines under high versus low levels of environmental dynamism. More specifically, we conceptualize operating-routine performance by distinguishing between evolutionary fitness (i.e., goal achievement) and technical fitness (i.e., goal achievement in relation to underlying costs). We analyze data on the purchasing processes of 200 small- and medium-sized enterprises. The findings reveal that dynamic capabilities increase the evolutionary fitness of operating routines irrespective of the level of environmental dynamism faced by the organization; however, the extent to which dynamic capabilities affect the technical fitness of operating routines differs considerably depending on the level of environmental dynamism. These findings corroborate and extend prior conceptual arguments on the impact dynamic capabilities have on firm fitness (Teece et al., 1997; Winter, 2003; Helfat et al., 2007; Helfat and Winter, 2011).

1.3.2 Change Within Organizational Routines

Research from the generative-systems perspective on routines seeks to explain how routine participants generate endogenous routine change or stability (Pentland and Rueter, 1994; Feldman, 2003; Lazaric and Denis, 2005; Zbaracki and Bergen, 2010). Such research emphasizes the agency of routine participants and frequently downplays the impact that the external and internal organizational context has on routine participants (Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011). My review on endogenous stability and change of routines has demonstrated that organizational context represents an important antecedent of endogenous routine processes and their economic outcomes: Some organizational contexts foster stability and continuity in organizational routines that are prone to variation and endogenous change, such as treatment routines in a hospital (Bohmer, 2010), to ensure short-term efficiency in routine performances (Katkalo et al., 2010). Other organizational contexts exhibit managerially supervised processes to achieve highly controlled endogenous change in stable organizational routines, such as suggestion systems implemented in the operating rou-

[3] Earlier versions of the third chapter were presented at the 73rd Annual Meeting of the Academy of Management 2013, Orlando and the WK ORG-Workshop 2011, Berlin.

tines of an industrial enterprise (Adler et al., 1999; Arthur and Aiman-Smith, 2001), to allow for incremental adaptation (Farjoun, 2010). Neglecting organizational context as an antecedent of processes and outcomes of routine change will yield a partial and incomplete understanding and explanation of endogenous routine change (Johns, 2006; Levinthal and Rerup, 2006). The subsequent chapters present empirical inquiries into settings where the organizational context fosters stability in situations where endogenous routine change is common (chapter 4) and where the organizational context fosters change in situations where endogenous stability is common (chapter 5). In doing so, these chapters contribute to our understanding of how the embeddedness of routine participants in a wider external and internal organizational context influences the dynamics of organizational routines.

In the **fourth chapter** (co-authored by Jessica Chromik)[4], we explore configurations of external and internal organizational contexts as antecedents of stability in organizational routines. More specifically, we seek to explain when and why written organizational rules—as a mechanism to foster stability in organizational routines—are persistently enacted within organizational routines that otherwise exhibit high levels of variation and endogenous change. Persistent rule enactment is critical for organizations to function, as failure of persistent rule enactment may lead to poor performance, organizational delegitimization, and even the death of employees or customers (cf. Weick, 1990; Inoue and Koizumi, 2004; Bruns, 2009). While current research demonstrates that organizational routines and written rules frequently drift apart (Anand et al., 2012), routine research has largely ignored contextual conditions that operate on multiple levels above (e.g., institutional pressures) and below (e.g., task complexity) the routine but nevertheless affect the enactment of written rules (cf. Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011). Our exploratory study is based on a fuzzy-set Qualitative Comparative Analysis of 19 medical-treatment routines performed in 10 internal-medicine departments of university hospitals. We identify three multilevel configurations where written rules persisted in an empirical setting characterized by high levels of improvisation and little managerial oversight: When institutional pressure is high, written rules will persist in routines addressing tasks of high complexity ("reducing risk") or when highly experienced routine participants execute tasks at high frequency ("securing status"). When institutional pressure is low, written rules will persist in routines where routine participants have low levels of experience in the face of high task volumes of little complexity ("surviving stress"). Our study contributes a multilevel

[4] Earlier versions of the fourth chapter were presented at the 73rd Annual Meeting of the Academy of Management 2013, Orlando and the 28th EGOS Colloquium 2012, Helsinki.

framework that incorporates external and internal organizational context into routine research. We conclude that written rules persist when they function as a resource to routine participants and provide them with confirming experience when enacting the written rule. Therefore, theories of organizational routines need to be broadened to include external and internal organizational contexts as antecedents of persistent rule enactment in organizational routines.

In the **fifth chapter** (co-authored by Andreas Richter and Thorsten Semrau)[5], we focus on employee creativity in suggestion systems. Suggestion systems represent a formal process through which many organizations channel and control routine participants' impetus for endogenous routine change, in particular in contexts where routines have to be performed at high levels of efficiency (Coriat and Dosi, 1998; Adler et al., 1999; Coriat, 2000). Organizations employ such systems to collect, evaluate, and compensate routine participants' ideas for changing work routines (Robinson and Stern, 1998; Frese, Teng and Wijnen, 1999). The development and submission of suggestions on how to improve work routines represents an example of creative performance behavior (Adler et al., 1999; Coriat, 2000; Montag, Maertz and Baer, 2012). Such behavior, however, does not necessarily lead to creative outcomes that are novel and useful to the organization (Montag et al., 2012). As Nelson and Winter (1982: 116) argue, individual routine participants that try "to do a better job" frequently fail to improve the routine's economic impact because they lack a comprehensive understanding of the whole organizational routine and its interdependent entities. More generally, because of the risky and uncertain nature of creativity (Weick, 1995a; Simonton, 1999; Fleming, 2001; Kelley and Littman, 2001; Sutton, 2001; March, 2010), creative failure is common and relevant for employees attempting to endogenously change organizational routines.

This chapter examines how the internal organizational context moderates how failed employee creativity predicts subsequent employee creativity in a suggestion system. Employee creativity encompasses creative performance behavior as well as the creative outcomes produced by that behavior. Because individual employee creativity is often enacted in teams (Shalley, Zhou and Oldham, 2004; Hirst, Van Knippenberg and Zhou, 2009), we argue that the team social context in particular influences whether prior creative failure triggers or stifles subsequent creative activity. Specifically, we posit that if employees with failure experiences work in teams that are *psychologically safe* (i.e., teams that are safe for interpersonal risk taking; Edmondson, 1999), they receive the encouragement

[5] Earlier versions of the fifth chapter were presented at the WK TIE Workshop 2013, St. Gallen and the 8th Annual INGRoup Conference 2013, Atlanta, where it received the *Best Conference Paper Award*.

and support they need to attenuate threat-rigidity reactions and boost self-efficacy beliefs, resulting in sustained creative effort. Beyond socio-emotional support, teams that provide a safe environment for interpersonal risk-taking may also encourage employees with failure experiences to seek out advice and information from, and confide in, their team colleagues. Provided that teams share a well-developed *transactive memory system* (Wegner, 1987), this environment may further fuel their idea-development process (Richter et al., 2012). We tested our hypothesis using archival and survey data from 218 employees working in 42 teams and found that creative failure positively predicted creative performance behavior and creative outcomes if employees worked in teams with medium-to-high levels of psychological safety. Under these conditions, employee creativity also benefited from well-developed team transactive memory systems. Given that we know little about how employees overcome creative failure for sustained creativity, this chapter goes beyond the boundaries of current routine research (Barreto, 2010; Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011) and focuses on employee creativity as a micro-foundation for endogenous routine change (Farjoun, 2010; Hirst et al., 2011; Rerup and Feldman, 2011). By examining the role of the team context in which employee creativity is enacted, we provide answers to the question of how employees can overcome prior creative failure for sustained creative activity.

1.3.3 Managers and Organizational Routine Change

Managers represent an important driver of change in organizational routines because managerial decisions shape formal structures, place routine participants in job positions, and provide rationales for particular patterns of interaction (Knott, 2001; Becker et al., 2005; Pentland and Feldman, 2005). Managers frequently employ popular management concepts, such as Total Quality Management and Lean Production, as a means to improve the economic outcome of established organizational routines (Watson, 1994; Abrahamson, 1996; Kieser, 1997; Becker, Knudsen and March, 2006). The implementation of a popular management concept in an organizational routine differs from routine change triggered by meta-routines, as popular management concepts usually "do not enable an enterprise to earn more than its cost of capital, or outperform its competitors" (Teece, 2007: 1321). Furthermore, popular management concepts usually remain ambiguous in their content, as they do not originate from the organizational routine in which they are implemented (Benders and Van Veen, 2001; Røvik, 2002). Therefore, the ad hoc implementation of popular management concepts also differs from endogenous routine change triggered by routine participants. Popular management concepts require extensive adaptation to the particular organizational routines within the specific organization (Benders and Van Veen, 2001; Ansari, Fiss

and Zajac, 2010). Routine participants shape the implementation of popular management concepts when they carry out their daily tasks (Lozeau, Langley and Denis, 2002; Feldman and Pentland, 2003). While prior research has advanced our understanding of why managers adopt popular concepts, we still know little about what happens to popular concepts after they have been adopted by an organization (Heusinkveld, Sturdy and Werr, 2011; Røvik, 2011).

In the **sixth chapter** (co-authored by Suleika Bort)[6], we explore how managers account for their use of popular management concepts adopted by their organizations. We conducted extensive interviews with top managers in Germany. Based on the managers' narrations of how they understand and apply popular management concepts, we identify four discourse categories: (1) learning from others' experiences, (2) controlling organizational change, (3) gaining external legitimacy, and (4) collective sensemaking. We argue that these discourse categories all draw on the social norm of rationality that is central to managerial identity (Townley, 2002). While each of the four discourse categories accounts for the consumption of concepts in terms of means and ends, we find that even managers within the same company consuming the same concept do not share a single common goal or end toward which the consumption of the concept is directed. In addition, we find that managerial accounts of concept consumption are highly contingent on particular external or internal organizational contexts. Therefore, managerial needs when implementing popular concepts in organizational routines are not homogeneous but vary according to the external and internal organizational context that managers face. Based on our finding that antecedents of exogenous routine change caused by managerial intervention are not limited to the alleged economic impact of popular concepts, but also encompass micro-political and macro-institutional motives, we argue that researchers should employ a *logic of appropriateness* rather than a *logic of consequence* (March, 1994; March and Olsen, 2008) when studying the implementation of popular management concepts.

[6] The sixth chapter is published and should be cited as follows: Wilhelm and Bort (2013): "How managers talk about their consumption of popular management concepts: Identity, rules and situations," in: *British Journal of Management* 24 (3): 428-444. Original layout and headings have been adapted and reformatted for the purposes of this dissertation. Previous versions of this publication have been presented at the 70th Annual Meeting of the Academy of Management 2010, Montreal and the 26th EGOS Colloquium 2010, Lisbon. The data analyzed in this chapter was collected by the first author as part of his diploma thesis at Mannheim University.

1.4 Conclusion

The research compiled in this dissertation provides insight into antecedents, processes, and outcomes of organizational routine change. In examining routines within and across different external and internal organizational contexts, the following chapters further our understanding of organizational routine change, and in doing so, our understanding of the foundations by which organizations perform and prevail. This dissertation contributes to current literature on organizational routines in the following ways. First, I focus on how organizational context influences the *economic outcome* of routine change. I demonstrate the implications that the external and internal organizational context may have for the economic impact of *exogenous* routine change, such as operating-routine performance (chapter 3), and *endogenous* routine change, such as the novelty and usefulness of improvement suggestions (chapter 5). In doing so, I directly contribute to closing research gaps by systematically investigating the contextual conditions under which change trough routines (Barreto, 2010; Peteraf, Di Stefano and Verona, 2013) and change within routines (Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011) contributes to economically relevant outcomes.

Second, my dissertation contributes to a more thorough understanding of the implications that the contextual embeddedness of routines has for *processes* of routine change. I contribute to our understanding of how contextual embeddedness and processes of routine change relate by studying how consistent types of meta-routines emerge within different external and internal organizational contexts (chapter 2). These meta-routines represent alternative processes to achieve exogenous change in operating routines. Additionally, I contribute research on how and why organizational context impacts managers' accounts of processes of exogenous routine change (chapter 6). Finally, I advance research that explicitly incorporates organizational context as an antecedent of different processes of *endogenous* routine dynamics (chapters 4 and 5). In doing so, I address research gaps on how processes of organizational routines are shaped by their external and internal organizational embeddedness (Howard-Grenville, 2005; Bresman, 2013).

Third, in contrast to much prior research on organizational routines, most chapters in my dissertation explicitly account for the embeddedness of organizational routines in *multiple levels* (chapter 2, 4, and 5) and *forms* (chapter 4 and 6) of organizational context. For example, I explicitly integrate economic necessities and social expectations into my conceptualization of context (chapter 4 and 6). Doing so allows me to address the potentially complementary or contradictory effects of different levels (chapter 4) and forms (chapters 4 and 6) of organizational context. In addition, some chapters in my dissertation recognize that con-

textual embeddedness may foster positive or negative outcomes of routine change (chapters 3 and 5), thus recognizing both opportunities and challenges of the embeddedness of organizational routines. My work on the multilevel and multi-faceted nature of contextual embeddedness of organizational routines addresses recent criticism highlighting a lack of theoretical and empirical work studying how multilevel (Salvato and Rerup, 2011) and multi-context embeddedness (Parmigiani and Howard-Grenville, 2011; Dionysiou and Tsoukas, 2013) impacts change in organizational routines. In studying organizational routines embedded in external and internal organizational contexts, my dissertation broadens our current understanding of organizational routine change by complementing mere outcome or process perspectives dominant in current routine research with organizational context as an *antecedent* of when, why, and how routines change (chapters 2 to 6).

2 Exploring Change in Operating Routines

2.1 Introduction

Organizations are in a permanent struggle between stability and change, seeking to balance efficiency and flexibility in order to perform and persist in the face of competition (March, 1991; Davis et al., 2009; Lavie, Stettner and Tushman, 2010). This struggle between stability and change is reflected in the operating routines of an organization (March and Simon, 1958; Cyert and March, 1963; Nelson and Winter, 1982; Winter, 2003): While many operating routines are designed to deliver stable and efficient performance, competitive environments may require repeated and extensive changes to these routines. Failure to change operating routines in the face of changed environmental circumstances is likely to jeopardize organization performance and survival (Tushman and Anderson, 1986; Leonard-Barton, 1992; Danneels, 2011). To explain how organizations achieve such adaptation, recent research emphasizes the importance of meta-routines as drivers of change in operating routines (Collis, 1994; Eisenhardt and Martin, 2000; Zollo and Winter, 2002). Whereas operating routines describe the way an organization carries out its day-to-day business, meta-routines are aimed at creating, extending, and/or modifying operating routines (Winter, 2003). Meta-routines constitute an organization's dynamic capabilities that prevent the rigidity and the drawbacks of operating-routine stability; in other words, they prevent the generalization and misapplication of outdated operating routines in the face of changed circumstances (Teece and Pisano, 1994; Teece et al., 1997; Romme et al., 2010).

Despite researchers' growing attention to dynamic capabilities and their influence on change in operating routines, comparative empirical analysis on what types of dynamic capabilities cause such change is lacking (cf. Barreto, 2010; Di Stefano et al., 2010; Parmigiani and Howard-Grenville, 2011). This lack of empirical research exploring the connection between types of dynamic capabilities and operating routine change has hindered a reconciliation of the fundamentally different and contradictory conceptualizations of dynamic capabilities in the literature (Arend and Bromiley, 2009; Barreto, 2010; Vogel and Güttel, 2013). The most influential conceptualizations significantly differ with regard to the boundary conditions, core elements, and characteristics of the dynamic-capabilities concept: While Teece et al. (1997) theorize that dynamic capabilities apply only in rapidly changing environments, Eisenhardt and Martin (2000: 1106) argue that dynamic capabilities "take on a different character" in moderately dynamic environments (Peteraf et al., 2013). Conceptual contradictions are mirrored in empiri-

cal research, which tends to follow one of these dominant perspectives (Di Stefano et al., 2010; Peteraf et al., 2013). More specifically, quantitative research in each camp focuses on testing the impact of predefined dynamic capabilities types on organizational outcomes (e.g., Marcus and Anderson, 2006; Drnevich and Kriauciunas, 2011; Protogerou et al., 2012). Qualitative research focuses on describing how a single or a few companies alter their operating routines (or fail to do so) by leveraging firm-specific dynamic capabilities (e.g., Galunic and Eisenhardt, 2001; Rindova and Kotha, 2001; Danneels, 2011).

While both theoretical perspectives and their respective empirical work have yielded valuable insights, we still lack knowledge about what commonalities dynamic capabilities exhibit across organizations that allow them to effect change in operating routines and what boundary conditions may drive idiosyncratic execution. Failing to consider different types of dynamic capabilities and acknowledge their equifinal outcome hampers our theoretical understanding of dynamic capabilities and is unlikely to resolve some recent puzzling empirical results. For example, quantitative studies that evaluate different levels of environmental dynamism have shown that dynamic capabilities are of value in both dynamic and less-dynamic environments (Drnevich and Kriauciunas, 2011; Protogerou et al., 2012). This is a puzzling finding, because the dominant conceptualization proposed by Teece et al. (1997) denies any benefit of dynamic capabilities under conditions of low environmental dynamism. While such empirical findings imply that distinct types of meta-routines are contingent on environmental dynamism and equifinally lead to changes in operating routines, empirical research has shown little effort to engage in their comparative exploration.

This chapter seeks to address this research gap by employing fuzzy-set Qualitative Comparative Analysis (fsQCA) to quantitative data collected from small- and medium-sized enterprises (SMEs) in order to study how dynamic capabilities effect changes in operating routines. In doing so, we explore the logical links among environmental dynamism, dynamic capabilities, and change in operating routines. More specifically—using fsQCA—we explore what configurations of environmental dynamism; execution frequency; and codification of higher-order sensing, learning, and reconfiguring routines represent necessary and/or sufficient explanations for change in operating routines. Our analysis reveals four distinct types of dynamic capabilities: experiential, reactive, programmed, and analytic. While experiential, reactive, and programmed-type dynamic capabilities cause operating routine change in environments characterized by high levels of dynamism, we find that analytic-type dynamic capabilities cause operating routine change in environments exhibiting low levels of dynamism. Taken together,

this study advances research on dynamic capabilities and routine change by providing a framework integrating different and seemingly contradictory types of dynamic capabilities. We therefore provide researchers with a more complete and accurate view of dynamic capabilities by contributing theoretical understanding and empirical evidence on the balancing of operating routine stability and change in present-day organizations.

In the next sections, we introduce the theoretical foundations of our exploratory study. In order to better understand the context of our study, we review the literature on operating routines and dynamic capabilities (Nelson and Winter, 1982; Teece et al., 1997; Eisenhardt and Martin, 2000). We elaborate on dynamic capabilities as exogenous triggers of change in operating routines (Zollo and Winter, 2002; Winter, 2003). Then we provide information on our empirical data. We analyze this data using fsQCA. Finally, we present our results, discuss our findings, and highlight the implications and limitations of this work.

2.2 Theory

2.2.1 Stability and Change in Operating Routines

Operating routines capture the characteristic patterns with which organizations accomplish value-adding tasks. Routines drive organizational efficiency, as they economize on individuals' cognitive resources, thereby increasing reliability and speed-of-task performances (Cohen and Bacdayan, 1994), and coordinating employees' efforts to form coherent activity patterns (Cohen, 2013; Dionysiou and Tsoukas, 2013). Operating routines have been studied in various recurring organizational activity patterns, including employee selection (Feldman, 2000), invoice processing (Pentland et al., 2011), drug development in pharmaceutical companies (Bresman, 2013), and price-setting (Zbaracki and Bergen, 2010). They have been found to be inherently important for the perseverance and performance of any organization (Becker, 2004) and serve as efficiency drivers in many organizations (Stene, 1940; March and Simon, 1958; Nelson and Winter, 1982).

While researchers have traditionally depicted routines as relatively stable entities (cf. Cyert and March, 1963; Gersick and Hackman, 1990), more-recent research emphasizes that routine participants are capable of reflecting upon routine performances. Depending on the ideals, experiences, and resources available to routine participants, they may engage in endogenous change and improve the operating routine's adaptation to environmental demands (Feldman and Pentland, 2003). For example, Feldman (2000), in her ethnographic study on university housing organizations, showed how employees initiated significant changes to

the yearly move-in routine for new residents after it was found to be economically inefficient and left an undesirable and negative impression on new residents. Also employing ethnographic methods, Howard-Grenville (2005) showed how the intentions, expectations, and temporal orientation of operating-routine participants in a semiconductor company produce routine change or stability over time. These changes comprise the alteration of routine patterns, such as changing the sequence of activities or implementing novel activities within an existing operating routine.

While such proactive employee behavior represents an important source of operating-routine change, many operating routines "[…] partly serve the purpose of minimizing the need for such agency on a continual basis, by providing order and stability" (Katkalo et al., 2010: 1179). To foster reliability in operating routines and to further exploit what has proven successful in the past (March, 1991), organizations employ mechanisms and structures to keep patterns of employee interaction "on track" (Schulz, 2008: 228). Examples of such structures include the strict behavioral scripts governing customer interaction in Apple stores (Kane and Sherr, 2011) and McDonald's (Leidner, 1993). While stable operating routines are likely to increase organizational efficiency through habitualization (Cohen and Bacdayan, 1994) and organizational learning (Argote, 1999), such exploitative patterns can hinder exploration of alternatives to the established operating routine (Leonard-Barton, 1992; Levinthal and March, 1993). Alternatives to the established operating routine are likely to be perceived as less certain in their performance, remote in time, and more distant from the current locus of action (March, 1991; Lavie et al., 2010). Therefore, mechanisms and structures designed to foster uniform, reliable, and efficient operating routines are likely to lead to operating-routine rigidity, a common source of inertia (Gilbert, 2005).

Inertia usually causes organizational maladaptation, implying that an organization is unable to respond to environmental opportunities or threats (Miller and Friesen, 1980; Hannan and Freeman, 1984; Collinson and Wilson, 2006). Failure to address environmental threats may not only decrease organizational performance, but also threaten organizational survival in the long run. This outcome is particularly true for small- and medium-sized organizations, as their possibilities to diversify into markets with independent and unrelated environmental threats are limited. Given the often-cited rigidity of operating routines, there is a major interest to understand the conditions leading to changes in operating routines (Gilbert, 2005; Parmigiani and Howard-Grenville, 2011; Vergne and Durand, 2011). Previous research suggests that organizations employ meta-routines—so called dynamic capabilities—to change rigid operating routines in order to ad-

dress environmental opportunities and threats and thereby avoid harmful organizational inertia (Teece et al., 1997). For these reasons, we argue that it is important to better understand meta-routines as drivers of change in operating routines.

2.2.2 Dynamic Capabilities and Change in Operating Routines

Recent literature on dynamic capabilities acknowledges meta-routines as drivers of change in a company's operating routines (Zollo and Winter, 2002; Winter, 2003; Helfat et al., 2007). These higher-order routines are most commonly referred to as sensing routines (i.e., scanning activities directed towards observing the environment and identifying relevant changes), learning routines (i.e., developing new ways of responding to observed environmental changes), and reconfiguring routines (i.e., reorganizing existing resources and processes) (Teece and Pisano, 1994). Higher-order sensing routines allow organizations to quickly detect and evaluate opportunities and threats in their environment (Drnevich and Kriauciunas, 2011). Higher-order learning routines expand the potential actions organizations can take and thus help to generate adequate responses when environmental conditions change (Eisenhardt and Martin, 2000). Higher-order reconfiguring routines imply that companies have access to and can provide the required resources if adequate solutions need to be implemented to adjust operating routines to new conditions (Teece et al., 1997).

Because of their ability to prevent the drawbacks of routine rigidity and instead keep operating routines flexible, dynamic capabilities are assumed to be especially beneficial under conditions of high environmental dynamism. Some influential conceptual work even views dynamic environments as a constitutive element in the dynamic-capabilities concept (Teece et al., 1997; Teece, 2007). Accordingly, the great majority of empirical work has studied the implications of dynamic capabilities in dynamic environments such as high-tech and IT industries (e.g., Deeds et al., 2000; Wu, 2007; Bruni and Verona, 2009). However, recent studies have challenged the notion that dynamic capabilities are valuable exclusively under conditions of high environmental dynamism; they thus also question high levels of environmental dynamism as a necessary condition under which higher-order routines (constituting dynamic capabilities) emerge. While earlier empirical work does not explicitly acknowledge such external organizational context (cf. Barreto, 2010), recent studies consider different environmental conditions. They hypothesize and empirically demonstrate the beneficial impact dynamic capabilities have on organizations under high and low levels of environmental dynamism (Drnevich and Kriauciunas, 2011; Protogerou et al., 2012). Such findings give rise to the question of whether the higher-order routines that manifest dynamic

capabilities are contingent on environmental dynamics and are thus characterized by different features and core characteristics (Eisenhardt and Martin, 2000; Romme et al., 2010; Helfat and Winter, 2011). More concretely, the conceptual work by Eisenhardt and Martin (2000) suggests that the dynamic capabilities in highly dynamic environments need to quickly create new knowledge and implement novel solutions. To do so, they rely on higher-order routines that are simple and unstable. In contrast, in less-dynamic environments, dynamic capabilities operate in line with the slower pace of change in these environments and are assumed to be more detailed and structured.

Types of dynamic capabilities, then, may vary with regard to the level of environmental dynamism, as well as with regard to the execution frequency and codification of their underlying higher-order sensing, learning, and reconfiguring routines. In this study, we seek to explore the types of conditions (environmental dynamism, as well as execution frequency and codification of higher-order routines) that equifinally effect change in stable operating routines. Equifinality here refers to the possibility of reaching the same final state by different and distinct causal paths (Katz and Kahn, 1978).

2.3 Sample and Method

2.3.1 Research Approach

Research on dynamic capabilities and change in organizational routines mostly draws on inductive case studies or deductive model-testing (Parmigiani and Howard-Grenville, 2011; for an exception, see: Pentland et al., 2012). These approaches have considerably enhanced our understanding of the activities underlying higher-order routines and their impact on operating-routine development and change. However, these approaches are also limited in their ability to provide insights into complex cause-effect relationships linking types of conditions to changes in operating routines (cf. Ragin, 2000). In the current chapter, we complement these approaches by using a set-theoretic method. Set-theoretic methods, such as fsQCA, are uniquely suitable for exploring equifinal and multilevel configurations that lead to specific outcomes because they treat cases as configurations of attributes (Ragin, 2000; Fiss, Cambré and Marx, 2013).

FsQCA applies Boolean logic to examine the presence or absence of conditions in which the outcome is present (e.g., all cases in which operating routine change occurred) and then uses Boolean algebra to reduce the configurations into a (super)set of conditions that are causally related to the outcome (Ragin, 2000). In doing so, fsQCA allows equifinal explanations because this method does not as-

sume that there is only one constellation of features among all observed cases that causes the outcome (Fiss, 2011). Emergent processes, such as dynamic capabilities causing changes to operating routines, are typically equifinal in form (Crutchfield, 2008). Given that extant literature highlights the equifinal nature of dynamic capabilities (Eisenhardt and Martin, 2000; Laamanen and Wallin, 2009), explicitly questions whether high environmental dynamism is a necessary or sufficient condition of dynamic capabilities (cf. Protogerou et al., 2012), and problematizes cross-level interactions between meta-routines and operating routines (Salvato and Rerup, 2011), we argue that fsQCA represents the appropriate method to shed light on the causal relationship between configurations of dynamic capabilities as well as environmental dynamism resulting in changes in operating routines.

2.3.2 Sample and Data Collection

The data for the present chapter was collected in a larger research program on dynamic capabilities in the procurement departments of SMEs in three German industrial sectors—engineering, rubber and plastics, and paper processing (Schlömer et al., 2013, see also chapter 3). The empirical setting of industrial SMEs and their purchasing processes seems particularly suited to explore types of dynamic capabilities effecting operating-routine change. In general, dynamic capabilities are likely to be of high relevance for SME firm survival (Sawers, Pretorius and Oerlemans, 2008). SMEs usually have scarce resource endowments when compared to large organizations. In order to survive, it is critical that SMEs efficiently use and develop their processes (Pressey, Winklhofer and Tzokas, 2009). This assertion is particularly true for the purchasing processes of SMEs: Today's firms tend to reduce their level of in-house value creation thereby increasing the impact purchasing has on firm performance (Zheng et al., 2007). This circumstance makes change and adaptation in the procurement process crucial for firm survival. Therefore, German SMEs' procurement processes are particularly appropriate to explore and test the concept of dynamic capabilities.

We developed a standardized written questionnaire to obtain information about the organization, its procurement processes, and its dynamic capabilities. Following the design of earlier studies, the companies' top managers served as key informants (cf. Danneels, 2008). More specifically, we considered the head of the procurement department to be the most-knowledgeable informant, responsible for the procurement department's processes and possessing in-depth knowledge about the performance of the department. In order to avoid key-informant bias, we adopted a number of procedural remedies when developing the survey (Podsakoff et al., 2003). In a preliminary qualitative study, we thoroughly pre-

tested the survey in order to refine questions and constructs and to gain valid items and reliable scales, thus avoiding ambiguity and vagueness in the final questionnaire (cf. Tourangeau, Rasinski and Rips, 2000). Our preliminary qualitative study entailed interviews with purchasing managers and general managers from 11 SMEs from the three industries surveyed. In these interviews, we employed a think-aloud protocol to receive structured feedback on the validity and comprehensibility of the questionnaire (Sudman, Bradburn and Schwarz, 2010). The think-aloud protocol allowed us to substantially refine the questionnaire across interview rounds. To guard against key-informant and social desirability biases, the respondents were guaranteed strict confidentiality, asked to answer the questions as honestly as possible, and reminded that the questions being asked of them had neither right nor wrong answers. Also, the measures of the independent and dependent variables were spatially and methodologically separated (Podsakoff et al., 2003). Following data collection, we checked for key-informant bias by cross-validating self-reported measures with data from second informants and archival data. Furthermore, we checked for possible non-response bias by employing an Analysis of Variance (ANOVA) to test for significant differences between early and late respondents. The assumption is that late respondents are more similar to non-respondents than to early respondents (Armstrong and Overton, 1977; Jansen, Simsek and Cao, 2012). The ANOVA did not reveal any significant difference between these two groups, indicating that non-response bias was not a problem in this study. For these reasons, we feel confident that the respondents provided reliable data on the variables gathered in this study.

To promote awareness of our survey, we sent a formal invitation letter by mail to each SME employing at least 40 people in the selected industries in Germany (5,152 in total). Each letter contained login details for an online survey tool we used to administer the questionnaire. Following our initial mailing and emailed follow-ups, 632 companies responded to our invitation and logged into the survey site. Following emailed follow-ups and telephone calls, 200 SMEs returned completed questionnaires that contained less than ten percent missing values. To avoid data loss due to missing values, we employed mean substitution (Roth, 1994; Lemieux and McAlister, 2005). The final sample captures about four percent of the total population in Germany and is representative in terms of group size and industry composition. The majority of sampled firms (89.5%) employ between 50 and 499 people, with an average of 4.09 people working in a purchasing function (SD = 3.87).

In order to explore higher-order routines as drivers of change in operating routines, we had to ensure that the procurement processes we sampled were stable

organizational routines that exhibited comparatively little routine drift through endogenous change (Helfat and Winter, 2011; Pentland et al., 2011). Routinization is likely to foster stability in patterns of interaction (Cohen and Bacdayan, 1994). Therefore, our questionnaire measured the *routinization* of the operating process by adapting Withey et al.'s (1983) items (Cronbach's alpha = .87). A sample item from this scale reads: "Our operative purchasing activities exhibit a fixed sequence of steps." The answers were rated on a Likert scale ranging from 1 (fully disagree) to 5 (fully agree). To exclude organizations where change might result from an inherently instable procurement process, we deleted all cases exhibiting routinization in their procurement process below the sample median (4.0). This operation reduced our dataset to 103 cases in total.

2.3.3 Measures

In developing the items and scales for the measurement of the focal concepts, we used existing measures, scales, and items wherever possible (see Schlömer et al., 2013). Because we studied change processes, our data collection had to account for possible time lags between configurations of higher-order sensing, learning, and reconfiguring routines and the outcome "operating routine change." In line with the recommendations of Drnevich and Kriauciunas (2011), we constructed measures of the explanatory conditions (*environmental dynamism*, as well as execution *frequency* and *codification* of sensing, learning, and reconfiguring higher-order routines) retrospectively to the year 2005; that is, five years before the survey was conducted. Furthermore, given that the *frequency* and *codification* refer to concrete attributes of a specific interaction pattern—an assessment that was confirmed by virtually unanimous agreement in our extensive pretest with procurement-department managers—we measured *frequency* and *codification* of scanning, learning, and reconfiguring activities using a single-item scale (Rossiter, 2002; Bergkvist and Rossiter, 2007; Heimeriks, Schijven and Gates, 2012). In the questionnaire, an introductory sentence describes each of the higher-order routines in managerial language. We believe this explanation provided survey respondents with a clear understanding of sensing, learning, and reconfiguring activities in the context of purchasing processes.

Explanatory Conditions. To measure the *execution frequency* of higher-order routines, we asked our respondents how often sensing, learning, and reconfiguring activities (respectively) had been executed by the purchasing department five years prior to the study. The possible responses to each question were as follows: daily, every week, monthly, once a quarter, or once a year. Our extensive pretest showed that procurement-department managers were able to look into and regu-

larly drew on objective archival data, such as procurement controlling reports, when answering these questions.

To measure *codification*, we asked our respondents whether "the purchasing department had written standard operating procedures that prescribe activity patterns to be performed when engaging in" sensing, learning, and reconfiguring (respectively) activities. The answers were rated on a Likert scale ranging from 1 (fully disagree) to 5 (fully agree).

The present inquiry uses three industry sectors—engineering, rubber and plastics, and paper processing—to investigate different levels of *environmental dynamism*. To capture the multiple characteristics of environmental dynamism, we relied on constructs to measure the innovation/sales ratio, changes in the sales volume, the number of employees and the number of companies in an industry (Child, 1972; McCarthy et al., 2010; Haunschild, zu Knyphausen-Aufseß and Rahmel, 2011). In line with prior studies on dynamic capabilities and environmental dynamism (Pavlou and El Sawy, 2011; Protogerou et al., 2012), these measures capture changes in competition, customer preferences, and technology, leading to conditions of uncertainty and unpredictability for the company. In order to distinguish and compare results from highly dynamic and less dynamic industries, we dummy-coded two groups. The first group (67 respondents) consists of SMEs operating in the German engineering industry, which represents a highly dynamic environment according to the above-mentioned criteria when compared to the average of all German manufacturing industries. Engineering SMEs in Germany traditionally face "fierce competition between a small number of firms which do not want to set their market position at risk […]" (Grotz and Braun, 1997: 548). Over the last years, engineering has ranked among the top four manufacturing industries in Germany in terms of R&D expenditure, sales generated with product innovations, and successful completion of innovation projects (Statistisches Bundesamt, 2010; ZEW, 2013). The second group (36 respondents) is characterized by comparatively low levels of environmental dynamism according to the above-mentioned criteria; it ranks well below the average of all German manufacturing industries (Statistisches Bundesamt, 2010; ZEW, 2013). It contains firms from the plastics, rubber, and paper-processing industries. Companies from these industries usually devote fewer resources to R&D and their sales volumes are less dependent on product innovation and the successful completion of innovation projects than engineering companies.

Outcome. The outcome, *operating routine change*, was measured by counting the number of changed process steps in the company's procurement routine over

the last five years. We presented generic procurement process steps (specifying goods; searching suppliers; contracting; tracking orders; scheduling incoming goods; inspecting incoming goods) to our respondents. For each single procurement process step we provided our respondents with a predefined set of actions that this process step may encompass (e.g., searching suppliers via trade fairs). The generic procurement process steps and actions were derived from our pretest and procurement process norms (ISO-Norm DIN EN ISO 9004: 2005/9001, 2008). Based on the process steps and the action sets, the respondents described their procurement processes in the years 2005 and 2009, respectively. Based on these two descriptions of the respondent's procurement process, we calculated the extent of change in the operating routine between 2005 and 2009 using the number of changed action sets across all procurement process steps. The resulting variable indicates a minimum of zero and a maximum of seven operating routine changes per case.

2.3.4 Analytical Approach

We followed standard procedures in preparing and conducting our fsQCA (e.g., Ragin, 2000; Fiss et al., 2013). To ensure transparency, our analysis is based on the established software package fsQCA version 2.5 (Ragin and Davey, 2009), which proceeds stepwise through each analytical moment. In preparing our fsQCA, we first converted the variable labels into logical sets (e.g., the variable *environmental dynamism* was relabeled to the set *high environmental dynamism*). Turning variables into logical sets is required, as fsQCA is based on logical sets rather than statistical variables. To capture meaningful differences in kind and degree between cases, we then determined the extent to which each empirical case is a set member (e.g., to what extent a case is a member of the set *high environmental dynamism*). The fuzzy-set approach we employed transcends the Boolean either/or view by allowing membership scores between 1 and 0. Cases are therefore not forced into a dichotomous schema, but can be partial members of a given set. Set membership values approaching but below *1* indicate a strong but partial membership, while set membership values close to but above *0* indicate a strong but partial non-membership. The crossover point provides a demarcation between being "inside" or "outside." It represents "the point of maximum ambiguity (i.e., fuzziness) in the assessment of whether a case is more in or out of a set" (Ragin, 2008b: 30).[7] The process of determining set-membership values is referred to as "calibration." The researcher has to devise three threshold values when calibrating a fuzzy set: full membership, full non-membership, and the

[7] To prevent cases from dropping out of the fuzzy-set analyses, Ragin (2008b) recommends avoiding calibrating cases to 0.5 set-membership scores. In line with prior research (Fiss, 2011), we complied with his recommendation by adding a constant of 0.001 to all causal conditions with full set-membership scores below 1.

crossover point. However, lack of preexisting qualitative and quantitative scientific knowledge for calibration is a common condition in the social sciences (Ragin, 2008b). Consistent with previous fsQCA research, we also relied on empirical knowledge when initially calibrating our sets (Fiss, 2011; Greckhamer, Misangyi and Fiss, 2013).

Environmental dynamism was measured using a categorical industry-membership variable. Therefore, we calibrated the cases to the set *high environmental dynamism* using the indirect method, which is appropriate for categorical data (Ragin, 2008a: 96): SMEs operating in the engineering industry were coded as full set members (value of 1), while SMEs competing in the rubber/plastics and the paper-processing industry were coded as full non-members (value of 0).

Given that our measures for the higher-order routines' *execution frequency* and *codification* as well as *operating routine change* are continuous, we used the direct method to calibrate all explanatory conditions and the outcome (Ragin, 2008b). The direct method requires the researcher to devise three threshold values that indicate full non-membership, full membership, and the crossover point.

The set *high execution frequency of sensing* was calibrated such that SMEs conducting scanning activities less than every quarter were full non-members and SMEs conducting scanning activities more often than monthly were full members. The crossover point was located between monthly and quarterly scanning activities and allowed us to calibrate the set membership of the remaining cases. Given that scanning activities consume fewer resources and can be done more easily than can learning and reconfiguring activities, we employed a slightly relaxed frequency calibration for learning and reconfiguring meta-routine activities. More specifically, *high execution frequency of learning* was calibrated such that SMEs conducting learning activities less than yearly were full non-members and SMEs conducting learning activities more often than quarterly were full members. The crossover point was located between quarterly and yearly learning activities and allowed us to calibrate the set membership of the remaining cases. The same threshold values were applied for *high execution frequency of reconfiguring*.

The sets *high codification* of the meta-routine activities *sensing, learning*, and *reconfiguring* were measured using a 5-point Likert scale. For calibration, we employed Likert-based threshold values suggested by prior research (Fiss, 2011). More specifically, we calibrated such that the extreme ends of the Likert scale

represented full non-membership and full membership, while the center of the scale represented the crossover point.

Operating routine change was calibrated such that SMEs that had changed less than one process step in the company's procurement routine were full non-members of the set. In our sample, 15 companies had not changed their procurement routines between 2005 and 2010. SMEs that changed more than two procurement process steps were calibrated as full members of the set. In particular, we decided that 2.5 changes in procurement process steps was an appropriate threshold for full membership in *high operating routine change* because this value implies that the SME changed about half of the activities constituting their procurement process. In our sample, 36 cases exhibited such high levels of operating-routine change. The crossover point (1.5) was located in the middle of both thresholds to distinguish between 52 cases exhibiting some but little operating-routine change.

Calibrating all explanatory conditions as well as the outcome to set membership values generates the fuzzy-set data matrix (Ragin, 2000; Fiss, 2011). The fuzzy-set data matrix provides the empirical basis for causal analysis in fsQCA. Causal analysis in fsQCA builds on the notion of necessary and sufficient conditions. Since procedures uncovering sufficient conditions cannot be relied on to uncover necessary conditions, we analyzed necessary and sufficient conditions separately (Schneider and Wagemann, 2010). Logically, *necessary conditions* are always present if the outcome is present; and there must not be an instance in which the outcome is present and the condition absent (Schneider and Wagemann, 2007). By convention, a consistency value of at least 0.9 is required for indicating necessary conditions (Ragin, 2006). We employed the *necessary conditions* procedure provided by fsQCA 2.5 and found that none of the conditions can be considered necessary for operating routine change to occur. We continued our analysis by testing for sufficient conditions.

For a *sufficient condition*, the outcome is always present if the condition is present and there must not be an instance in which the condition is present and the outcome absent (Schneider and Wagemann, 2007). To analyze the data for *sufficient conditions*, we relied on the Quine-McClusky truth-table algorithm provided in fsQCA 2.5. The Quine-McClusky algorithm requires the researcher to first specify a truth table based on the fuzzy-set data matrix. While the fuzzy-set data matrix depicts the set membership values of every case, the truth table captures all possible dichotomous combinations of conditions in a given fuzzy-set data matrix. As our present study entails seven explanatory conditions (*high environ-*

mental dynamism, three conditions pertaining to *high execution frequency* of dynamic capabilities, and three conditions pertaining to *high codification* of dynamic capabilities), our truth table exhibits 2^7 rows. However, not every row on the truth table will yield an adequate number and proportion of cases that display the outcome (e.g., *high operating routine change*). Therefore, fsQCA 2.5 requires the researcher to specify a minimum number of empirical cases and a consistency threshold value to code the outcome of a row and proceed with the analysis. Rows that fail to meet the minimum number of empirical cases are removed from the truth table. Rows that fail to meet the consistency threshold are coded as non-members of the outcome set. We employed a threshold of two cases per truth table row. While this frequency threshold captures most (74%) of our empirical cases for the analysis, it also reduce the impact of possible outliers and measurement errors on our solution terms (Ragin and Fiss, 2008). We applied a consistency threshold of 0.825, which is stricter than Ragin's (2008a) recommendation (0.75).

The Quine-McClusky algorithm uses Boolean algebra to reduce these truth-table rows to less complex expressions. In this minimization procedure, complex configurations are reduced in favor of logically equivalent but less complex solution terms (Schneider and Wagemann, 2007). In the course of the minimization procedure, the fsQCA software allows for three types of solutions. Whereas the parsimonious and the intermediate solution (to various extents) incorporate logical remainders, the complex solution incorporates only statements about situations that occur empirically (Ragin, 2000) and therefore represents the most conservative approach (Vis, 2012). Accordingly, our analysis relies on the complex solution.

2.4 Findings

The findings are presented in Table 2.1 using the notation suggested by Ragin and Fiss (2008). In this notation style, black circles (●) indicate the presence of a condition, while circles with a cross (⊗) indicate the absence of a condition. Blank spaces indicate a so-called "don't care" situation, in which the condition may be either absent or present. Table 2.1 depicts the complex solution encompassing five different solutions that are covered by 20 cases from our sample.[8] Based on similar gestalts, we created four types that group the five sufficient equifinal solutions explaining the outcome of operating-routine change (see Table 2.1).

[8] The parsimonious and the intermediate solution are available upon request.

Table 2.1: Configurations Causing Change in Operating Routines

	Solution				
Condition	**1**	**2**	**3a**	**3b**	**4**
High Environmental Dynamism	●	●	●	●	⊗
High Execution Frequency					
Sensing		⊗	●	●	⊗
Learning		⊗	●	⊗	●
Reconfiguring	●	⊗	●	●	⊗
High Codification					
Sensing	⊗	⊗	●	●	●
Learning	⊗		⊗	●	●
Reconfiguring	⊗	●	●	●	●
Consistency	.86	.91	.86	.90	.86
Raw Coverage	.24	.15	.11	.13	.06
Unique Coverage	.12	.05	.01	.05	.06
Overall Solution Consistency			**.88**		
Overall Solution Coverage			**.42**		

In general, the consistency indicators provided with each solution capture "how closely a perfect subset relation is approximated" (Ragin, 2008b: 44). The overall solution consistency (0.88) as well as all consistency terms are above the minimum 0.80 consistency recommended by Ragin (2008b). This result indicates that there is an appropriate correspondence between our empirical data and the set-theoretic relationships captured in the solution terms. As indicated by the overall solution coverage, together all solutions account for approximately 42 percent of the fuzzy-membership values in the outcome. This scenario implies that almost half of the outcome is explained by the solution terms, comparable to other research applying this method (Fiss, 2011; Jackson and Ni, 2013).

In the following section, we give a detailed description of the four solution types our analysis revealed. These types show major differences regarding the level of environmental dynamism as well as the frequency and codification of higher-order sensing, learning, and reconfiguring routines. Interestingly, all configurations we found explicitly incorporated environmental dynamism (i.e., we found no solution where high environmental dynamism was a "don't care" condition). In addition, we provide information on the organizations covered by each solution type. This information was collected as part of the overall research project. On the one hand, it refers to the organizations' descriptive attributes (i.e., their *age* measured in years from firm founding until data collection in 2009; *size*, measured in number of employees; and changes in the *level of vertical integration* over the last five years). On the other hand, it captures assumptions about the importance and realization of process innovations within these organizations. To

measure the shared *process innovation mind-set*, we adapted a scale suggested by Jaworski and Kohli (1993). Survey respondents were asked whether they regard their organization "as an innovator in procurement standards vis-à-vis competitors" and whether their organization "encourages the development of innovative procurement solutions." The answers were rated on a Likert scale ranging from 1 (fully disagree) to 5 (fully agree). The scale achieved a Cronbach's alpha of .79. Table 2.2 depicts organizational attributes and shared process innovation mind-set for each solution type by showing whether the median value for each solution corresponds to the overall median (○) or ranges below (--) or above (++), respectively.

Table 2.2: Descriptive Information on Organizations and Types of Dynamic Capabilities

	Dynamic Capabilities Type								
	Type 1 Experiential		*Type 2 Reactive*		*Type 3 Programmed*		*Type 4 Analytic*		Overall Median
	Rank	Median	Rank	Median	Rank	Median	Rank	Median	
Organizational Attributes									
Age	○	61.5	– –	51.24	++	77	+	64.5	61
Size	○	151.5	– –	98	+	180	++	220	147.5
Vertical Integration	– –	2.5	–	3	+	4	○	3.5	3.5
Process Innovation Mind-set	++	3	○	2.5	++	3	+	2.75	2.5

2.4.1 Type 1: Experiential

Solution 1 indicates that under high levels of environmental dynamism, non-codified higher-order sensing, learning, and reconfiguring routines, in conjunction with a frequent execution of the reconfiguring routine, cause changes in the operating routine. More concretely, organizations covered by this solution type do not provide procurement staff with a clearly defined and codified procedure for how they should scan the environment for relevant changes, develop new ways to respond to such changes, and reorganize the existing procurement process in a proper way. Rather, procurement staff is given considerable leeway in the execution of higher-order sensing, learning, and reconfiguring routines, which can, in turn, be regarded as inherently flexible. While lacking codified procedures for the execution of higher-order routines, reconfiguring activities take place in a regular and frequent manner. Variations in the operating-procurement routine are proposed and tested on at least a monthly basis. They may, for example, refer to a changed sequence of process steps in supplier search, the inclusion of supplier audits, or a switch from local to global supplier.

Eight of our sample organizations are members of this "experiential"-type of dynamic capabilities. Compared to all organizations contributing to the typology,

these organizations are on average characterized by a medium age and slightly greater size. More concretely, the age of five organizations is below the average age of 61 years; three organizations are above average. Most of the organizations employ between 100 and 200 employees; two of them present outliers, employing almost 500 employees, which is per definition the upper limit as an SME (Günterberg and Wolter, 2003). All organizations lowered their level of vertical integration substantially during the last five years. Their lowered in-house production is likely to increase the importance of their operating-procurement routine. Additionally, these organizations show a high level of process innovation mind-set. They consider process innovations to be of great importance and view themselves as innovators with regard to their procurement processes.

The experiential-type set of higher-order routines resembles dynamic capabilities that are usually associated with highly dynamic environments (Eisenhardt and Martin, 2000). Such environments are characterized by a flow of opportunities and threats that is fast, complex, ambiguous, and unpredictable (Davis et al., 2009). Therefore, change in operating routines is likely to be caused by higher-order routines that are simple, experiential, and unstable (i.e., not codified) and rely on high rates of change proposals (i.e., frequent execution of the reconfiguring routine). Such higher-order routines themselves are basically in flux (Schreyögg and Kliesch-Eberl, 2007) and only their regular and frequent execution distinguishes them from mere ad-hoc problem solving (Winter, 2003).

The high frequency with which organizations with experiential-type dynamic capabilities probe variations to their operating routines is likely to keep them highly flexible. Qualitative research on new-product development (Brown and Eisenhardt, 1997) and strategic change (Gersick, 1994) revealed that the rhythmic and frequent changes of a time-based pacing enabled organizations to check new solutions while at the same time preventing them from committing to obsolete ones. Both studies emphasize that time-pacing seems especially suitable in fast-changing environments because it creates regular and explicit opportunities to assess progress and implement adaptations. This built-in check prevents organizations from missing novel opportunities and thus from becoming inert and maladapted. Rather, high frequency scanning lays the groundwork for a proactive and experiential way of seizing novel opportunities in an environment that provides a diverse and high level of stimuli at a high rate. In the sample organizations, this proactive approach to routine change is consistent with and backed by high degree of process innovation mind-set.

The low levels of codification in their higher-order routines help highly dynamic organizations to cope with the complex and ambiguous stimuli—be they opportunities, challenges, or threats. Prior research has claimed (Eisenhardt and Martin, 2000) and demonstrated empirically (Brown and Eisenhardt, 1997) that high-performing organizations counteract the challenges of environmental dynamism with less-structured processes. This scenario results because such environments do not demand well-defined solutions, but rather require broad and unspecified searches to identify a range of future options (Rowley, Behrens and Krackhardt, 2000). Prestructured and codified higher-order routines are likely to confine searches, miss or misinterpret opportunities, and predetermine solution space. Instead, in highly dynamic environments, non-codified higher-order sensing, learning, and reconfiguring routines provide the flexibility needed to detect and react to the complex signals encouraging new solutions and necessitating change to operating routines. Organizations with low levels of size, age and vertical integration usually have less coordination requirements (cf. Meilich, 2000). Furthermore, they often are characterized by little organizational slack. Therefore, such organizations may eschew costly codification. The experiential-type approach of little codification fits to these organizations' comparatively small size and lowered levels of vertical integration.

All in all, the high reconfiguration frequency and minimal codification of experiential-type organizations' higher-order routines supports an experiential way of proactively seeking out opportunities (underpinned by an innovative mindset) in a flexible way (consistent with younger, smaller, and less-vertically integrated firms), which fits to the velocity and complexity of environmental opportunities.

2.4.2 Type 2: Reactive

Solution 2 depicts another path to operating-routine change under high levels of environmental dynamism. Similar to the experiential type, sensing activities show little codification. In contrast to the experiential type, however, reconfiguring activities are highly codified and all higher-order routines (sensing, learning, and reconfiguring) are only executed at low frequency. In these organizations, procurement staff engages in sensing activities between once a quarter and once a year. Learning and reconfiguring activities are temporally pooled and take place once a year. While sensing activities are not guided by prestructured codified procedures, procurement staff uses codified procedures for the reconfiguration of an existing procurement routine. Thus, instead of continuously generating and experimenting with new variations of their procurement routine—as is the case of the experiential types—this "reactive"-type seems to concentrate sensing,

learning, and reconfiguring efforts temporally and adjusts operating routines in a prestructured and efficient manner.

We find five organizations belonging to the reactive-type solution. These organizations are comparatively young and small. Four organizations are at or below the average of age and size. One organization is only slightly above the average age of 61 years. Four of them employ fewer than the average of 147 employees. These organizations have lowered their level of in-house production over the past five years, yet to a smaller extent than the experiential-type organizations. In contrast to experiential, reactive-type organizations view themselves as neither innovative with regard to procurement standards nor as encouraging their members to develop innovative procurement solutions. Organizations that exhibit this configuration of higher-level routines are likely to change their operating routines at diligently planned episodes of change that "punctuate" otherwise stable operating routines (cf. Tushman and Romanelli, 1985).

The low frequency in which higher-order sensing, learning, and reconfiguring routines are executed implies that these firms are unlikely to seize the various opportunities of dynamic environments in a timely manner. They are even less likely to set innovative standards that a time-paced approach yields (Gersick, 1994; Posen, Lee and Yi, 2013). Still, this approach enables reactive-type organizations to revise their operating routines from time to time and thus to catch up with existing industry standards. In these organizations reactive adaptation—in contrast to proactive opportunity seizing—is in line with comparatively low levels of a shared process innovation mind-set.

Codified *reconfiguring* routines support these reactive adaptations. The opportunities of codification lie in their efficient way to produce predictable outcomes, because standardized processes provide a frame of reference and a foundation to organizational learning when changing the organizational resource base (Zollo and Singh, 2004). Codified reconfiguring routines cannot provide the flexibility needed to explore and experiment with complex and ambiguous environmental opportunities. Rather, their design helps to adopt changes in operating routines that proved worthwhile. The low-level codification of higher-order *sensing* routines might be of help in detecting such best practice solutions before implementing them in an efficient prestructured manner. Moreover, low-level codification of sensing may also originate in efficiency strives. In a qualitative study on Alessi's product development, Salvato (2009) mentions several reasons why less codification of search routines is superior to their deliberate prestructuring. One refers to the opportunity cost of developing and maintaining prestructured routines,

which seems especially inefficient if, as in our case, higher-order sensing routines are applied infrequently. The relatively low levels of higher-order routine codification can—similar to the experiential type—be explained by their younger ages, smaller sizes, and lower levels of vertical integration, which usually involves a scarce resource endowment and thus the need for efficient processes. Taken together, reactive-type dynamic capabilities allow for an efficient adoption of best practice solutions by infrequent sensing, learning and reconfiguring as well as a flexible search for such solutions and their efficient implementation. Efficient adoption corresponds to low levels of a process-innovating mind-set and the comparatively poor resource endowment of young and small organizations.

2.4.3 Type 3: Programmed

Solution 3a and 3b represent the last two explanatory paths incorporating high levels of environmental dynamism. In organizations exhibiting "programmed"-type higher-level routines, change in operating routines is a result of higher-order routines that are frequently executed *and* highly codified. These organizations engage in a daily to weekly sensing of their environment to detect relevant changes and opportunities. Based on such scanning activities, they reengineer their operating procurement routines, resulting in monthly to quarterly shifts and adjustments. Their frequent sensing, reconfiguring, and (in part) learning activities are executed most efficiently by relying on detailed and codified operating procedures. The high execution frequency and extant codification suggests a programmed type of dynamic capabilities.

Altogether, five organizations are members of the programmed-type set solution; solution 3a includes one organization, solution 3b encompasses four organizations. The organizations exhibiting programmed-type dynamic capabilities are comparatively older than the organizations exhibiting different types of dynamic capabilities, with some of them founded at the end of the nineteenth and the beginning of the twentieth century. With regard to size, most of them employ between 100 and 300 employees. Thus, on average, they are much larger than organizations of the reactive type (solution 2) and also slightly larger than organizations classified as experiential (solution 1). Similar to the experiential type, these organizations view themselves as innovative with regard to procurement standards and put a high emphasis on the development of novel procurement solutions. However, in sharp contrast to the other solution types, organizations of the programmed-type expanded their level of vertical integration over the last five years; that is, they increased their reliance on in-house manufacturing substantially.

This notion of change seems closest to the process-oriented ideal type, which features patterned and systematic ways of dealing with highly dynamic environments as described in some parts of the literature on dynamic capabilities (Teece et al., 1997; Helfat and Peteraf, 2003). Here, change in operating routines results from an intentionally designed program, where the frequency by which the program is executed is aligned with the degree of environmental dynamism that the organization faces. Similar to the experiential type, and with even greater consequence for these organizations, the frequent sensing, learning, and reconfiguring allows seizing opportunities in a proactive way. The results are speedy changes in operating routines, which may set the pace for new standards and inventions. Their mode of proactive change is aligned closely to a high degree of process innovation mind-set, which is reflected in these organizations' assumptions about themselves as process innovators vis-à-vis competitors.

The high levels of codification support the efficient execution of higher-order routines. Standardized and prestructured processes provide a frame of reference to guide sensemaking and activity patterns when changing the organizational resource base (Zollo and Singh, 2004). This seems especially worthwhile when such activity patterns are executed at high frequency. However, some literature cautions against establishing prestructured and defined operations in highly dynamic environments. Codified higher-order routines entail the risk of producing inadequate solutions because they might miss environmental signals or overstandardize proposed change solutions. Moreover, they produce linear adjustments in an environment that requires and rewards non-linear changes (Eisenhardt and Martin, 2000; Schreyögg and Kliesch-Eberl, 2007). On the other hand, the organizations exhibiting high levels of codification in our sample are characterized by comparatively high levels of age, size and an increase in vertical integration. It is not surprising for older and larger firms to have prestructured and standardized operating procedures (cf. Meilich, 2000). Moreover, the expansion of in-house manufacturing may provide these organizations with accumulated know-how regarding the efficient change of operating routines, which is explicated in codified operating procedures. Thus, programmed-type dynamic capabilities seem to build on and exploit the accumulated experience of older, larger and vertically integrated organizations in executing efficient change in operating routines (Peteraf et al., 2013). In sum, the programmed type combines the efficient execution of higher-order routines found in large and experienced organizations with the proactive opportunity-seizing of innovative mind-sets.

2.4.4 Type 4: Analytic

Solution 4 is the only solution incorporating "*not* high environmental dynamism" (i.e., less-dynamic industry environments). It therefore represents a completely different path to operating-routine change than the other types. More specifically, this solution suggests that under less-dynamic environmental conditions, changes in operating routines result from highly codified higher-order routines. Procurement staff's sensing, learning, and reconfiguring activities are guided by codified operating procedures prescribing the correct steps and sequences of scanning the environment for relevant changes, developing response patterns to such changes, and reconfiguring the existing procurement routine. While sensing and reconfiguring higher-order routines are seldom executed, the learning routine is run at high frequency, implying the frequent modification and enlargement of the organization's knowledge based on experience accumulated within the organization. We therefore termed this solution an "analytic" configuration of higher-order routines.

Two organizations are members of the analytic type. With regard to age, these organizations are around average. With regard to size, analytic-type organizations are slightly above average; they employ 140 and 300 employees, respectively. With regard to change in vertical integration, these organizations show little adjustment over the last five years. Similar to the experiential and programmed type, these organizations emphasize process improvements and describe themselves as innovative with regard to the procurement standards prevalent in their industry.

This analytic mode can also be found in conceptual arguments that underline the different forms yet similar value of dynamic capabilities for changing operating routines when environments are characterized by low dynamism (Eisenhardt and Martin, 2000). Low or moderately dynamic environments show more predictable changes that occur at a lower rate and extent. While some research questions the value of dynamic capabilities under these conditions (Teece et al., 1997; Drnevich and Kriauciunas, 2011), recent empirical findings showed that dynamic capabilities are beneficial under conditions of both high and low environmental dynamism (Protogerou et al., 2012). However, as each type of environment presents fundamentally different threats and opportunities to organizations, such findings suggest that the higher-order routines found in low-environmental dynamism differ from those in high-environmental dynamism (Winter, 2003; Laamanen and Wallin, 2009); that is, they are assumed to be "complicated, predictable, analytic processes that rely extensively on existing knowledge, linear execution and slow evolution over time" (Eisenhardt and Martin, 2000: 1113).

Low-execution frequency aligns sensing and reconfiguring with the lower change rates in less-dynamic environments, in which an adaptation mode to routine change is sufficient. The process innovativeness of analytic-type organizations shows that they are not resistant to changes, but rather that they choose an adaptive mode of change in line with the demands of their environment. Codified and structured higher-order routines present analytic tools that support incremental and efficient adjustments to an organization's operating routines (Davis et al., 2009). Similar to programmed type dynamic capabilities, analytic-type dynamic capabilities are found in organizations featuring high levels of age and size, potentially facilitating the efficient execution of higher-order routines. In sum, the analytic type aligns closely with the demands of low environmental dynamism. Efficient adaptation is reflected by low execution frequency of sensing and reconfiguring and frequent learning (based on an above-average level of a process-innovating mind-set) as well as high levels of codification (as characteristic of older and larger organizations).

2.4.5 Findings for Absence of Change in Operating Routines

While the conceptual literature on dynamic capabilities suggests an asymmetric understanding of the outcomes caused by dynamic capabilities (i.e., the absence of dynamic capabilities cannot be equated with the non-occurrence of change in operating routines [Winter, 2003; Helfat and Winter, 2011]), traditional statistical regression approaches imply such symmetry. As Fiss (2011) reiterates, while analyzing the *absence* of the outcome is part of regression analysis due to the symmetry of relationships in such models, occurrence and non-occurrence of an outcome are explained by the same model. For example, with logit models, the explanation of failure is the inverse of success (Goertz and James, 2012). To further explore the potential causal asymmetry in dynamic capabilities, we also conducted fuzzy-set analyses modeling *no operating routine change* as an outcome. To conduct this analysis, we calibrated all cases (15 SMEs) exhibiting no change in their operating routine as full members of the dichotomous set *no operating routine change*, while all remaining cases exhibiting non-zero operating routine change were coded as full non-members of this set. In line with an asymmetric understanding of causality in dynamic capabilities, the consistency scores in the truth table for *no operating routine change* remained considerably below the acceptable level of 0.75 (cf. Ragin, 2000). The truth table row exhibiting the highest consistency score (0.29) contained four cases. Therefore, our data does not suggest any consistently identifiable set-theoretic relationship when *no operating routine change* is used as an outcome. While our analysis suggests different types of dynamic capabilities under specific environmental conditions as explanations of operating routine change, we find no configuration of dynamic capabilities and

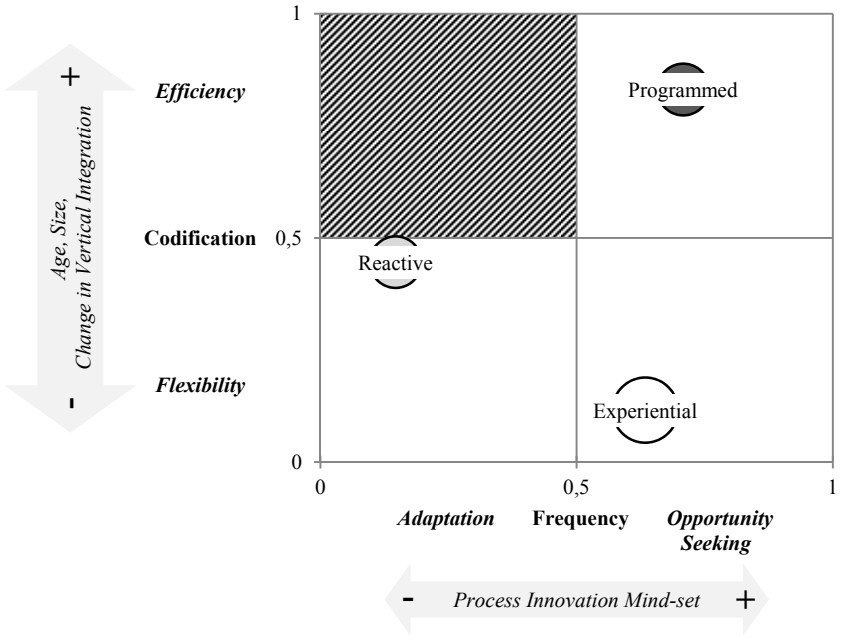
environmental dynamism that consistently leads to no operating routine change. This result indicates that dynamic capabilities are inherently linked to change in operating routines. In the following section, we discuss how these types of dynamic capabilities fit with different approaches to operating-routine change under high and low levels of environmental dynamism.

2.5 Discussion

Our exploratory study uncovered and further explored four different types of dynamic capabilities exhibiting distinct characteristics and structures that equifinally cause change in operating routines. In doing so, our study advances our understanding of dynamic capabilities as a cause of operating-routine change. In the following discussion, we generalize our typology derived in the findings section into a tentative framework about how *reactive, experiential, programmed* and *analytic* types of dynamic capabilities align with different approaches to operating-routine change under high and low levels of environmental dynamism. This framework expands on the notion that the higher-order routines constituting dynamic capabilities differ in terms of codification and execution frequency. We argued that high levels of codification imply that the higher-order routines constituting dynamic capabilities are likely to exhibit a standardized and more efficiency-driven approach towards operating routine change, while low levels of codification imply that the dynamic capabilities offers a more flexible approach. Executing routines of sensing, learning, and reconfiguring at a high frequency resembles an approach of opportunity seeking, while a low-frequency approach is likely to lead to a more adaptive approach towards environmental dynamism. Furthermore, we argue that each approach to operating routine change emerges in different internal organizational contexts characterized by specific organizational attributes (i.e., age, size and changes in the level of vertical integration) and levels of process innovation mind-sets. Figure 2.1 (high-dynamic environments) and Figure 2.2 (low-dynamic environments) situate each type of dynamic capabilities within this framework.[9]

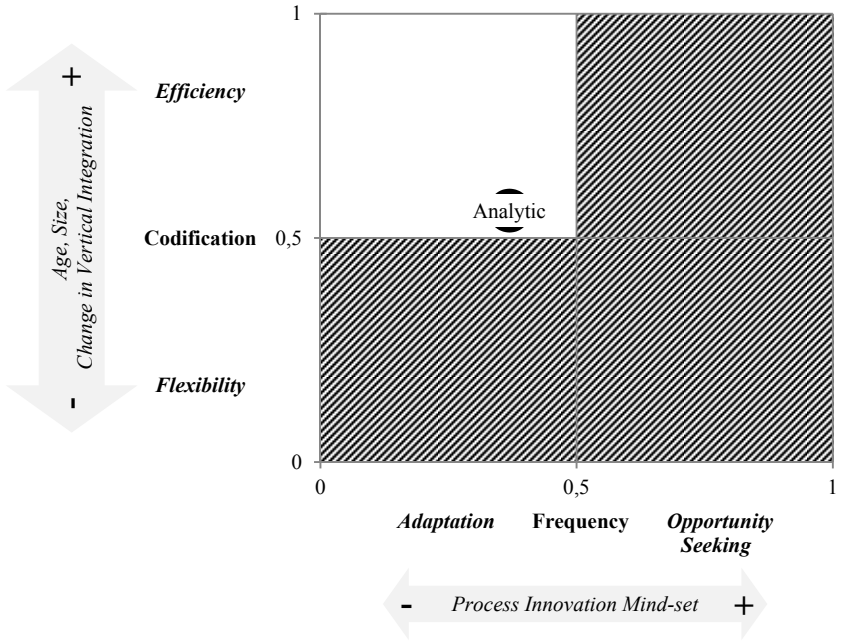
[9] Figures 2.1 and 2.2 are based on the original fuzzy-set data matrix and the solution terms depicted in Table 2.2. The position of each cluster within the matrix represents the average set-membership score in the codification and frequency conditions of all cases explained by the respective solution. The size of each cluster reflects the number of cases explained by the respective solution term.

Figure 2.1: Types of Dynamic Capabilities in High-dynamic Environments



As Figure 2.1 depicts, organizations exhibiting *experiential* dynamic capabilities take an opportunity seeking approach towards their highly dynamic environments, emphasizing flexibility and openness in how operating routines are changed. This approach encompasses frequent experiments and little codification, thereby broadening the organization's exposure to diverse experiences. Accordingly, change in operating routines is likely to be of more exploratory nature, encompassing small experiments, "learning-by-doing" and attempts to act as a first mover in seizing environmental opportunities (cf. Pisano, 1994; Eisenhardt and Martin, 2000). In contrast, organizations featuring *reactive* dynamic capabilities take an adaptive approach that puts less emphasis on flexibility and openness in how operating routines are changed. Under such a regime of higher-order routines, change in operating routines is likely to be more conservative, mostly drawing on and exploiting the experiences of other companies who lead the respective process innovations. Finally, *programmed* dynamic capabilities emphasize opportunity seeking and efficiency in higher order routines. Change in operating routines is likely to be of limited exploratory nature, encompassing frequent variations of similar patterns, suggesting attempts of linear and piecemeal adjustment to a highly dynamic environment. Interestingly, in high-dynamic environments, we do not find a type of dynamic capabilities encompassing efficiency and adaptation. As Figure 2.2 below highlights, this quadrant is covered in low-dynamic environments.

Figure 2.2: Type of Dynamic Capabilities in Low-dynamic Environments



As Figure 2.2 demonstrates, organizations exhibiting *analytic* dynamic capabilities take an adaptive approach towards their comparatively stable environments, emphasizing efficiency and narrow generation of own experience. Accordingly, change in operating routines is likely to be of highly conservative nature, devising well-developed and broadly tested change initiatives. Given such extensive "learning-before-doing" (Pisano, 1996: 1097) and limited exposure to exploratory behavioral patterns, operating routine change will primarily encompass incremental innovation and change to address slowly changing circumstances implied by low environmental dynamism.

Finally, different internal organizational contexts characterized by specific organizational attributes (i.e., age, size and changes in the level of vertical integration) and specific levels of a process innovation mind-set seem to foster different approaches to operating routine change. This finding is illustrated by the outer arrows in Figures 2.1/2.2, which are based on the descriptive information provided in Table 2.2. It seems that the level of an organization's process innovation mind-set distinguishes between an adaptation and opportunity-seeking mode towards operating routine change. More concretely, the higher the level of process innovation mind-set in an organization, the more likely is an opportunity-seeking approach. Furthermore, it seems that organizational attributes, such as age, size and changes in the level of vertical integration are aligned with a flexibility or efficiency-oriented approach to operating routine change. While younger, smaller and disintegrating organizations are more likely to take a flexible stance towards routine change, older, larger and vertically integrating organizations are equipped with the resources and experience needed to follow an efficiency-approach.

2.6 Conclusion and Limitations

Our contribution to the literature is threefold. First, we advance our understanding of dynamic capabilities as a cause of operating-routine change by empirically uncovering four different types exhibiting distinct characteristics and structures. For example, while the *experiential*-type prevalent in high-dynamism environments focuses on seeking opportunities in a flexible manner, the *analytic*-type occurring in environments characterized by low dynamism relates to more adaptive operating-routine change. Against this backdrop, we sketch a framework to theorize the internal consistency of the different types of dynamic capabilities and their role in organizational stability and change. Second, our research also complements existing work on routine change that focuses on endogenous change (Pentland et al., 2011; Rerup and Feldman, 2011) and non-routine sources of change and novelty (Obstfeld, 2012) by exploring dynamic capabilities as higher-order routines that lead to exogenous change in operating routines. Third, in revealing that our analysis does not find types of dynamic capabilities causing *no-change* in operating routines, we substantiate prior theoretical arguments suggesting that dynamic capabilities are indeed a non-linear and non-symmetric phenomenon, suggesting caution when applying analytical approaches that incorporate assumptions of symmetry.

Despite the contribution of our study, we also have to acknowledge its limitations, some of which might provide a fruitful starting point for future research. Comparable to other work applying fsQCA (e.g., Fiss, 2011), our analysis entails too few cases for each solution term to conduct further statistical analysis of our dynamic capabilities typology. While other qualitative studies on dynamic capabilities or change in operating routines incorporate a comparable or smaller number of organizations (e.g., Brown and Eisenhardt, 1997; Rindova and Kotha, 2001; Pentland and Feldman, 2008a), any generalizations drawn from our study should consider this limitation. We therefore call for future research to corroborate our findings. Similarly, while the engineering industry in Germany is considered highly dynamic, other industries face even higher levels of environmental dynamism, such as software and biotechnology industries. Therefore, researchers that want to replicate the typology derived in this chapter might expand the scope beyond the current empirical setting using a sample that includes these industries as well. Finally, while our research provides insight into the different ways leading to changes in operating routines, as presented by distinct types of dynamic capabilities, we cannot provide further evaluations of these types. Accordingly, our present research provides a fruitful foundation for future research to test the different implications each type of dynamic capabilities has for company performance and a potential sustainable competitive advantage.

3 How Dynamic Capabilities Impact the Evolutionary and Technical Fitness of Operating Routines under High and Low Levels of Environmental Dynamism

3.1 Introduction

In recent years, research on strategic management has identified dynamic capabilities as a driver of sustained competitive advantage. Dynamic capabilities enable companies to constantly adjust their operating routines and adapt to changing environmental demands, thus allowing them to outperform their competitors (Teece et al., 1997; Winter, 2003; Helfat et al., 2007). While this outcome may be true for some organizations, dynamic capabilities are unlikely to constitute a guarantor of success for every organization (Ambrosini and Bowman, 2009). Despite their undisputed performance-enhancing effects, the systematic investigation of the conditions under which dynamic capabilities lead to company success is still in its infancy (Easterby-Smith et al., 2009; Di Stefano et al., 2010; Vogel and Güttel, 2013). In particular, the impact of environmental dynamism on the performance effect of dynamic capabilities remains under-investigated (Wang and Ahmed, 2007; Barreto, 2010). Environmental dynamism can be defined in terms of frequency, magnitude, and irregularity of changes in competition, customer preferences, and technology (Miller and Friesen, 1983; McCarthy et al., 2010). High levels of environmental dynamism reflect conditions of uncertainty, unpredictability, and ambiguity, raising severe challenges for companies (Galbraith, 1973; Eisenhardt and Tabrizi, 1995).

While the bulk of management research examines companies in highly dynamic environments, such as high-tech and IT industries (e.g., Deeds et al., 2000; Wu, 2007; Bruni and Verona, 2009), the few studies that evaluate different environmental circumstances have shown inconsistent performance effects. Some authors find no moderating environmental effect on the potential performance implications of dynamic capabilities (Drnevich and Kriauciunas, 2011; Protogerou et al., 2012), while others provide evidence for this relationship (Pavlou and El Sawy, 2006; Romme et al., 2010). Given that the progress of research on dynamic capabilities is seriously hampered by such inconsistent findings in empirical research (Barreto, 2010; Vogel and Güttel, 2013), the different conditions of dynamic capabilities' impact on operating-routine performance deserve investigation to resolve inconsistent research findings and provide guidance for practitioners.

In this study, we hypothesize and test the impact that dynamic capabilities have on two different performance yardsticks of operating routines under high versus low levels of environmental dynamism, namely the evolutionary fitness (i.e., goal achievement) and technical fitness (i.e., goal achievement in relation to underlying costs). The findings reveal that dynamic capabilities increase the evolutionary fitness of operating routines irrespective of environmental dynamism; however, the extent to which dynamic capabilities affect the technical fitness of operating routines, determined by the ratio between evolutionary improvements and underlying costs, differs considerably depending on environmental conditions. These findings corroborate and extend prior conceptual arguments on the impact dynamic capabilities have on firm fitness (Teece et al., 1997; Winter, 2003; Helfat et al., 2007; Helfat and Winter, 2011).

3.2 Theory

3.2.1 Dynamic Capabilities and their Activity Components

Research on dynamic capabilities seeks to explain companies' competitive advantages. In doing so, research on dynamic capabilities extends the resource-based view (Teece et al., 1997; Helfat and Peteraf, 2003), which states that companies can gain a sustained competitive advantage if the company's resources are valuable, rare, inimitable, and non-substitutable (Penrose, 1959; Wernerfelt, 1984; Barney, 1991). However, in order to build and maintain enduring competitive advantages, the exploitation of such resources is insufficient because competition between companies usually erodes the value of resources over time (Teece, 2007). Dynamic capabilities address this critique. This concept describes and explains how companies can build and maintain a sustained competitive advantage in changing environments.

Within the literature, specific organizational meta-routines (i.e., recurring action patterns allowing for a competitively adequate adjustment of a company's operating routines) constitute such dynamic capabilities (Collis, 1994; Szulanski, 1996; Dosi et al., 2000). While operating routines are geared towards the operational functioning of a company and thus describe the way a company earns profits, dynamic capabilities encompass meta-routines that are used to create, extend, and/or modify these routines (Winter, 2003). Accordingly, this chapter defines dynamic capabilities as meta-routines designed to improve a company's operating routines by renewing or modifying them. Although we find different conceptualizations of the meta-routines that constitute dynamic capabilities in the literature (Barreto, 2010; Vogel and Güttel, 2013), the most-widely used conceptualization is based on the theoretical work of Teece and Pisano (1994) (Peteraf et

al., 2013). This work describes higher-order sensing, learning/seizing, and reconfiguration/transformation routines as constitutive activities of dynamic capabilities (for a detailed description, see also Teece [2007]). We build on these authors and conceptualize dynamic capabilities as manifestations of three regularly recurring activity components: (1) sensing—scanning activities directed towards observing the environment and identifying relevant changes; (2) learning—developing new ways of responding to observed environmental changes; and (3) reconfiguring—reorganizing existing operating routines.

3.2.2 Effects of Dynamic Capabilities on Operating Routines

A meta-analysis by Barreto (2010) shows that the great majority of empirical studies substantiate the positive performance effects of dynamic capabilities. Recent studies have shown that dynamic capabilities do not directly lead to an enhancement of competitiveness, but instead have an indirect effect by enhancing the performance of operating routines (Protogerou et al., 2012). Accordingly, recent research measures the effect of dynamic capabilities on operating routines of companies (Ray, Barney and Muhanna, 2004; Drnevich and Kriauciunas, 2011; Protogerou et al., 2012). While these approaches succeed in reducing noisy influences that affect the impact of dynamic capabilities, the measures of performance in these studies still differ considerably.

Some studies employ evolutionary-fitness measures as yardsticks of routine performance. Evolutionary fitness captures "how well a dynamic capability enables an organization to make a living by creating, extending or modifying its resource base" (Helfat et al., 2007: 7). These studies examine the effects of dynamic capabilities with respect to the degree that operating routines contribute to goal achievement. For example, in their qualitative analysis of the companies Yahoo! and Exite, Rindova & Kotha (2001) demonstrate that these companies were able to implement organizational changes more effectively than did their competitors as a result of employing dynamic capabilities.

Other researchers use technical fitness as yardstick for measuring operating-routine performance. Technical fitness captures how well a routine "[…] performs its intended function when normalized (divided) by its cost" (Helfat et al., 2007: 7). Such studies focus on the effect of dynamic capabilities by comparing goal achievement with efforts taken (Zott, 2003). A few studies include both evolutionary- and technical-fitness measures but do not conduct a separate analysis of evolutionary and technical fitness. Drnevich & Kriauciunas (2011), for example, combine several items measuring operating-routine effectiveness and efficiency into a single, integrated performance measure (relative firm performance

at the process level); as such, due to their generalized performance measurement, the separate effects of dynamic capabilities on evolutionary and technical fitness are not evaluable in their study. While these studies in general show a positive effect of dynamic capabilities, research remains ambiguous on exactly whether and when dynamic capabilities impact the evolutionary and/or technical fitness of operating routines.

3.2.3 Dynamic Capabilities and Environmental Dynamism

Although dynamic capabilities are said to generally enhance organizational fitness, these performance effects are unlikely to occur for every organization in every industry environment (Winter, 2003). Rather, the effects of dynamic capabilities seem to depend on the environmental dynamism which the respective organizations face (Zahra, Sapienza and Davidsson, 2006; Romme et al., 2010). Environmental dynamism includes the external changes an organization encounters—for example, changes in competition, customer preferences, technology, products, and/or changes in legislation (Porter, 1998; McCarthy et al., 2010). Hence, industries with rapidly changing environments are characterized by high innovation rates (an indicator of product changes) and high R&D expenditures (an indicator of technology changes) (Child, 1972; McCarthy and Gordon, 2010). Organizations that operate within such high-dynamic environments are therefore confronted with uncertainty and ambiguity. Such organizations face the problem of adjusting, renewing, and reconfiguring their resource base to respond to changing environmental conditions (Teece et al., 1997; Drnevich and Kriauciunas, 2011). In contrast, organizations facing a lower level of environmental dynamism do not have to adjust their resources so frequently. Therefore, one might expect little or no competitive advantage from dynamic capabilities in organizations with a low level of environmental dynamism (Augier and Teece, 2009; Barrales-Molina, Bustinza and Gutiérrez-Gutiérrez, 2013).

To date, few studies have tested this low-level environmental dynamism relationship (Wang and Ahmed, 2007; Barreto, 2010; Peteraf et al., 2013). On the organizational level, Fang & Zou (2009) and Wu (2010) demonstrate that dynamic capabilities can lead to financial success and competitive advantages for organizations operating under low levels of environmental dynamism, but these two effects are greater for organizations operating under high levels of environmental dynamism. Similarly, Drnevich & Kriauciunas (2011) were able to show a moderating effect of the environmental dynamism on the organizational success potential of companies incorporating dynamic capabilities. On the level of operating routines, Pavlou and El Sawy (2006) also report a moderating effect of environmental dynamism. In contrast, Drnevich & Kriauciunas (2011) could not con-

firm this effect on operating routines. Similarly, Protogerou et al. (2012) find that dynamic capabilities positively impact operating routines as well as overall firm performance even in less-dynamic environments, indicating their important role irrespective of environmental conditions. Such inconsistent findings indicate a need for further studies illuminating the role of environmental dynamism.

3.3 Hypotheses

3.3.1 Dynamic Capabilities and the Evolutionary Fitness of Operating Routines under High versus Low Levels of Environmental Dynamism

Operating routine evolutionary fitness refers to achieving operative goals and comprises outcomes such as the quality and innovativeness of products or customer service quality (Ray et al., 2004; Pavlou and El Sawy, 2006; Helfat et al., 2007). Dynamic capabilities are expected to enhance the evolutionary fitness of operating routines by enabling companies to better detect and take advantage of opportunities and threats vis-à-vis their competitors. Companies that employ dynamic capabilities execute regular and recurring sensing activities to help them more quickly detect and evaluate opportunities and threats in their environment than their competitors do (Drnevich and Kriauciunas, 2011). Employing systematic sensing activities, companies may discover new and technically significant opportunities, uncover latent demand, detect early the moves of both suppliers and competitors, and identify risks in a timely manner. While dynamic capabilities not only help companies to identify upcoming opportunities and threats, indicating whether and how to enhance the outcome of their operating routines, they also allow firms to implement adequate responses and thereby enhance the outcome of their operating routines. By employing organizational learning practices, companies can develop and evaluate new response patterns. As a way of evaluating opportunities and threats, dynamic capabilities expand the potential actions a company can take. Thus, companies can better generate adequate responses and in turn better achieve operating routine's goals (Helfat et al., 2007). Further, as an integral component of dynamic capabilities, reconfiguring activities imply that companies have access to and can provide the required resources if adequate solutions need to be implemented to adjust their operating routines to new conditions (Teece et al., 1997). In sum, dynamic capabilities contribute to an evolutionary adjustment of existing operating routines, preparing the company for changing environmental conditions by way of sensing environmental conditions, learning response patterns, and reconfiguring operating routines. Utilizing dynamic capabilities therefore increases the evolutionary fitness of operating routines.

This assertion should be qualified, however. Organizations in low-dynamic environments seem to benefit less from the development and maintenance of dynamic capabilities than do organizations in dynamic industries. In stable industries, environmental conditions change more slowly and goals stay in place for comparatively longer time frames. Therefore the necessity of adjustments in an organization's operating routines is lower than it is in dynamic environments (Davis et al., 2009). In contrast, environmental dynamism is likely to evoke discrepancies between existing routines and competitive requirements (Fredrickson and Mitchell, 1984). At the same time, dynamic environments afford more opportunities and options for developing existing operating routines. Thus, while creating the necessity to adjust operating routines, dynamic environments also bear potential to address these necessities. In this situation, dynamic capabilities function as options that offer the ability to detect and make use of the opportunities the environment creates (Pavlou and El Sawy, 2011). By using dynamic capabilities, organizations in dynamic environments can pursue business opportunities and mitigate threats, expand their respective possibilities for action, and adjust their actual resource configuration more goal-oriented than can organizations in stable environments. Hence, the change in evolutionary fitness of the underlying routine would be greater in the former than in the latter.

Hypothesis 1: Environmental dynamism positively moderates the relationship between dynamic capabilities and the evolutionary fitness (i.e., the goal achievement) of operating routines.

3.3.2 Dynamic Capabilities and Technical Fitness of Operating Routines under High versus Low Levels of Environmental Dynamism

Improvements in the evolutionary fitness of operating routines do not necessarily imply an enhancement of the technical fitness of operating routines. This circumstance results because a better achievement of qualitative routine goals may incur costs that are out of proportion to their evolutionary benefits (Helfat et al., 2007). For example, companies could achieve more-demanding operating-routine goals by simply devoting more labor and IT resources to the routine (inducing functional costs) or by allowing for short-term changes and ad-hoc problem solving (inducing adaptation costs). Accordingly, in the literature, the technical fitness of operating routines relates to measures such as time-to-market at a low cost (cf. Pavlou and El Sawy, 2011). Dynamic capabilities should enhance the technical fitness of operating routines by both optimizing operating routines (thus enhancing functional technical fitness) and making them more flexible in response to unexpected changes (thus enhancing adaptive technical fitness).

Functional technical fitness is driven by the optimization of operating routines through continuous sensing, learning, and reconfiguring activities (in spite of the costs these activities themselves invoke), which implies economizing on functional costs for labor and IT without sacrificing overall operating routine goals. If dynamic capabilities are to result in enhanced functional technical fitness' of operating routines via routine optimization, their benefits must be greater than all resulting functional costs (Barreto, 2010). Functional costs include the costs for the operating routine as well as the implementation and maintenance of dynamic capabilities. On the one hand, costs for labor and IT come about because the operating routine itself is costly. On the other hand, the development, maintenance, and use of dynamic capabilities generates costs within a company (Winter, 2003; Ambrosini and Bowman, 2009). More specifically, sensing activities result in search costs (Zott, 2003); learning activities are costly because companies must process and codify experience and solution patterns (Zollo and Winter, 2002); reconfiguring activities transfer abstract response patterns into actual change activities inducing change costs as well as opportunity costs for business interruption (Zahra et al., 2006).

The literature on dynamic capabilities points to an overall positive performance effect—meaning the benefits of dynamic capabilities should exceed all resulting functional costs (Barreto, 2010). Dynamic capabilities help to save resources within operating routines and therefore decrease functional routine costs (Aragón-Correa and Sharma, 2003). For example, sensing and adopting new manufacturing technologies can streamline and accelerate operating routines. This reconfiguration releases labor capacity and thereby reduces functional operating routine costs (Eakin, 2002). Similarly, regular learning activities broaden the scope for redesigning company routines and thus provide hints and solution for optimizing existing operating routines (Romme et al., 2010). With regard to costs for developing and maintaining dynamic capabilities, one can state that once established within a company, dynamic capabilities encourage continuous routine optimization and reorganization to enhance goal achievement (Zollo and Winter, 2002). Therefore, the economic benefits should outweigh the setup and maintenance costs of dynamic capabilities. In sum, dynamic capabilities should not only enhance the evolutionary fitness of routines but also increase technical fitness of operating routines, even when the costs for employing dynamic capabilities are taken into account.

However, because of the high maintenance costs and limited effect in environments exhibiting low dynamism, dynamic capabilities contribute less to the functional technical fitness under low levels of environmental dynamism (Aragón-

Correa and Sharma, 2003). High levels of environmental dynamism generate a comparatively high erosion of competitive advantages, quickly reducing the value contribution of existing operating routines (Winter, 2003). Therefore, maintaining dynamic capabilities is especially profitable for organizations in dynamic environments that have to frequently adjust their operating routines (Barreto, 2010).

Hypothesis 2: Environmental dynamism positively moderates the relationship between dynamic capabilities and the functional technical fitness of operating routines.

Adaptive technical fitness is driven by the flexibilization of operating routines through continuous sensing, learning, and reconfiguring activities. An operating routines' adaptive technical fitness is negatively affected by costs that may arise due to unexpected additional costs for short-term changes and ad-hoc problem solving (Winter, 2003). Routine flexibilization implies that keeping or enhancing operating routine goals does not increase such unexpected ad-hoc costs. Rather, through regular sensing, learning, and reconfiguring, dynamic capabilities make operating routines more flexible and thus help companies reduce or even avoid ad-hoc costs. This setup may result in enhanced adaptive technical fitness of operating routines.

Dynamic capabilities aim to identify opportunities for an organization at an early stage, foster the learning of appropriate responses, and drive the reconfiguration of operating routines. If organizations do not continuously exercise sensing, learning, and reconfiguring activities, they might be more prone to overlook opportunities or identify important changes too late and may therefore not react, or at least not adequately, to these changes (Teece, 2007). Conversely, dynamic capabilities can contribute to decreasing ad-hoc costs for reactions to unscheduled changes, as regular sensing detects early signals to unexpected changes, learning facilitates response patterns and provides alternative solutions in case of failures, and reconfiguring enables the prompt yet systematic implementation of such solutions. Accordingly, the activity components of dynamic capabilities may enable the necessary flexibility to react to unexpected events. In doing so, cost-intensive, ad-hoc problem solving and firefighting can be avoided, increasing the adaptive technical fitness of operating routines.

The value of dynamic capabilities for enhancing adaptive technical fitness seems especially relevant for organizations in highly dynamic environments. Due to environmental change requirements such organizations are in danger of falling

back to costly ad-hoc solutions unless they use dynamic capabilities to keep their processes flexible. In contrast, under conditions of low levels of environmental dynamism in which change requirements are low, dynamic capabilities may lead to inadequate changes (Teece et al., 1997). Inadequate changes of operating routines imply suboptimal resource allocations that lower the adaptive technical fitness of operating routines. While lowering costs for ad-hoc solutions, inadequate or unnecessary changes of operating routines also put the achievement of routine goals at risk. Given low levels of environmental dynamism, costly yet infrequent ad-hoc solutions are therefore likely to lead to better operating-routine results and thus adaptive technical fitness of operating routines (Winter, 2003). Altogether, one can assume that the higher the environmental dynamism within an industry, the stronger the impact dynamic capabilities have on the adaptive technical fitness of operating routines.

Hypothesis 3: Environmental dynamism positively moderates the relationship between dynamic capabilities and adaptive technical fitness of operating routines.

3.4 Sample and Method

3.4.1 Sample Selection and Description

We conducted a quantitative survey using the purchasing routines in small- and medium-sized enterprises (SMEs) in three German industrial sectors—engineering, rubber and plastics, and paper processing (see also: Schlömer, 2011; Schlömer et al., 2013). For several reasons, the empirical setting of industrial SMEs and their purchasing routines seems particularly suited to address this study's research interest. In an SME, dynamic capabilities are likely to be of high relevance for firm survival and success (Sawers et al., 2008). SMEs usually have scarce resource endowments when compared to large organizations. In order for SMEs to survive, it is critical that they efficiently use and develop their resource base, (Pressey et al., 2009), turning dynamic capabilities into a key driver of SME success.

The purchasing routine represents a particularly important operating routine in SMEs because today's firms tend to reduce their level of in-house value creation (Zheng et al., 2007). This circumstance makes the investment in costly dynamic capabilities both profitable and crucial for firms that want to enhance the performance of their purchasing routines. Furthermore, focusing on purchasing routines allows for a close alignment between the activity patterns of dynamic capabilities and their fitness effects, thereby enhancing the validity of causal attributions be-

tween dynamic capabilities and their effects, as well as addressing some measurement shortcomings of prior dynamic capabilities research (Zahra et al., 2006).

To promote awareness of our survey, we sent a formal invitation letter with login details for an online questionnaire to each SME employing at least 40 people in the selected industries in Germany (5,152 in total). Following our initial mailing, 632 companies (12.3%) logged into the survey site. Following emailed follow-ups and telephone calls, 200 SMEs returned completed questionnaires that contained less than ten percent missing values. To avoid data loss due to missing values, we employed mean substitution (Roth, 1994; Lemieux and McAlister, 2005). The final sample captures about four percent of the total population in Germany and is representative in terms of firm size and industry composition. The majority of sampled firms (89.5%) employ between 50 and 499 people, with an average of 4.09 people working in a purchasing function (SD = 3.87).

To capture the multiple characteristics of environmental dynamism, we relied on constructs to measure R&D expenditure, sales generated with product innovations, and successful completion of innovation projects (Child, 1972; McCarthy et al., 2010). In line with prior studies on environmental dynamism and dynamic capabilities (Pavlou and El Sawy, 2011; Protogerou et al., 2012), these measures capture changes in competition, customer preferences, and technology, which imply conditions of uncertainty and unpredictability for the company. In order to distinguish and compare results from highly dynamic and less-dynamic industries, the sample was split into two groups. The first group (120 respondents) consists of SMEs operating in the German engineering industry, which represents a highly dynamic environment according to the above-mentioned criteria when compared to the average of all German manufacturing industries. Engineering SMEs in Germany traditionally face "fierce competition between a small number of firms which do not want to set their market position at risk […]" (Grotz and Braun, 1997: 548). Over the last years, engineering has ranked among the top four manufacturing industries in Germany in terms of R&D expenditure, sales generated with product innovations, and successful completion of innovation projects (*Statistisches Bundesamt*, 2010; ZEW, 2013). The second group (80 respondents) is characterized by comparatively low levels of environmental dynamism according to the above-mentioned criteria; it ranks well below the average of all German manufacturing industries (*Statistisches Bundesamt*, 2010; ZEW, 2013). It contains firms from the plastics, rubber, and paper-processing industries. Companies from these industries usually devote fewer resources to R&D and their sales volumes are less dependent on product innovation and the successful completion of innovation projects than engineering companies.

3.4.2 Survey Development

We developed a standardized written questionnaire to obtain information about the organization, its procurement routine, and its use of dynamic capabilities (Schlömer et al., 2013). Following the design of earlier studies, the companies' top managers served as key informants (cf. Danneels, 2008). More specifically, we considered the head of the procurement department to be the most-knowledgeable informant, responsible for the procurement department's routines and possessing in-depth knowledge about the performance of the department.

In order to avoid key-informant bias, we adopted a number of procedural remedies when developing the survey (Podsakoff et al., 2003). In a preliminary qualitative study, we thoroughly pre-tested the survey in order to refine questions and constructs and to gain valid items and reliable scales, thus avoiding ambiguity and vagueness in the final questionnaire (Tourangeau et al., 2000). This study entailed interviews with purchasing managers and general managers from 11 SMEs from the three industries later surveyed. In these interviews, we employed a think-aloud protocol to receive structured feedback on the validity and comprehensibility of the questionnaire (Sudman et al., 2010). The protocol allowed us to substantially refine the questionnaire across interview rounds. To further guard against key-informant and social desirability biases, the respondents were guaranteed strict confidentiality, asked to answer the questions as honestly as possible, and reminded that the questions being asked had neither right nor wrong answers. Also, the measures of the independent and dependent variables were spatially and methodologically separated (Podsakoff et al., 2003). For these reasons, we feel confident that the respondents provided reliable data on the variables gathered in this study.

3.4.3 Measures

In developing the items and scales for the measurement of the focal concept, we used existing measures, scales, and items wherever possible. However, only a limited number of prior empirical studies on dynamic capabilities proved suitable (e.g., Newey and Zahra, 2009; Prieto, Revilla and Rodríguez-Prado, 2009). Therefore, we decided to integrate existing items from related research contexts and adapt them to the concept of dynamic capabilities. The present inquiry also has to account for possible time lags between the introduction of dynamic capabilities (independent variables) and their fitness effects (dependent variables) (Ambrosini and Bowman, 2009). In line with recommendations of Drnevich and Kriauciunas (2011), measures of the independent variables were set retrospectively to the year 2005; that is, five years before the survey was conducted. The

dependent variables were measured as an average annual rate of change over the last five years (2005 to 2009).

Independent Variables. By focusing on the three observable *dynamic capabilities* manifestations of higher-order sensing, learning, and reconfiguring routines, our study is able to describe and measure dynamic capabilities straightforwardly. In order to capture their procedural and recurring character, we relied on items proposed by Hambrick (1981) as well as Pfeffer and Leblebici (1973) in their empirical studies on organizational routines and activity patterns. However, since these items do not originate from the dynamic capabilities literature, they were reformulated in order to fit each of the three dynamic capabilities components. The reformulations and adaptations were guided by the current dynamic capabilities literature (e.g., Ettlie and Pavlou, 2006; Newey and Zahra, 2009). In order to provide survey respondents with a clear understanding of this study's conceptual position, we described each of the three components in managerial language. In total, this survey measured dynamic capabilities with six items: The first three items relate to the frequency with which each of the three activity components (i.e., sensing, learning, and reconfiguring) was executed by the purchasing department five years ago (daily, weekly, monthly, once a quarter, once a year). The remaining three items focused on the percentage of average monthly working hours the department spent on the execution of sensing, learning, and reconfiguring activities, and thus enabled us to calculate the average daily working hours. Our extensive pre-test showed that procurement department managers are able to look into and regularly draw on objective archival data, such as procurement controlling reports, when answering these questions. Based on these measures, a multiplicative index (working days per year × working hours per day = working hours per year) for each of the three components that manifest dynamic capabilities is calculated. This calculation was done in order to generate a valid estimate of the prevalence of dynamic capabilities components in the organization based on the actual time spent per year on these activities in the specific purchasing department. The values of these indices were skewed to the right—above acceptable limits. In order to use structural-equation modeling appropriately, the skewed distribution had to be corrected by applying a logarithmic transformation (West, Finch and Curran, 1995).

Dependent Variables. Evolutionary fitness refers to goal achievement (Helfat et al., 2007). Therefore, we operationalize *evolutionary fitness* of operating routines as effectiveness; that is, the extent to which the operating routine achieves predefined operational goals (Pavlou and El Sawy, 2006). Drawing on the current purchasing literature, the survey measures effectiveness using three percentage-

scaled items: to what extent orders arrived on time, to what extent they were the expected quality, and to what extent they contained the correct quantity (Shin, Collier and Wilson, 2000; Chen, Paulraj and Lado, 2004; Vaidyanathan and Devaraj, 2008).

In general terms, technical fitness refers to how well a routine performs its function (Helfat et al., 2007). Therefore, we operationalize technical fitness as operating-routine efficiency; that is, the ratio of effective output to input (Drucker, 1967). These variables were measured indirectly by asking whether the surveyed firms changed their cost structure. To capture efficiency through routine optimization (*functional technical fitness*), we collected information on the average annual percentage change in functional costs, including purchasing department costs such as labor, proportional IT, proportional accounting, and equipment costs. To capture the company's efficiency in handling unexpected changes (*adaptive technical fitness*), the survey collected information on changes in costs for ad-hoc deliveries (e.g., short-notice changes in supplier's delivery dates, air-freight charges resulting from missing spare parts). The respondents were asked to answer these questions with respect to their most-important purchased articles as well as to discount for industry-wide cost changes. Given that we collected data on both operating-routine effectiveness and costs (functional and ad-hoc) using percentage scales, each respondent company may judge our scale using different baseline values. Therefore, calculating efficiency measures based on a ratio would have yielded an invalid efficiency metric. To avoid this validity issue, we calculated the functional technical fitness by using the difference between the values for effectiveness and functional costs, and the adaptive technical fitness by the difference between the values for effectiveness and ad-hoc costs. This transformation provides a metric for efficiency with a symmetric distribution around zero and a foundation to derive statements about technical effectiveness—that is, the output in relation to the input (costs).

Control variables. To control for other possible influences on the evolutionary and technical fitness of purchasing routine, five organization-related control variables were included in the model. *Firm size* (measured by the natural logarithm of the overall number of employees in relation to the natural logarithm of the purchasing departments' number of employees) may have an impact on operating routine performance, since larger firms are more likely to realize economies of scale and scope and firm size might impact the evolutionary and technical fitness of the operating routine. *Firm age* (measured by the number of years from founding to 2009) may influence operating routine performance because older firms are more experienced and therefore are expected to have more-elaborate operat-

ing routines. *Sales* (measured by average annual percentage change in sales during the firm's previous five years) might have an effect on this study's dependent variables because a high volatility in sales volume influences the workload, which in turn could have an impact on the evolutionary and technical fitness of purchasing routine. The membership and position within a group was measured as a dummy variable indicating on the one hand whether the organization is part of a *conglomerate* and on the other whether the company owns a *subsidiary* company. Both variables might impact routine performance because organizations belonging to a conglomerate or managing other companies can access more slack resources to enhance routine fitness than can single firms.

In addition, the model includes six purchasing-related control variables. *Purchasing volume* (measured by average annual percentage change during the previous five years) may influence the purchasing routine performance because firms with high purchasing volumes are more likely to realize economies of scale and scope. *Procurement mode* (measured by one survey item asking whether important parts are bought as single components or modules) might have an effect on the dependent variables because procuring modules is likely to lower information and coordination effort, resulting in both more effective and efficient operating routine. *Routinization* of the purchasing routine (measured by two survey items asking about task variety and two items asking about task analyzability suggested by Withey et al. [1983]) might influence routine performance because routinization implies learning effects, which in turn leads to higher degrees of goal achievement (at a lower cost). Perceived *relevance of purchasing* in the organization (measured by a statement indicating whether the purchasing function makes an important contribution to organizational performance, which we then dummy-coded around the mean value) might influence the dependent variables because a high level of perceived relevance implies that more resources are allocated to the purchasing department, enhancing its evolutionary or technical fitness. *Job tenure* (measured by years on the job) controls for the respondent's experience level, which may affect the validity of the information provided, since respondent experience relates to the ability to judge the effectiveness and efficiency of firms' purchasing routine. Finally, *vocational training* (measured by changes in the procurement department's expenses for vocational training over the last five years, which we then dummy-coded around the mean value) increases the job-related skills of the employees. Therefore, vocational training might impact the effectiveness of the procurement routine while also influencing the department's cost structure.

3.4.4 Validity and Reliability of Measures

We conducted principal-component factor analyses for all independent and dependent variables to test for convergent validity of the multi-item constructs. Standardized factor loadings for all tested items are above the recommended minimum of 0.40, except for one item measuring evolutionary fitness (deliveries received on-time), which was thereafter excluded from the analysis (Ford, MacCallum and Tait, 1986). The remaining standardized factor loadings of the items are close to or above 0.80. Average variances extracted by the factors are all above the recommended minimum of 0.50 (Fornell and Larcker, 1981). Cronbach's alpha is above the recommended minimum of .70 for all constructs except for evolutionary fitness (.66) which is, however, still within acceptable limits (see Pedhazur and Schmelkin, 1991). Discriminant validity of the constructs was tested by determining whether the average variance extracted from each construct is higher than the squared correlation between the constructs (Fornell and Larcker, 1981). All constructs demonstrate discriminant validity. Furthermore, the self-reported measures were cross-validated with data from second informants and archival data. These additional validations did not reveal any errors in our survey data. We checked for possible non-response bias by employing an Analysis of Variance (ANOVA) to test for significant differences between early and late respondents (cf. Jansen et al., 2012). The assumption is that late respondents are more similar to non-respondents than to early respondents (Armstrong and Overton, 1977). The ANOVA did not reveal any significant difference between these two groups for all variables used in our model, indicating that non-response bias was not a problem in this study. Overall, the constructs of this study demonstrate reliability and validity.

Finally, we controlled for common-method variance with Harman's one-factor test (Podsakoff and Organ, 1986). Conducting exploratory principal-component factor analysis of all items in the hypothesized model resulted in ten factors explaining 68 percent of the variance (12 percent was the largest variance explained by one factor). Dependent and independent variables loaded on different factors; therefore, common-method variance is unlikely to be a problem. Overall, these measures suggest satisfactory psychometric properties of the data.

3.4.5 Analytical Approach

We tested our hypothesis by means of structural-equation modeling using maximum-likelihood estimation. Structural-equation modeling is the appropriate methodology to test models incorporating latent variables, such as dynamic capabilities. While correlations among predictors of such latent constructs may cause problems in regression analysis, structural-equation modeling explicitly

accounts for such correlations. By using structural-equation modeling, we are able to simultaneously incorporate observed and latent constructs into the model and account for the potential biases due to random measurement error in the latent constructs. Due to these advantages, structural-equation modeling has been used extensively in quantitative dynamic capabilities research (e.g., Song et al., 2005; Protogerou et al., 2012; Barrales-Molina et al., 2013).

Principal-component factor analyses were used to extract factors for the constructs. On this basis, we calculated indices for the dependent variables. At first, all control variables were included in the path model. The model also specifies paths between evolutionary and technical fitness, since these variables may be interrelated. Accordingly, the covariances between evolutionary fitness and the two variables measuring technical fitness (functional technical fitness and adaptive technical fitness) are included in the present model. In the course of post-hoc analyses, we omitted control variables which had no effect on the dependent variables (Byrne, 2010). We also included covariances among firm age, firm size, sales, relevance of purchasing, and vocational training as these measures usually correlate. This procedure did not change the significance and direction of the estimates, but slightly enhanced the fit of our model. In a first analytical step, we estimated a baseline model (Model I). In a second step, a model to test our hypotheses was estimated. In line with methodological recommendations (Wegener and Fabrigar, 2000) and prior empirical research (Protogerou et al., 2012; Barrales-Molina et al., 2013), we conducted a sample split to compare results for high versus low levels of environmental dynamism (Model II).

3.5 Results

Table 3.1 depicts means, standard deviations and correlations between the variables used in our model. Table 3.2 reports the parameter estimates for the main and the control variables for the baseline model based on the overall sample (Model I). Figures 3.1 and 3.2 report the results for high versus low levels of environmental dynamism (Model II).

Table 3.1: Means, Standard Deviations, and Correlations

		Mean	SD	1	2	3	4	5	6	7	8
1	Sensing	2.22	1.73								
2	Learning	1.12	1.14	.505**							
3	Reconfiguring	.95	1.00	.459**	.617**						
4	Firm Size	-3.54	.67	-.088	-.074	-.129+					
5	Firm Age	51.24	37.74	.062	-.015	.021	-.127+				
6	Sales	5.09	10.66	.100	.036	-.011	-.100	-.164*			
7	Group: Subsidiary	.33	.46	-.078	-.004	.062	-.081	.002	-.015		
8	Group: Conglomerate	.44	.48	-.008	-.073	-.087	-.072	.128+	.127+	-.002	
9	Purchasing Volume	4.10	4.18	.106	.003	.085	-.124+	-.056	.402**	.115	.050
10	Procurement Mode	.24	.40	-.037	-.049	-.115	.031	.000	.124+	.048	-.039
11	Routinization	3.79	.89	-.026	-.120+	-.172*	-.001	.012	.030	-.044	.077
12	Relevance of Purchasing	.60	.49	-.032	-.056	-.002	.038	.080	-.023	-.033	-.020
13	Job Tenure	8.57	7.92	.082	.168*	.123+	.149*	.022	.005	-.183**	-.050
14	Vocational Training	.34	.47	-.172*	-.081	-.115	.073	.056	.070	.087	.059
15	Evolutionary Fitness	2.67	2.68	.093	.154*	.200**	-.008	.153*	-.043	.035	.029
16	Technical Fitness (Functional)	2.72	6.23	.082	.105	.116	-.121+	.098	-.081	.083	.046
17	Technical Fitness (Adaptive)	1.85	4.76	.052	.149*	.102	-.036	.061	-.066	.037	-.002
18	Environmental Dynamism	.60	.49	-.129+	-.042	-.078	.306**	-.042	-.018	-.010	.011

Notes: *N* organizations = 200; ** p ≤ .01 (two-tailed); * p ≤ .05 (two-tailed); + p ≤ .10 (two-tailed).

Table 3.1: Means, Standard Deviations, and Correlations (continued)

		9	10	11	12	13	14	15	16	17
1	Sensing									
2	Learning									
3	Reconfiguring									
4	Firm Size									
5	Firm Age									
6	Sales									
7	Group: Subsidiary									
8	Group: Conglomerate									
9	Purchasing Volume									
10	Procurement Mode	.084								
11	Routinization	-.070	.008							
12	Relevance of Purchasing	.121+	.025	-.023						
13	Job Tenure	-.042	-.068	-.095	.204**					
14	Vocational Training	.074	.167*	.049	.112	.012				
15	Evolutionary Fitness	.022	.007	-.045	.186**	.114	.058			
16	Technical Fitness (Functional)	.016	.037	-.025	.126+	.053	.119+	.621**		
17	Technical Fitness (Adaptive)	.100	.037	-.004	.181*	.090	.010	.659**	.513**	
18	Environmental Dynamism	-.031	.007	.075	.021	-.045	.069	-.016	.033	-.107

Notes: *N* organizations = 200; ** p ≤ .01 (two-tailed); * p ≤ .05 (two-tailed); + p ≤ .10 (two-tailed).

As a preliminary result, this study finds that the three activity components of dynamic capabilities are positive and highly significant in relation to the latent construct (see Table 3.2). This latent construct, representing dynamic capabilities, shows a positive and highly significant path coefficient to the evolutionary fitness of operating routines (β = .25, p = .00). Furthermore, our baseline model provides evidence that dynamic capabilities are positively related to the functional technical fitness (β = .16, p = .03) and adaptive technical fitness (β = .18, p = .02) of operating routines, respectively. With regard to the control variables, results imply that they play a limited role in explaining both, evolutionary and technical (i.e., functional and adaptive) routine fitness.

Table 3.2: Baseline Structural Equation Modeling Results (Model I)

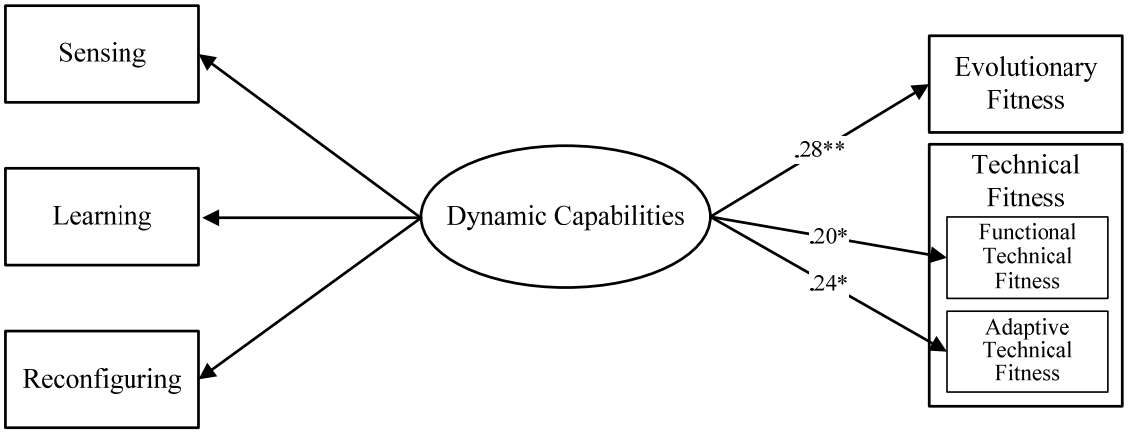
Description of Path		Path Coefficient
Sensing	→ Dynamic Capabilities	.61***
Learning	→ Dynamic Capabilities	.82***
Reconfiguring	→ Dynamic Capabilities	.75***
Dynamic Capabilities	→ Evolutionary Fitness	.25***
	→ Technical Fitness (Functional)	.16*
	→ Technical Fitness (Adaptive)	.18*
Firm Size	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	-.15*
	→ Technical Fitness (Adaptive)	n.s.
Firm Age	→ Evolutionary Fitness	.11*
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Sales	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	-.11^{+}
	→ Technical Fitness (Adaptive)	n.s.
Group: Subsidiary	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Group: Conglomerate	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Purchasing Volume	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Procurement Mode	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Routinization	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Relevance of Purchasing	→ Evolutionary Fitness	.15*
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	.19**
Job Tenure	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	n.s.
	→ Technical Fitness (Adaptive)	n.s.
Vocational Training	→ Evolutionary Fitness	n.s.
	→ Technical Fitness (Functional)	.12*
	→ Technical Fitness (Adaptive)	n.s.

Notes: *** $p \leq .001$ (two-tailed); ** $p \leq .01$ (two-tailed); * $p \leq .05$ (two-tailed); $^{+}$ $p \leq .10$ (two-tailed); n.s.: not significant (two-tailed).

To test the moderating effects of environmental dynamism, we applied a group split by using the existing dummy variable on environmental dynamism (Arbuckle, 2003). Before running the analysis, we tested the equivalence of our measurement model across the two groups (Williams, Edwards and Vandenberg, 2003; Byrne, 2010; Hair et al., 2010). We found our measurement model to be invariant across groups ($\Delta\chi^2$ [Δdf] = 3.69 [2]; p = .16), allowing us to proceed with analyzing the moderation hypotheses based on the invariant measurement model (Song et al., 2005; Byrne, 2010). We analyzed the moderation hypotheses by comparing the path coefficients between the latent dynamic capabilities construct and the dependent variables for high versus low levels of environmental dynamism (Bagozzi and Dholakia, 2006).

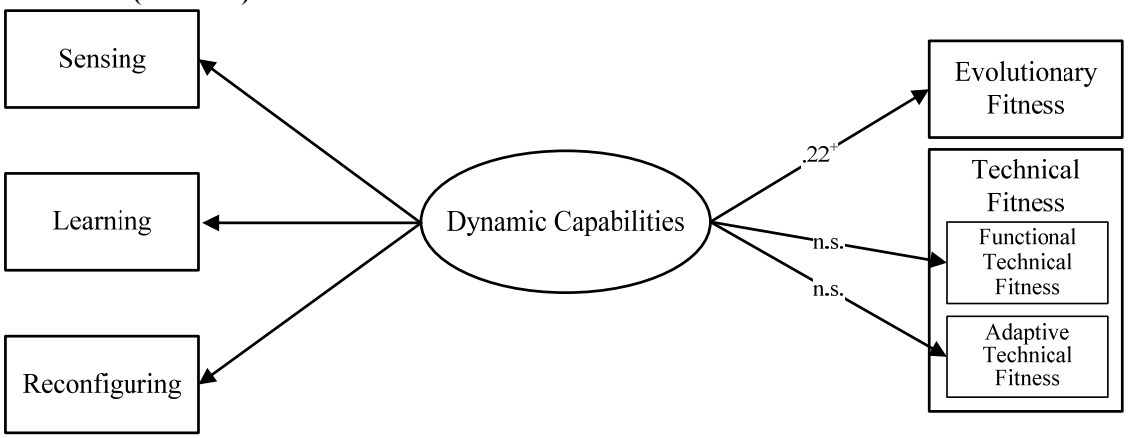
Hypothesis 1. Hypothesis 1 stated that dynamic capabilities are more likely to foster evolutionary fitness under conditions of high levels of environmental dynamism than they are under conditions of low levels of environmental dynamism. As Figures 3.1 and 3.2 demonstrate, our analyses do not support this conjecture. While dynamic capabilities have a significant positive impact on evolutionary fitness at high levels of environmental dynamism ($\beta = .28$, $p = .01$), they also significantly increase evolutionary routine fitness at low levels of environmental dynamism ($\beta = .22$, $p = .08$).

Figure 3.1: Structural Equation Modeling Results for High Levels of Environmental Dynamism (Model II)



Notes: This simplified version of the model omits invariant measurement model coefficients, error terms, control variables, and covariances among the dependent variables. ** $p \leq .01$ (two-tailed); * $p \leq .05$ (two-tailed).

Figure 3.2: Structural Equation Modeling Results for Low Levels of Environmental Dynamism (Model II)



Notes: This simplified version of the model omits invariant measurement model coefficients, error terms, control variables, and covariances among the dependent variables. + $p \leq .10$ (two-tailed); n.s.: not significant (two-tailed).

Hypotheses 2 and 3. Hypothesis 2 posits a moderating effect of environmental dynamism with regard to functional technical fitness, while Hypothesis 3 proposes a moderating effect of environmental dynamism with regard to adaptive technical fitness. As Figures 3.1 and 3.2 demonstrate, our analyses do not find that

dynamic capabilities impact either the functional technical fitness (β = .12, p = .32) or the adaptive technical fitness (β = .09, p = .45) of operating routines at low levels of environmental dynamism. In contrast, under conditions of high environmental dynamism, dynamic capabilities show the expected impact on the functional technical fitness (β = .20, p = .04) and the adaptive technical fitness (β = .24, p = .05) of operating routines. The data thus fully support Hypotheses 2 and 3.

The fit of the baseline Model I and the split-sample Model II were assessed using goodness-of-fit statistics. To examine model fit, most literature suggests applying diverse goodness-of-fit statistics (Hair et al., 2010). Overall, based on the usual cut-off points (Browne and Cudeck, 1992; Hooper, Coughlan and Mullen, 2008), the fit indices for the models analyzed (as presented in Table 3.2 and Figures 3.1/3.2) can be considered acceptable (see Table 3.3).

Table 3.3: Model Statistics

Model	GFI	IFI	RMSEA	Chi²	d.f.	Normed Chi²
Model I: Overall Sample	0.94	0.88	0.09	84.97	35	2.42
Model II: Subsamples	0.91	0.88	0.06	125.36	73	1.72

3.6 Discussion

This study provides a possible explanation for the inconclusive results documented in the existing literature with regard to environmental dynamism and the performance effects of dynamic capabilities. The findings suggest that the impact of environmental dynamism on the relationship between dynamic capabilities and operating-routine performance depends on whether the underlying costs of evolutionary gains are considered. More specifically, dynamic capabilities enhance evolutionary fitness of operating routines in both high and low levels of environmental dynamism. However, when the costs of increased evolutionary fitness are taken into account, environmental dynamism makes a difference. Under low levels of environmental dynamism, dynamic capabilities seem of little value and accordingly show no impact on the technical fitness of operating routines, whereas under high levels of environmental dynamism they lead to higher technical fitness of operating routines.

These findings question the general role of environmental dynamism as a necessary precondition or constitutive element of dynamic capabilities (Teece et al., 1997; Eisenhardt and Martin, 2000; Barreto, 2010) and also as a boundary condition (Drnevich and Kriauciunas, 2011). This study therefore urges a more differ-

entiated view of environmental dynamism. High levels of environmental dynamism constantly create new opportunities for firms. Under such circumstances, firm agility, defined as the ability to sense and respond quickly to opportunities, becomes a major necessity for performance (Roberts and Grover, 2012). Dynamic capabilities support a firm in recognizing and seizing favorable opportunities. They allow for frequent and recurring adjustments of operating routines through routinely setting triggers of opportunity seeking (Newey and Zahra, 2009). In this sense, dynamic capabilities can be viewed as creating favorable circumstances for firms to seize and respond to opportunities in the business environment. Independent of environmental dynamism, employing dynamic capabilities may result in a better evolutionary fitness. However, because provisioning of options does not come without cost, the value of dynamic capabilities increases with the number of opportunities the environment offers (Pavlou and El Sawy, 2011). Functional costs that firms incur for the development and maintenance of dynamic capabilities therefore particularly pay off under high levels of environmental dynamism. At the same time, high levels of environmental dynamism provide more opportunities for operating-routine redesign to realize functional cost savings. Together, dynamic capabilities lead to higher functional technical fitness when operating under high levels of environmental dynamism. In a similar vein, a greater necessity exists for maneuvering and quickly adapting to short-term changes in high levels of environmental dynamism. Since dynamic capabilities help avoid costly ad-hoc solutions without sacrificing overall routine goals, this process is likely to result in advanced adaptive technical fitness. In contrast, when operating under lower levels of environmental dynamism, fewer opportunities exist for operating-routine optimization and quick responses are not nearly as critical. The balance between evolutionary fitness and cost becomes suboptimal, diminishing, or even obliterating for both functional and adaptive technical efficiency.

3.7 Conclusion and Limitations

In order to resolve the mixed findings on the role of environmental dynamism in the current dynamic capabilities literature, our work suggests that empirical studies with a focus on the characteristics and goal achievement of operating routines are likely to find only limited impact of environmental dynamism (e.g., Protogerou et al., 2012). Instead, studies that take underlying costs into account tend to find that environmental dynamism positively moderates the relationship between dynamic capabilities and performance (e.g., Pavlou and El Sawy, 2006). In general, our empirical findings provide supportive evidence to Heft et al. (2007), who theoretically highlight the potentially antithetic effects of dynamic capabili-

ties on evolutionary- and technical-performance yardsticks. More specifically, our findings suggest that researchers should consider these potentially countervailing outcomes: While dynamic capabilities may improve the fitness of an organization in general, such increased fitness may be achieved by enhancing the goal achievement of operating routines or by reducing the cost incurred by operating routines. Depending on whether the organization faces either low or high levels of environmental dynamism, the impact of dynamic capabilities on the evolutionary and technical fitness of operating routines differs.

Despite the contributions of our study, we also want to highlight some limitations that might provide a fruitful starting point for future research. Although the engineering industry is characterized as a dynamic, competitive environment in Germany, other industries face even greater uncertainties and more-rapid market shifts, such as software and biotechnology industries. Therefore, researchers might want to test the hypotheses derived in this chapter using a sample that includes these industries as well. Furthermore, this study relied on a dichotomous distinction of environmental dynamism. While this approach allowed us to collect data in specific industries, thereby increasing case comparability, this sampling prohibited us from taking a more fine-grained perspective on the influences that environmental dynamism has on dynamic capabilities. Hence, further research should elaborate the nuanced consequences that different intensities of environmental dynamism have for the deployment and performance of dynamic capabilities.

4 When Do Written Rules Persist in Routines?

4.1 Introduction

Organizational routines are inherently important for the continued existence and performance of any organization (Stene, 1940; Cyert and March, 1963; Nelson and Winter, 1982) and have been found in diverse organizational tasks, such as hiring new employees (Feldman, 2000) and treating patients in hospitals (e.g., Edmondson et al., 2001). They refer to "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland, 2003: 95). To ensure consistency and efficiency in routine performances, many organizations implement written rules as substitutes for direct supervision (Weber, 1922; Blau, 1955; Okhuysen and Bechky, 2009). Written rules prescribe how employees *should* carry out organizational routines (Schulz, 2008). Examples of such written rules include the strict behavioral scripts governing customer-interaction routines in Apple stores (Kane and Sherr, 2011) or care pathways governing clinical-treatment routines in hospitals (Vanhaecht et al., 2006). Organizations often undertake considerable effort to achieve persistent enactment of these written rules by routine participants; however, recent routine research demonstrates that—once implemented—rules and organizational routines frequently drift apart (e.g., Suchman, 1983; Ciborra, 2000; Bruns, 2009). Persistent rule enactment is critical for organizations to function, as failure to do so may lead to poor performance, organizational delegitimization, and even the death of employees and patients (Weick, 1990; Inoue and Koizumi, 2004; Anand et al., 2012). This chapter seeks to address the question of when and why rules are persistently enacted in organizational routines.

Research focusing on routines as generative systems has recently developed explanations for why routine performances and written rules drift apart, despite well-designed rules and a successful initial implementation. This research stresses the ability of routine participants to improvise as they perform the routine and to reflect upon their experiences afterwards, thereby causing endogenous routine change and eventually a drift between written rules and organizational routines (Ciborra, 2000; Feldman and Pentland, 2003; 2008b). Expanding on this theoretical stance, researchers have provided qualitative and quantitative empirical evidence that many organizational routines change endogenously (e.g., Feldman, 2000; Pentland et al., 2011) and that once successfully implemented written rules may *fail to persist* (e.g., Bruns, 2009; Van de Klundert, Gorissen and Zeemering, 2010; Anand et al., 2012). In being so focused on the specific actions of specific routine participants in specific organizations, this research has largely ignored

conditions and mechanisms that operate on multiple levels above and below the routine but nevertheless affect the enactment of written rules (cf. Parmigiani and Howard-Grenville, 2011; Salvato and Rerup, 2011). Apparently, we know surprisingly little about which conditions foster the persistent enactment of written rules within organizational routines (Reynaud, 2005; Tyler and Blader, 2005; D'Adderio, 2008).

We address this research gap by exploring the phenomenon of persistent rule enactment, theoretically and empirically building on the generative-systems perspective of routine research (e.g., Feldman and Pentland, 2003; Howard-Grenville, 2005). We build on this perspective by conceptualizing the enactment of written rules within organizational routines as ongoing accomplishments of routine participants (characterized by a specific level of professional experience) who perform organizational routines to address tasks (characterized by specific levels of task complexity and frequency). We expand established routine research to a multilevel framework by taking the institutional context (characterized by specific levels of pressure demanding the enactment of written rules) into account. We argue that configurations of these four explanatory conditions—institutional pressure, routine participants' professional experience, task complexity, and task frequency—constitute a situation in which routine participants will be more or less inclined to persistently enact written organizational rules.

To empirically explore when and why routine participants will persistently enact written rules, we conduct a comparative case analysis of the persistent enactment of care pathways—a specific type of a written organizational rule prescribing a clinical-treatment routine—in university hospitals. This setting is favorable given the competitive pressures that most hospitals face and the common interest of hospital managers and medical professionals in treating patients in an effective and efficient manner (cf., Cochrane, 1972; Bohmer, 2009). While one would expect care pathways to be persistently followed when carrying out the respective treatment routines, previous research has demonstrated that medical professionals' adherence to care pathways drops dramatically a few years after the initial implementation in their departments (e.g., Rood et al., 2005; Van de Klundert et al., 2010). As hospitals are professional organizations where most routine participants act as autonomous professionals and are subject to comparatively little managerial control, studying rule persistence in this context provides a conservative setting for our inquiry (cf. Perrow, 1972; Freidson, 2001; Bohmer, 2009). Our empirical analysis relies on qualitative and quantitative data from 19 treatment routines and care pathways in 10 internal-medicine departments of university hospitals in Germany. We employ fuzzy-set Qualitative Comparative Analysis

to explore which configurations of institutional, organizational, and task conditions are necessary and/or sufficient for care pathways to persist in a hospital department's treatment routines.

Our study provides two key contributions. First, we identify three multilevel configurations where written rules persisted in an empirical setting characterized by high levels of improvisation and little managerial oversight: When institutional pressure is high, written rules will persist in routines addressing tasks of high complexity ("reducing risk") or when highly experienced routine participants execute tasks at high frequency ("securing status"). When institutional pressure is low, written rules will persist in routines when routine participants have low levels of experience and face high task volumes of low complexity ("surviving stress"). Second, our study advances a multilevel framework that highlights that rule persistence depends on the interaction of conditions incorporating the organizational routine and the external and internal organizational context. We conclude that written rules persist when they function as a resource to routine participants and provide routine participants with confirming experience when enacting the written rule. Therefore, theories of organizational routines need to be broadened to include the interplay of multilevel dynamics to explain persistence of written rules in organizational routines.

4.2 Theory

4.2.1 Organizational Routines as Endogenously Changing Entities

Research on organizational routines has recently focused on the internal dynamics of routines in order to explain their capacity to change endogenously (Parmigiani and Howard-Grenville, 2011). Endogenous routine change emerges from the interplay of the performative and ostensive aspect of organizational routines (Feldman and Pentland, 2003; Pentland and Feldman, 2005). The performative aspect captures the "real actions, by real people, in specific times and places" (Feldman and Pentland, 2008b: 302), whereas the ostensive aspect captures the "abstract, generalized idea of the routine" (Feldman and Pentland, 2003: 101). The performative and ostensive aspect of routines have a reciprocal relationship, whereby the former creates, maintains, and modifies the latter, which in turn is used to guide, account for, and refer to the former. This mutually constitutive iteration between performative and ostensive aspect provides the foundation for routine participants to introduce and retain variations in a routine, eventually causing endogenous routine change (Feldman and Pentland, 2003; 2008b; Pentland et al., 2012).

4.2.2 Written Rules as Enacted Artifacts in Organizational Routines

When participating in organizational routines, employees are frequently required to enact written organizational rules (Leidner, 1993; D'Adderio, 2008; Schulz, 2008). Written organizational rules are codified, ideal-type representations of organizational routines (Pentland and Feldman, 2005). Care pathways are an example of such rules. A care pathway is a document that describes in words and graphics which medical parameters are to be monitored, what medications are to be given, and which specialists are to be consulted after a patient has been given a specific diagnosis (Bohmer, 2009). While they are implemented to keep individuals' activities and organizational routines "on track" (Schulz, 2008: 228; see also: Avadikyan et al., 2001), the enactment of written rules is not a deterministic process (Suchman, 1983; Taylor, 1993; Reynaud, 2005).

Written rules relate to the ostensive and performative aspect; however, they represent a distinct entity (Pentland and Feldman, 2005): On the one hand, rules articulate how patterns of interaction should form in principle; thus, they shape the routine participant's abstract notion (i.e., the ostensive aspect) of an organizational routine (D'Adderio, 2008). On the other hand, an observer may notice a resemblance between a specific routine performance (i.e., the performative aspect) and a specific rule when routine participants enact that rule. Against this background, we understand a written rule to be persistently enacted when a knowledgeable observer is unable to detect a frequent and substantial *violation* of a written organizational rule across routine performances (cf. Taylor, 1993; Tyler and Blader, 2005; Desai, 2010). Non-persistence of written rules may occur due to the interplay among written rule, ostensive structure, and performative agency—the latter being characterized by improvisatory freedom and interpretive flexibility. Even if a written rule becomes firmly enacted during the initial implementation phase, processes of endogenous routine change may subsequently cause profound divergence between a written organizational rule and the organizational routine's ostensive and performative aspect (Orlikowski, 2000; Feldman, 2004; Anand et al., 2012). The enactment of a firmly implemented rule may therefore discontinue across the iterations of an organizational routine.

Failure to persistently enact written rules may result in coordination problems among routine participants that cause organizational routines to break down (Weick, 1990; Vardi and Weitz, 2004). To ensure that routine participants adhere to the rule, organizations engage in formal monitoring activities and incentivize actors to follow rules (O'Reilly, 1989; Kohn, 1999). While prominent in the economic literature, managerial monitoring and incentivizing have been found to have limited effect in organizations (Gouldner, 1954; Streatfield, 2001). For ex-

ample, Tyler and Bladder (2005) show, using two empirical studies on employee rule adherence in various types of organizations, that the influence of incentive- and monitoring-based, command-and-control approaches to achieve employee rule adherence is inferior to self-regulatory approaches. This outcome is especially true for professional organizations, where most routine participants are autonomous professionals who are obliged to follow professional norms (Freidson, 2001). For example, a medical worker "[…] traditionally enjoys a collective autonomy over the content and conditions of medical practice" (Doolin, 2002: 373). Such autonomy causes an asymmetry of power between professionals and managers that allows professionals to play a dominant role in enacting or neglecting written organizational rules (Ferlie et al., 2005). This autonomy is in line with research on the micro-evolutionary processes of organizational routines, which suggests that routines are resistant to external changes initiated by management or other outside interferences (Loch et al., 2013).

In the following section, we therefore focus on conditions that previous research has connected to the self-regulatory enactment of written rules in organizations. In doing so, we argue that the institutional context in which routine participants are embedded complements task- and organization-based conditions. While these conditions originate at multiple ontological levels, they provide explanations of rule persistence that draw on the processes connecting the ostensive and performative aspect. To explore what configurations of these conditions contribute to persistent enactment of written rules in organizational routines, we conducted an empirical inquiry employing fsQCA as a configurational method.

4.2.3 Rules as Enablers in Guiding, Accounting, and Referring to Performative Aspects

4.2.3.1 Institutional Embeddedness of Routine Participants: Social Sanctioning

Actors participating in a routine may enact written rules because they consider them to be reliable guides of appropriate behavior (March, 1994). What is considered appropriate depends on the social expectations that apply to an actor in a given context. Social expectations matter, as "[…] identities and their contentions come all wrapped in larger structures and processes that predate them" (White, 1992: 6). For example, physicians are expected to provide patients with high-quality medical treatment according to current medical standards. These standards are usually developed in collective efforts incorporating medical practitioners and scientists. Students of medicine learn these standards in their training, while more experienced practitioners are required by law to attend continuing education where current standards are taught. If practitioners fail to meet these standards, they are subject to legal sanctions (Ulsenheimer, 1996).

The social expectations that apply to an actor are reflected by the *institutional pressure* that an institutional field exerts. The institutional pressure provides an indication of what is "desirable, proper, or appropriate" (Suchman, 1995: 574) and describes the social context against which routine participants have to account for their performances. Drawing on a written rule legitimized in the institutional field provides an indication of actors' "conformity to a specific standard or model" (Ruef and Scott, 1998: 880), thereby securing routine participants' status as legitimate actors in a field (Thomas, Walker and Zelditch, 1986). In contrast, deviating from written rules legitimized in the institutional field is likely to attract scrutiny and contempt by other actors embedded in the same field and put routine participants at risk of social sanctions (cf. Meyer and Rowan, 1977). These sanctions may, for instance, include the withdrawal of certificates by accreditation bodies and professional associations or the loss of public endorsement (Deeds, Mang and Frandsen, 2004: 12). Further, routine participants who fail to comply with institutionalized expectations may face social disapproval in their work environment such as "snide comments" and isolation by peers (Kellogg, 2009: 679). To dispel any doubts regarding the appropriateness of their conduct, routine participants are likely to consider a legitimized written organizational rule for a particular routine when accounting for, seeking guidance for, or referring to specific routine performances.

While these arguments suggest that the enactment of written rules simply conforms to institutional demands, research on organizational routines emphasizes that local practice (e.g., persistent enactment of written rules) is strongly influenced by routine participants' coordination efforts when engaging in the task addressed by the organizational routine (Pentland, 1992; Jarzabkowski et al., 2012; Dionysiou and Tsoukas, 2013). Therefore, we also consider the extent to which written rules may solve local coordination issues for routine participants.

4.2.3.2 Organization of Routine Participants: Collective Coordination

Given that organizational routines are constituted by interdependent actions of multiple actors, coordination mechanisms are crucial for the functioning of organizational routines (Jarzabkowski et al., 2012; Miller et al., 2012). Coordination refers to "fitting together the activities of organization members" (Argote, 1982: 423). Coordination among routine participants draws on an intersubjective understanding of how individual actions relate and contribute to the organizational routine (Reagans, Argote and Brooks, 2005; Dionysiou and Tsoukas, 2013). This knowledge of the routine and the internal organizational context links tasks and responsibilities to required competencies and the expertise of other routine participants, thereby facilitating coordinated execution of the organiza-

tional routine (Feldman and Rafaeli, 2002; Miller et al., 2012). The participants' *professional experience* reflects this part of the ostensive aspect, as it contains a repertoire of past routine iterations, providing the basis for behavioral guidance, and accounting for and referring to performative aspects (Turner and Fern, 2012).

Written rules may become persistently enacted when they make it easier for routine participants to relate to each other and to participate in coordinated action. Written rules may fulfill this coordinating function because they define responsibilities for tasks, help allocate resources, and facilitate agreement among organizational actors (Faraj and Xiao, 2006; Okhuysen and Bechky, 2009). Given that any kind of personal coordination is time-consuming because it involves direct and frequent communication (Van de Ven, Delbecq and Koenig, 1976), written rules may provide useful templates for guiding, accounting for, and referring to performative aspects when actors cannot draw on their own professional experience for reliable conceptions of appropriate conduct (cf. Hutchins, 1995).

4.2.4 Rules as Enablers in Creating, Maintaining, and Modifying Ostensive Aspects

Routine performances create, maintain, or modify the ostensive aspect (Feldman and Pentland, 2003). Whether and how routine performances shape the ostensive aspect depends on the experience that routine participants derive from the performance. Experience in enacting a specific written rule creates, maintains, or modifies the routine participants' ostensive aspects to either incorporate or reject the written rule as a part of the generalized representation of the routine (Pentland and Feldman, 2005; 2008a). Routine participants should be less inclined to enact written rules when past routine performances incorporating these written rules fail to achieve the intended outcome and when the failure to achieve the outcome can be attributed to the enactment of the written rule (Feldman, 2000; Desai, 2010). The extent to which written rules are likely to foster positive or negative task experiences depends on the *frequency* and the *complexity*[10] of the executed task (cf., Levitt and March, 1988). As Zollo and Winter (2002: 347) argue, with greater task frequency, actors are more likely to "have retained their impressions as to what worked and what didn't work in the previous experiences." Accordingly, the task frequency creates the baseline against which routine participants develop their ostensive aspect of the routine. The more frequently an organizational routine is performed to address a given task, the more elaborate the ostensive aspect that routine participants develop in enacting a written rule.

[10] We define the complexity of a task addressed by an organizational routine as the number and sequence of actions employed in accomplishing the task as well as how those sequences vary across time (Pentland et al., 2011).

Whether routine participants will gather positive or negative experiences in applying the rule depends, among other contingencies, on the rule's effectiveness as a coordination device. With regard to the coordinating function of written rules, previous research has demonstrated that the extent to which written rules function as coordinating devices depends on the complexity inherent in the task addressed by the organizational routine (Davis et al., 2009). Written rules are considered inappropriate coordination devices when tasks involve a large number of exceptions (March and Simon, 1958; Thompson, 1967; Van de Ven et al., 1976). With increasing task complexity, routine participants will experience an increased number of exceptions. Given that only a limited number of exceptions can be covered by written rules, routine participants will soon be confronted with ad-hoc coordination and uncertainty regarding the validity of their assessments (Galbraith, 1973; Milliken, 1987). Overall, these arguments suggest that task frequency and task complexity jointly influence how routine participants will enact written rules. Depending on these experiences, the routine performances carried out according to written rules will create, maintain, or modify the routine participants' ostensive aspects and thereby influence the persistent enactment of rules in organizational routines.

These preceding arguments suggest four explanatory conditions (institutional pressure, routine participants' professional experience, task complexity, and task frequency) that influence whether actors draw on a written rule while carrying out an organizational routine. However, whether written rules are persistently enacted depends on the routine dynamics that emerge from the mutual interplay of the ostensive and performative aspect given the empirical configuration of these conditions. To identify configurations of the aforementioned conditions that foster the persistent enactment of written organizational rules in organizational routines, we conducted an exploratory comparative case study. To analyze our data, we applied fsQCA as a method that enables the identification of equifinal and multilevel explanations. In the following section, we introduce the empirical setting in which we conducted our case studies.

4.3 Sample and Method

4.3.1 Research Approach

Drawing on our theoretical development, we designed an investigation to understand when and why written rules become persistently enacted in organizational routines. We focused on care pathways as an example of organizational rules that are supposed to be persistently enacted. In hospitals, care pathways are one of the

most-common written organizational rules for performing treatment routines (Timmermans and Almeling, 2009). Care pathways typically define "[…] a number of steps to be taken when specified conditions are met: how general practitioners should proceed when they suspect a new case of diabetes, what steps a nurse should follow in preventing decubitus ulcers […]" (Timmermans and Berg, 2003: 25). Care pathways are designed to provide medical professionals with current and evidence-based medical knowledge to facilitate coordination between treatment-routine participants and provide a means to evaluate whether a specific iteration of a treatment routine was consistent with medical standards (Bohmer, 2009). Care pathways are usually subject to extensive scientific scrutiny; similar to other treatment protocols, they are typically accompanied by and grounded in high-quality evidence regarding the standard to be achieved as well as the medical and economic outcomes expected following their implementation (see Rotter et al., 2010; Vanhaecht et al., 2011). Such research is readily available to clinicians, since it is published in numerous medical journals and advanced by institutions such as *The Cochrane Collaboration*. Therefore, we believe the enactment of care pathways within treatment routines is a theoretically adequate and practically relevant research context within which to examine the persistent enactment of written organizational rules.

Given the lack of an encompassing theoretical framework explaining the persistent enactment of organizational rules, as well as our research interest exploring configurations of conditions that contribute to this phenomenon, we used a case-based method (Morgan and Smircich, 1980). We conducted a pilot study in which we interviewed 14 chief physicians from a broad spectrum of disciplines working in university and non-university hospitals and discussed changes in treatment routines that they supervised after the introduction of lump-sum reimbursements in Germany. These interviews demonstrated a great diversity of terms and associations linked to "care pathways" and their persistence in treatment routines, a situation requiring a more reflective mode of data collection than would have been possible using a large-scale survey. We selected cases on the basis of a theoretical sampling procedure (Eisenhardt, 1989). To generate insights on how institutional, organizational, and task conditions affect the persistent enactment of organizational rules, we searched for hospitals that operated under similar economic conditions and regulatory regimes but differed considerably with regard to our explanatory conditions. University hospitals, as maximum providers of medical care, appeared particularly suited to provide cases relevant to our research interest. While university hospitals face competitive pressures similar to those of regular hospitals, they also represent a clearly defined population that is subject to identical economic challenges and regulatory re-

gimes (Reinhold et al., 2009). Because of their extensive experience with medical research studies, university hospitals are accustomed to designing and updating workable care pathways. Hence, the organizations that constitute our sample are well versed in designing and implementing clinical pathways in treatment routines. Differences across cases in the persistent enactment of written rules are therefore due to the effect of routine dynamics following initial implementation. By focusing on the university hospitals' internal-medicine departments, which offer a broad but comparable spectrum of treatment routines, we expect variations in the institutional, organizational, and task conditions to account for the persistent enactment of care pathways.

4.3.2 Sample and Data Collection

This research was conducted as part of a larger qualitative study of work organization in hospitals. We approached the nursing directors of all 32 German university hospitals to gain access to their internal-medicine departments. Following this initial approach, 16 hospitals agreed to provide access. Our data collection draws on archival data provided by hospitals' mandatory quality reporting, the medical database MedLine (2012), and interview data from the respective departments.[11] To avoid common-method bias (Podsakoff and Organ, 1986), we only used the interviews to inquire which care pathways implemented in the respective departments had persisted and which had not. Our explanatory conditions were operationalized and measured on the basis of publicly available data on the hospital departments. Most of this data was found in the quality reports issued by the hospitals (Gemeinsamer Bundesausschuss, 2012). Because these reports belong to the official reporting data demanded by German hospital law (§ 137 Abs. 3 Satz 1 Nr. 4 SGB V), we are confident that this data is reliable and valid.

We arranged interviews with physicians, nurses, and case managers to learn about the enactment of care pathways in their departments. To reduce the possi-

[11] While there are potential drawbacks to collecting data via interviews, data collection via participant observation or archival data was not feasible in this study setting. In order to detect the persistent enactment of a care pathway across all explanatory conditions, a large number of observed treatment routine iterations across time would have been required. In order to detect differences between specific treatment actions and written care pathways, these observations would have to be conducted by knowledgeable medical personal. This mode of data collection would have been extremely resource consuming, given the number of actions and cycle times of a single treatment routine execution (Pentland and Feldman, 2008b). Furthermore, given the complexity of such an observation, errors or incomplete documentation would have been likely. While relying on archival data would have bypassed many of the problems linked to observations (Pentland et al., 2011), matching the medical documentation of individual patients with written care pathways was not legally feasible due to strict data-protection standards. Against this backdrop, and considering that our inquiry does not intend to study or compare individual treatment routine performances and how these eventually deviate from care pathways, we judged data collection via interviews to be appropriate.

ble biases that may have influenced our respondents' assessments, we took a number of precautions: First, to reduce cognitive biases and errors resulting from faulty memory, our questions focused on past facts and behavior, not their beliefs and intentions (Golden, 1992). Second, to avoid social-desirability response bias, we assured all interviewees of their complete anonymity and communicated that all identifying information was to be removed upon transcription of the interviews. Participation in our interviews was voluntary. Third, wherever possible, we interviewed at least two people—including at least one of each healthcare profession—per department (e.g., nephrology) to ensure reliable statements. In a few cases, we were also granted access to the case managers of the respective departments for validation purposes. In addition, we had a generally high agreement rate among interviewees from the same department. Given that our interviews documented instances in which care pathways had not persisted, despite university hospitals being experienced designers and users of medical protocols, we have confidence in the validity of our data-collection method.

We conducted 48 semi-structured interviews in total, including 22 background interviews with nursing directors and hospital quality-of-care managers, as well as 26 semi-structured interviews with healthcare professionals from internal-medicine departments. Approximately half of these university hospitals' internal-medicine departments either had not attempted to introduce care pathways in their internal-medicine departments or employed simpler standard operating procedures and were therefore excluded from further analysis. In one case, our interview partner was able to provide us with information on two departments, as she had been a member of two medical teams. The interviews were conducted in German—the native language of the interviewers and all interviewees. Because of the work-intensive environment, interview duration ranged between 20 and 104 minutes. On average, interviews lasted fifty minutes. In nine cases, we had to interrupt the interview because patients required our interviewee's attention. Given that our data collection was part of a larger research project, our interviews focused on care pathways as one of several facets of work organization in hospitals.

4.3.3 Measures

Outcome. *Persistent enactment of care pathways* was measured using our interview data. In all interviews, we specifically asked which diagnoses/procedures in the interviewee's department are practiced on the basis of care pathways, as well as from which care pathways practitioners regularly and substantially deviate. We also asked which diagnoses/procedures are associated with care pathways that have been fully implemented in the past yet are no longer enacted. Our inter-

views sought to identify which care pathways had become an element of daily practice beyond the initial implementation period. With the exception of brief conversations, which we documented with written notes, all interviews were recorded digitally and transcribed for further analysis (Bryman, 2008). Based on the interview data, we derived a list of treatment routines for which care pathways had been implemented and noted whether or not their implementation had persisted.

Explanatory Conditions. *Institutional pressure* at field level was measured by the number of citations of the most-frequently-cited scientific article on care pathways applicable to the respective treatment routine. While we lack a commonly accepted measure for institutional pressure, we are confident that the number of citations represents a valid proxy, since practitioners draw on this research to inform their practice and are held accountable to this current state of knowledge (Timmermans and Berg, 2003). The more widely disseminated an article that describes and tests a specific care pathway in the professional and scientific community constituting the institutional field, the harder it is for practitioners to justify treatment routines that are not aligned with that guideline (Bohmer, 2009). Furthermore, if the most-cited article on a care pathway for the respective treatment routine is very frequently referenced in subsequent articles, the prevailing opinion on the use of care pathways can be assumed to be rather homogenous. The more homogenous a field's expectations are, the stronger the pressure towards conformity becomes, in this case the enactment of care pathways (Oliver, 1991). Our search for scientific publications was conducted via MedLine (2012) using an array of search terms.[12] Random samples of the cited articles were inspected to ensure that findings were largely in favor of the respective care pathway.

Professional experience. The level of experience within the department executing the respective treatment routine was calculated using the ratio of specialist doctors ("Fachärzte") to all other clinicians within the department in question.[13] Specialists have mastered the highest level of medical training available, having un-

[12] As search terms, we used all synonyms for care pathways described by the European Pathway Organization (2012): "clinical pathway*", "clinical care pathway*", "care pathway*", "critical pathway*", "care path*", "integrated care pathway*", "case management plan*", "care map". Furthermore, we restricted our search to articles published in English or German.

[13] While care pathways usually prescribe all relevant treatment steps for a specific disease and these steps also may include nursing work, the present study focuses on medical doctors as routine participants. This decision naturally excludes nurses and other service personnel from our analysis. However, given that our study intends to explain the persistence of rules in a context where application of rules is not mandated by working contracts—and medical doctors in Germany represent the only participants of a treatment routine who exert legally sanctioned discretion regarding the treatment of patients—excluding nurses and other service personnel from our analysis seems warranted.

dergone five to seven additional years of practical training, and are therefore highly experienced in performing medical treatment routines (Maclachlan, 1997; Egan and Jaye, 2009). Thus, we assume the ratio of specialists to all other clinicians within a department validly captures the average level of professional experience present in a department.

Task complexity. Task complexity was calculated using the average complexity of the medical cases treated using the corresponding treatment routine. We collected this information from the so-called G-DRG (German Diagnosis Related Groups) weights that are typically assigned to each treatment routine. These cost weights indicate the relative complexity of a certain diagnosis-related group and are updated annually to provide the basis for health insurance providers' reimbursement rates for clinical treatments (Pierdzioch, 2008). The weights are determined by InEK, a public organization set up by the German government (Schreyögg, Tiemann and Busse, 2006: 272). As a first step, we matched the medical procedures constituting the respective routine with the related G-DRG codes and validated these matches using expert ratings provided by the head of the accounting department of one of the largest German hospitals. In a second step, we weighted the respective G-DRG weights according to their relative occurrence in the German hospital field to account for the patient composition receiving the respective treatment. We then calculated the average weight of the respective G-DRG codes per treatment routine. These values constitute our data on task complexity. We decided to use G-DRG weights as a measure because G-DRGs are by law designed to capture treatment complexity (KHEntG § 9 Abs. 1).

Task frequency. The frequency of a task was measured by the number of treatments performed by the hospital department within one reporting year.

Table 4.1 depicts the raw data collected for each treatment routine.

Table 4.1: Cases and Raw Data

Case ID	University Hospital	Internal Medicine Department	Treatment Routine
1	I	Nephrology	Renal Transplant Evaluation
2			Renal Dialysis
3		Cardiology	Cardioversion
4	II	Nephrology	Renal Transplant Evaluation
5			Renal Puncture
6			Shunt
7		Cardiology	Angiography
8	III	Oncology	Plasmacytoma
9	IV	Cardiology	Angina Pectoris
10	V	Nephrology	Arterial Hypertension
11			Renal Biopsy
12			Renal Insufficiency
13	VI	Oncology	Bone Marrow Transplantation
14		Nephrology	Arterial Hypertension
15			Renal Biopsy
16	VII	Gastroenterology	Peritoneal Puncture
17			Pleural Punctuation
18			Trans-Arterial Chemo Embolization
19			Mini-Laparoscopy

Table 4.1: Cases and Raw Data (continued)

Case ID	Institutional Pressure	Professional Experience	Task Complexity	Task Frequency	Care Pathway
1	13	1.25	2.27	10	Persistent
2	11	1.25	1.35	8900	Persistent
3	0	1.21	0.49	164	Persistent
4	13	0.50	2.27	16	Persistent
5	0	0.50	0.91	1	Non-Persistent
6	0	0.50	0.95	85	Persistent
7	1	0.50	0.92	6307	Persistent
8	0	0.63	1.09	228	Non-Persistent
9	76	1.01	0.55	623	Persistent
10	2	0.56	0.53	83	Persistent
11	1	0.56	0.91	218	Persistent
12	11	0.56	1.35	242	Persistent
13	7	1.25	15.70	216	Persistent
14	2	0.86	0.53	56	Non-Persistent
15	1	0.86	0.91	155	Persistent
16	0	0.64	0.76	610	Persistent
17	0	0.64	0.67	101	Persistent
18	11	0.64	1.11	81	Persistent
19	6	0.64	1.06	366	Persistent

4.3.4 Analytical Approach

We employed fuzzy-set Qualitative Comparative Analysis (fsQCA) to explain the persistence of written organizational rules using the four explanatory conditions discussed in our theory section. While researchers have recently begun employing fsQCA to test theory (e.g., Fiss, 2011; Bell, Filatotchev and Aguilera, 2013), the method was originally developed and applied to smaller data sets to elaborate theory (Greckhamer et al., 2013). We argue that fsQCA has a number of advantages for the present study. FsQCA treats each case as a complex configuration of causal factors with a specific outcome and analyzes which set of

relations is necessary and sufficient for the outcome to occur (Ragin, 1987; 2000). A conception of causation based on necessary and sufficient conditions is particularly suitable to explore how *conjunctions* of mechanisms are connected to an outcome (e.g., institutionalist and coordinative mechanisms interacting in causing persistent enactment of written rules). Furthermore, fsQCA allows equifinal explanations because this method does not assume that there is only one constellation of features among all observed cases that causes the outcome (Fiss, 2011). Emergent processes, such as the processes causing persistent enactment of written rules in organizational routines, are typically equifinal in form (Crutchfield, 2008). The analytical focus of fsQCA meets our objective to explore emergent processes that cause persistent enactment of rules in organizational routines. Finally, fsQCA techniques are suitable for analyzing multilevel data structures (Rohlfing, 2011; Crilly, 2013). Given the multiple ontological levels inherent in our conceptualization of the enactment of rules in routines, fsQCA as a multilevel method represents the appropriate method for the present inquiry.

We followed standard procedures in preparing and conducting our fsQCA (e.g., Ragin, 2000; Fiss et al., 2013). To ensure transparency, our analysis is based on the standard software package fsQCA version 2.5 (Ragin and Davey, 2009), which proceeds stepwise through each analytical moment. Analysis with fsQCA requires us to first transform variables into sets: the explanatory and outcome variables are therefore to be renamed and structured in set-theoretic terms (e.g., the variable "task frequency" was labeled "high task frequency") (Ragin, 2000). The extent to which cases are members of these sets is used by fsQCA to explore the causal structure between explanatory conditions and outcomes. Set-membership values result from calibrating the raw data with three qualitatively meaningful thresholds: full membership, full non-membership, and the crossover point. These thresholds are derived from external standards, such as pre-existing qualitative and quantitative scientific knowledge, to calibrate each attribute in a manner that best captures a difference in kind for the particular set membership (Ragin, 1987; 2000). We elaborate below how we calibrated the outcome as well as the explanatory conditions.

Persistent Enactment of Care Pathways. We calibrated the outcome (persistent enactment of care pathway) dichotomously. Set-membership values were assigned to outcomes based on a simple logic: the persistent enactment of care pathways following an initial implementation phase must imply a fuzzy-set membership value of *1* because lower values would falsely indicate qualities of non-persistence. Therefore, all treatment routines exhibiting persistent enactment

of care pathways were assigned set-membership values of *1*, whereas treatment routines exhibiting non-persistence of care pathway enactment were assigned set-membership values of *0*. An example for a persistent enactment of care pathways is provided by Case 1 in our dataset. Here, patients who were about to receive a renal transplant were persistently treated according to a written care pathway that was implemented about nine years ago. While our interviewee admitted that exceptional cases required physicians to deviate from the pathway to allow for flexible routine performances ensuring patient safety, he pointed out that the pathway for the evaluation of renal transplant patients was enacted in everyday practice because "especially in the case of a transplantation, it is reasonable to reflect upon the preparation procedures. Also, because [the pathway] coordinates interaction." Accordingly, Case 1 was coded *1* for the persistent enactment of care pathways. Non-persistent enactment of a care pathway, on the other hand, can be observed in Case 14, where a care pathway for the treatment of arterial hypertension had been implemented but failed to persist. As our interviewee put it: "Hypertension is being [treated] according to the maxim: 'Well, I am pretty familiar with that, I am just going to do that [my way].'" Case 14 was coded *0* on the outcome condition.

Institutional Pressure. Our calibration of *"high institutional pressure"* draws on exogenous threshold values for full membership, full non-membership, and the crossover point. The full-membership threshold and the crossover point were derived by conducting an additional MedLine search on care pathways limited to the respective specialty area (e.g., nephrology). We analyzed the search results for the most-cited article published in the respective subject area. Given our theoretical assumptions on institutional pressure, this number indicates full set membership for a specific department type. In line with this rationale, we set the threshold for full non-membership in the set to *0.5* citations.[14] The crossover point was derived by inspecting the distribution of the MedLine citation records for a value break among the citation clusters (Crilly, Zollo and Hansen, 2012).

Professional Experience. We calibrated the set *"high professional experience"* using our basic population. More specifically, we calculated our measure for actors' professional experience (specialist/non-specialist) for all internal-medicine departments in the sample (e.g., nephrology) across all university hospitals in Germany. We derived threshold values for full membership, full non-membership, and the crossover point for each department type by visually inspecting the data for value breaks between clusters (Crilly et al., 2012).

[14] Setting the threshold to *0* was not possible, as the sample includes cases exhibiting no citations on care pathways. Thresholds cannot be placed on values covered by empirical data (Ragin, 2000).

Task Complexity. Calibration of the set *"high task complexity"* was based on the German hospital reimbursement system. This system assigns the DRG value *1* to treatments of average complexity (InEK, 2012). Accordingly, a measured routine complexity of *1* provides a highly appropriate qualitative anchor for the set's crossover point. Lacking theoretical criteria indicating threshold values for full membership and full non-membership, we decided to derive these anchors by inspecting the distribution of the average DRG values reported by all German hospitals for obvious value breaks (Crilly et al., 2012).

Task Frequency. The set *"high task frequency"* was calibrated using basic population information. Again, we relied on the official quality reports of all German university hospitals. Based on this information, we first gathered data on the number of treatment-routine executions (e.g., renal biopsy) in the respective departments per report year. To derive threshold values for full membership, full non-membership, and the crossover point, we inspected these distributions for value breaks (Crilly et al., 2012). We assume that these breaks indicate qualitative differences in the levels of treatment frequencies (Crilly et al., 2012).

Table 4.2 provides an overview of the thresholds used for calibrating the raw data. While the four explanatory conditions and the outcome of each case are calibrated to fuzzy-set membership values (see Table 4.3), further analysis in fsQCA requires the researcher to first derive the truth table.

Table 4.2: Thresholds of the Explanatory Conditions

Condition	Full Membership	Crossover Point	Full Non-Membership
High Institutional Pressure			
Cardiology	76	15	0.5
Gastroenterology	27	5.5	0.5
Nephrology	13	6.5	0.5
Oncology	26	3.5	0.5
High Professional Experience			
Cardiology	1.3	0.8	0.37
Gastroenterology	1.8	1.2	0.71
Nephrology	1.3	0.95	0.6
Oncology	1.4	0.9	0.45
High Task Complexity	1.8	1	0.7
High Task Frequency			
Angina Pectoris	650	400	216
Angiography	6935	3780	875
Arterial Hypertension	143	66	43
Bone Marrow Transplantation	185	144	50
Cardioversion	325	132	70
Mini-Laparoscopy	240	70	20
Peritoneal Puncture	487	281	83
Plasmacytoma	178	130	30
Pleural Punctuation	77	38	22
Renal Biopsy	195	116	50
Renal Dialysis	6300	3700	900
Renal Insufficiency	157	85	18
Renal Puncture	50	18	5
Renal Transplant Evaluation	51	32	9
Shunt	30	16	4
Trans-Arterial Chemo Embolization	40	19	3

Table 4.3: Fuzzy-set Data Matrix

ID	High Institutional Pressure	High Professional Experience	High Task Complexity	High Task Frequency	Persistent Enactment of Care Pathway
1	0.95	0.93	0.99	0.05	1
2	0.89	0.93	0.79	1.00	1
3	0.04	0.92	0.01	0.62	1
4	0.95	0.02	0.99	0.11	1
5	0.04	0.02	0.29	0.00	0
6	0.04	0.02	0.38	1.00	1
7	0.05	0.11	0.31	0.92	1
8	0.03	0.14	0.58	1.00	0
9	0.95	0.78	0.01	0.94	1
10	0.10	0.03	0.01	0.66	1
11	0.06	0.03	0.29	0.98	1
12	0.89	0.03	0.79	1.00	1
13	0.61	0.89	1.00	0.99	1
14	0.10	0.32	0.01	0.21	0
15	0.06	0.32	0.29	0.81	1
16	0.04	0.03	0.08	0.99	1
17	0.04	0.03	0.04	0.99	1
18	0.68	0.03	0.60	1.00	1
19	0.52	0.03	0.57	0.99	1

Deriving the Truth Table. The next step in performing an fsQCA involves the construction of a truth table to identify configurations of conditions associated with an outcome (see Table 4.4). The truth table describes all logically possible combinations of explanatory conditions and the outcome using a present *(1)*—absent *(0)* dichotomy (Ragin, 1987; 2008a).

Table 4.4: Truth Table

Row	High Institutional Pressure	High Professional Experience	High Task Complexity	High Task Frequency	Cases[15]	Consistency of Sufficiency for Outcome[16]
1	1	0	1	1	12, 18, 19	0.98
2	1	1	1	1	2, 13	0.98
3	1	1	1	0	1	0.97
4	1	0	1	0	4	0.96
5	0	1	1	0	--	0.94
6	1	0	0	1	--	0.93
7	1	1	0	1	9	0.91
8	0	0	0	1	6, 7, 10, 11, 15, 16, 17	0.91
9	0	1	1	1	--	0.89
10	0	0	1	1	8	0.82
11	0	1	0	1	3	0.81
12	1	0	0	0	--	0.73
13	1	1	0	0	--	0.72
14	0	1	0	0	--	0.70
15	0	0	1	0	--	0.61
16	0	0	0	0	5, 14	0.37

Inspecting the truth table (Table 4.4) and the fuzzy-set data matrix (Table 4.3) could provide information on cases with identical causal conditions yet contradictory outcomes. As inspection of the tables demonstrates, this issue does not arise in our current data set. We can therefore use the truth table as presented above for further analysis of the cases without the need to add additional explanatory conditions to address such inconsistencies.

Necessary and Sufficient Conditions of the Persistent Enactment of Care Pathways. Causal analysis in fsQCA builds on the notion of necessary and sufficient conditions. Since procedures uncovering sufficient conditions cannot be relied on to uncover necessary conditions, we analyzed necessary and sufficient conditions separately, beginning with the necessary conditions (Schneider and Wagemann, 2010). Logically, *necessary conditions* are always present if the outcome is present, and there must not be an instance in which the outcome is pre-

[15] The cases listed in each truth table row are still members of fuzzy sets; they have only been sorted to the corner in the dichotomous vector space that provides the best fit based on the rounding rules outlined above.

[16] While the consistency value for sufficiency also provides an indicator for inconsistent outcomes, this measure is particularly relevant for exploring the sufficient conditions later on in the analysis.

sent and the condition absent (Schneider and Wagemann, 2007). By convention, a consistency value of at least 0.9 is required for indicating necessary conditions (Goertz, 2006). To test for necessary conditions, we applied the "necessary conditions" procedure provided by fsQCA 2.5 to the fuzzy-set data matrix (Table 4.3). In scrutinizing the results of the analysis, we found that the consistency values of all conditions (as well as their negations) are well below 0.9, suggesting that fuzzy-set membership values of the explanatory conditions across all cases are lower than outcome-membership values (Ragin, 2006). Therefore, none of the conditions was considered necessary for the persistent enactment of care pathways in treatment routines. We continued our analysis by testing for sufficient conditions.

For a *sufficient condition*, the outcome is always present if the condition is present; and there must not be an instance in which the condition is present and the outcome absent (Schneider and Wagemann, 2007). This rationale implies that fuzzy-set membership values of sufficient conditions (or conjunctions of conditions) are equal to or lower than outcome membership values (Ragin, 2000). To analyze the data for sufficient conditions, we first deleted configurations not associated with any of the 19 cases from the truth table (Schneider and Wagemann, 2007). We then specified a consistency threshold to select the configurations reliably associated with our outcome. The consistency value, which can range from *0* to *1*, captures the extent to which the fuzzy-membership values of a row correspond to the assertion that the row is sufficient for the outcome (Ragin, 2006). Rows that fall below the consistency threshold are considered as failing to correspond consistently to the sufficiency criterion. Hence, the outcome value of that row will be coded as *0*. Conversely, all rows achieving or surpassing the criterion are coded as *1*—the row is consistently sufficient for the outcome. One guideline is to select a threshold that corresponds to a break observed in the distribution of consistency scores (Crilly et al., 2012). Following this approach, we applied a consistency threshold (0.90) that is stricter than the consistency threshold (0.75) suggested by Ragin (2006). Following the preparation of the truth table, seven rows were coded as full members of the outcome set "Persistent Enactment of Care Pathway."

The Quine-McClusky algorithm provided by the fsQCA 2.5 software package uses Boolean algebra to reduce the truth-table rows to less-complex expressions. In this minimization procedure, complex configurations are reduced in favor of logically equivalent but less-complex solution terms (Schneider and Wagemann, 2007). In the course of the minimization procedure, the fsQCA 2.5 software allows for three types of solutions. Whereas the parsimonious and intermediate

solutions incorporate logical remainders to varying extents, the complex solution incorporates only statements about situations that occur empirically (Ragin, 2000) and therefore represents the most conservative approach (Vis, 2012). Accordingly, our analysis relies on the complex solution.[17] The findings are presented below.

4.4 Findings

In Table 4.5 we present the configurations of conditions associated with the persistent enactment of care pathways. We present these results using the established notation style suggested by Ragin and Fiss (2008). Black circles indicate the presence of a condition, while crossed circles indicate the absence of a condition. Blank spaces indicate a "don't care" situation in which the condition may be either absent or present.

Table 4.5: Complex Solution of Sufficient Conditions for Outcome

	Solution		
Condition	**1**	**2**	**3**
High Institutional Pressure	●	●	⊗
High Professional Experience		●	⊗
High Task Complexity	●		⊗
High Task Frequency		●	●
Consistency	.99	.95	.91
Raw Coverage	.35	.17	.40
Unique Coverage	.18	.05	.31
Cases Covered[18]	1, 2, 4, 12, 13, 18, 19	2, 9, 13	6, 7, 10, 11, 15, 16, 17
Overall Solution Consistency		**.94**	
Overall Solution Coverage		**.71**	

The complex solution (Table 4.5) indicates three sufficient equifinal solutions explaining the outcome of persistent care-pathway enactment. Solution 1 states that the presence of high institutional pressure and high task complexity are sufficient for the persistent enactment of care pathways to occur, whereas Solution 2 states that the presence of high institutional pressure in conjunction with both high levels of professional experience and high task frequency are sufficient for this outcome. Solution 3 states that the *absence* of high institutional pressure in conjunction with the *absence* of high levels of professional experience, the *absence* of high task complexity, and the *presence* of high task frequency, are sufficient for care pathways to persist. The overall solution consistency (0.94) and

[17] The parsimonious and the intermediate solution are available upon request.

[18] Cases 8, 3, 5, 14 were excluded from the analysis because the truth table rows containing these cases failed to meet the consistency threshold (0.90).

individual solution consistency terms (0.99, 0.95 and 0.91) are well above the minimum consistency (0.80) recommended by Ragin (2008b). This result indicates that there is an appropriate correspondence between our empirical data and the set-theoretic relationships captured in the solution terms (Fiss et al., 2013). The relevance of the different solution terms is expressed by the coverage scores, which are calculated from the percentage of cases that represent a given solution term within the outcome (Ragin, 2006). As indicated by the solution coverage, all three solutions together account for approximately 71 percent of the fuzzy-set membership values in the outcome. While this result implies that most of the outcome is explained by the solution terms, it also indicates some degree of unexplained idiosyncrasy. As indicated by the unique coverage measures, which are lower than the solution coverage, some cases are explained by all three solution terms. This result indicates that equifinality is present in this phenomenon.

4.5 Discussion

Our research provides a foundation for understanding what happens to organizational rules after their initial implementation in an organization. Previous research on organizational routines has provided evidence that routines and rules frequently drift apart (Ciborra, 2000; Bruns, 2009; Anand et al., 2012), thereby calling into question the persistence of "once-routinized" rule implementations (e.g., Van de Klundert et al., 2010). In the present analysis, we observed organizational rules that were implemented within the very same hospital department and persisted in one instance (Case 15) and did not persist in the other (Case 14). Interestingly, the non-persistent written rule in this department was persistently enacted in another hospital department (Case 10). With these patterns in mind, attributing the varying outcomes to differences in change-management practices seems implausible, especially as our empirical setting exhibits long-standing experience with the design and implementation of written rules (e.g., from conducting clinical studies).

4.5.1 Exploring Rule Persistence in Organizational Routines

Our analysis found no necessary condition explaining written rule persistence in routines. This finding casts a critical light on traditional phase models of organizational change and stability (e.g., Lewin, 1951) that emphasize single, key dimensions as drivers of organizational change (Tsoukas and Chia, 2002). However, our analysis revealed three equifinally sufficient explanations for the occurrence of rule persistence. In the following section, we demonstrate how and why these configurations of conditions foster rule persistence. To clarify the central mechanism of each configuration fostering persistent rule enactment, we provide

short descriptive labels for each configuration that name the types of situations in which rules are persistently enacted

4.5.1.1 Situation 1: Reducing Risk

The first solution states that high institutional pressure and high task complexity are sufficient for the persistent enactment of care pathways to occur, irrespective of task frequency and the professional experience of routine participants. Case 1 illustrates well how and why high institutional pressure interacting with high task complexity can foster the persistent enactment of written rules in treatment routines. In this specific case, a care pathway for a renal transplant evaluation routine has been persistently enacted. Institutional pressure to carry out a renal transplant evaluation routine according to written care pathways is high. With 13 publications focusing on care pathways for a renal transplant evaluation, Case 1 is subject to the second-highest level of institutional pressure in our sample. In addition to a close scrutiny by peers and institutional stakeholders, routine participants in Case 1 are confronted with high task complexity that increases the risk of adverse outcomes. High task complexity results from the high number of interdependent actions that constitute this treatment routine (e.g., surveying the patient's as well as the donor's health status, controlling for possible infections, and monitoring for immune suppression). Completing a renal transplant evaluation routine requires the coordination of specialists (e.g., transplantation surgeons, dietitians, and psychologists [cf. Levin et al., 2008]) and patients with an unstable and potentially life-threatening health condition (Cohen and Galbraith, 2001).

While written rules represent a comparatively inefficient coordination device for such complex tasks, routine participants are confronted with strong social expectations from their peers to strictly and verifiably adhere to current medical standards when conducting highly complex tasks prone to adverse medical outcomes. High institutional pressure creates strong social expectations for actors to account for their performances. Such institutionalized expectations may prescribe the appropriateness of rule enactment; corresponding written rules provide a detailed check for evaluating the appropriateness of and thereby accounting for routine performances. In this constellation, social contempt becomes more likely if routine participants find themselves unable to account for their actions. In such situations, written rules protect routine participants from accusations of inappropriate conduct when failing at the complex task. Participants who fail to live up to social expectations risk sanctions from institutional stakeholders (e.g., loss of certifications) as well as disapproval by peers. In this configuration, written rules are likely to become persistently enacted across routine iterations, as they support

routine participants in reducing their risk of failure in a situation in which failure is more likely due to high task complexity and linked to severe social sanctions due to high institutional pressures. Written rules reduce routine participants' risk by continuously guiding present routine performances while also providing reliable means of accounting for past routine performances.

4.5.1.2 Situation 2: Securing Status

The second solution states that high institutional pressure in conjunction with high levels of routine participants' professional experience and high task frequency are sufficient for the persistent enactment of care pathways, irrespective of task complexity. Case 9 provides a particularly illustrative example of this configuration of conditions. In Case 9, a care pathway is persistently enacted in the treatment routine for angina pectoris, a common state of chest discomfort resulting from a restriction in blood supply to the heart. In our sample, the institutional pressure to employ care pathways is highest for this treatment routine, with 76 articles arguing for the use of a written pathway when treating patients with angina pectoris. With a high ratio of specialist physicians relative to residents, the routine participants in this department exhibit high levels of professional experience. Hence, these routine participants obtain the status of medical experts who are expected to constantly deliver high-quality medical care and have to account for their performances accordingly. Further, with 623 cases of angina pectoris in a year, actors in this department are confronted with almost two cases per day. Here, deviance from well-established standards is more likely to be detected by peers and external stakeholders, as high task frequency allows for a reliable distinction between singular divergence and systematic deviance from established care pathways. Taken together, the situation described in Case 9 of our sample illustrates how three different levels of explanatory conditions jointly foster the persistent enactment of care pathways.

In this configuration, rules are likely to become persistently enacted across routine iterations, as they support routine participants in securing their professional status in a situation in which their high professional experience puts them under particular pressure to continuously respond to the strong social expectations that prescribe the enactment of written rules as appropriate behavior, while high task frequency increases the chances that deviant behavior will be detected. Written rules help to secure routine participants' status by providing a means to guide routine performances, thereby visibly complying with the institutional pressures that weigh particularly strong on highly experienced routine participants. Further, the persistent enactment of written rules secures routine participants' status by

supporting them when accounting for their routine performances in adverse outcomes.

4.5.1.3 Situation 3: Surviving Stress

The third solution states that low levels of professional experience in conjunction with low institutional pressure, low task complexity, and high task frequency is sufficient for the persistent enactment of care pathways. Case 17 is a good example of how this configuration fosters the persistent enactment of a care pathway. Here, the treatment routine for pleural punctuation, an invasive procedure to remove fluid or air from the pleural space, was persistently carried out according to a care pathway. Performed 101 times a year, pleural punctuation is a common treatment in the department of Case 17. With an average DRG-weight of only 0.67, this procedure is of particular low complexity and is generally "found to be a safe procedure" (Mynarek et al., 2004: 519). Accordingly, the reimbursement rates for pleural puncture are significantly lower compared to medical treatments of average complexity. In this situation, routine participants are forced to guide their performances in a way that ensures economic efficiency. With almost twice as many residents as specialist physicians in this department, routine participants are unable to draw on personal experience or constant guidance from experienced colleagues and supervisors to identify the most-efficient way to execute a pleural puncture. Here, the persistent enactment of care pathways serves as a substitute for personal coordination and thus supports routine participants in guiding performances to achieve high levels of task efficiency.

For several reasons, the complete absence of publications referring to a pathway for pleural punctuation is further evidence that this procedure is often a locally developed pathway. Field-level pressures to enact care pathways are usually based on the idea of the medical superiority of pathways. In the department of Case 17, the dominant rationale for persistently enacting a pathway for a pleural punctuation is efficiency. Hence, in this case the enactment of a pathway would not comply with the institutional demands of the medical field. Overall, the relatively inexperienced routine participants in this department draw on care pathways to compensate for their low levels of professional experience. Accordingly, written rules allow them to consistently execute the frequently occurring and relatively easy pleural punctuation routine in the most-efficient manner possible.

In this situation, routine dynamics are likely to foster persistent rule enactment, as routine participants with limited professional experience can draw on written rules for guidance and reflection on their experiences. Low levels of professional experience in a department imply that most routine participants have not devel-

oped elaborate ostensive aspects to guide their routine performance. Written rules may help inexperienced actors compensate for their lack of ostensive elaboration and provide security in choosing task-adequate courses of action. Rules are likely to become persistently enacted because they allow participants to guide, account for, and refer to routine performances. The low task complexity in this situation places routine participants under the pressure of addressing the respective task in the most effective and efficient manner, as tasks of this kind are easily comprehensible and highly analyzable. While those tasks as such do not bear the risk of a great medical failure, a lack of professional experience raises the risk of inefficiently executed treatment routines and puts routine participants under stress.

Under conditions of high task frequency, inexperienced actors are more likely to inefficiently execute treatment routines and, as a consequence, must justify their routine performances more often. Having performed a routine in accordance with a written rule will aid inexperienced routine participants in accounting for the actions taken. The enactment of rules will minimize sanctions for failing at relatively easy tasks, as adhering to written rules implies that routine participants performed a routine not only to the best of their knowledge but also to the best of general knowledge within the department. In this configuration, rules are likely to become persistently enacted across routine iterations, as they support routine participants in surviving stress. The persistent enactment of rules serves as a resource to routine participants that allows them to survive stress, because rules guide inexperienced routine participants with weakly developed ostensive aspects while at the same time supporting inexperienced actors in accounting for their performance whenever undesired outcomes arise in these frequent routine performances.

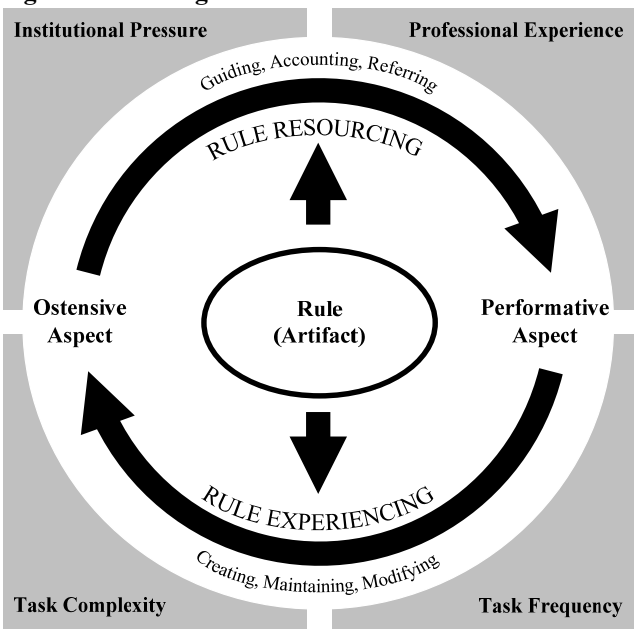
4.5.2 A Configurational Model of Rule Persistence

Across the three sufficient conditions of persistent care-pathway enactment, we find that written rules persist when rule participants draw on written rules as a resource in a given situation. Written rules become resources when they enable routine participants to perform an organizational routine. To perform an organizational routine, participants have to successfully coordinate their individual actions (Jarzabkowski et al., 2012; Dionysiou and Tsoukas, 2013). Furthermore, routine performances must be considered legitimate by peers. To achieve both coordination and legitimization, routine participants can draw on written rules. Written rules can serve as guides to coordinate routine performances, as sources to account for routine performances, and as labels when referring to routine performances. Written rules therefore may serve as resources for routine participants when engaging in the processes that link the ostensive to the performative aspect

of an organizational routine. Routine performances create, maintain, or modify the ostensive aspects of routine participants.

In our theory section, we argued that the persistent enactment of written rules is also contingent on the experiences that routine participants derive from each routine performance incorporating the written rule. Our findings demonstrate that written rules only become a resource when specific situations make guiding, referring to, and accounting for routine performances more challenging to routine participants because of increased coordination needs or strict behavioral expectations reflected by the institutional environment. For example, in Solution 3 ("surviving stress") routine participants are likely to quickly integrate the enactment of a written rule into their representation of the routine (i.e., the ostensive aspect), as they frequently execute a routine that addresses a treatment of little complexity. In this situation, the rule will most likely work as an efficient coordination device while also compensating for the routine participant's lack of professional experience. Given this configuration of conditions, routine participants are likely to experience frequent and positive feedback from enacting a care pathway, contributing to the persistent enactment of the written rule in future performances of the organizational routine. Figure 4.1 depicts our configurational model of rule persistence.

Figure 4.1: Configurational Model of Persistent Rule Enactment



This model shows how the interplay between the ostensive and performative aspect of a routine fosters persistent rule enactment. Based on our empirical analysis, we distinguish between *rule resourcing* and *rule experiencing* as an anteced-

ent to *rule persistence.* Rule resourcing takes place whenever routine participants find themselves in a situation in which they enact a written rule, as it provides a resource in guiding, accounting for, and referring to routine performances. Depending on the experiences that follow from each routine performance incorporating the written rule, the performative aspect (which includes the enactment of a written rule) creates and maintains an ostensive aspect that includes rule enactment as an important element of routine participants' shared representation of the routine.

Going back to our empirical data, we find that in solutions 1 and 2, routine participants find themselves in a situation in which they face social pressures to conform to what is deemed appropriate conduct in the eyes of field-level stakeholders as well as peers, while at the same time are confronted with task characteristics that increase the risk associated with failure to do so. In solution 3, routine participants find themselves under high pressure to perform routines efficiently while lacking experience to guide their performance. In all three configurations, the way in which routine participants' ostensive aspect guides, accounts for, and refers to their performance needs to satisfy multilevel demands encompassing institutional, organizational, and task conditions to ensure appropriate conduct and efficient coordination. Our analysis therefore underscores that the dynamics of organizational routines not only depend on internal organizational contexts (Howard-Grenville, 2005) but also on external institutional contexts. Furthermore, our finding of three equifinal solutions supports the notion established by some researchers that organizational routine dynamics are subject to equifinal processes. Only a few single-case studies have indicated that multiple ontological levels influence routine dynamics (e.g., Howard-Grenville, 2005; Rerup and Feldman, 2011). Equifinality in routine dynamics has been mostly implied by existing research but rarely studied empirically (Pentland et al., 2010: 933).

4.6 Conclusion and Limitations

The persistent enactment of rules can be explained by their function as a resource linking the ostensive to the performative routine aspect and the experiences derived from the routine performances incorporating the written rule. Our analysis substantiates but also extends the generative-systems perspective on organizational routines. It substantiates the generative-systems perspective in demonstrating that both conditions influencing rule resourcing (related to processes of guiding, accounting for, and referring to performative aspects) as well as conditions influencing rule experience (related to creating, maintaining, and modifying ostensive aspects) interact in fostering the persistent enactment of written rules. Our

analysis also extends previous research in the generative-systems tradition. It does so by demonstrating that the persistent enactment of written rules is not only subject to specific performances by specific actors in specific situations, but also follows from the interaction of conditions incorporating the institutional, organizational, and task level. This finding should remind researchers theorizing about routines as generative systems to consider the different contexts in which routines are performed. Failure to do so might result in incomplete descriptions and interpretations of phenomena. We suggest that theories of organizational routines need to be broadened to include multilevel dynamics to explain the persistence of written rules in organizational routines. Based on our empirical analysis of persistent rule enactment, we propose a configurational model of rule persistence that incorporates external and internal organizational context. Accordingly, our work expands the generative-systems perspective on routines by contributing theory and data that explicitly address context as an oftentimes neglected influence (Parmigiani and Howard-Grenville, 2011). In conclusion, we propose a "routines-in-situations perspective" to explain routine dynamics and rule persistence.

This study aims to explain an empirical phenomenon—the persistent enactment of organizational rules—for which the relevance for organizational survival and performance has been extensively documented by organizational research (cf., Heugens and Lander, 2009). However, we still lack research that examines the persistent enactment of written organizational rules in organizational routines. While our inquiry addresses this research gap, our sample includes a relatively small number of organizational routines. Although other qualitative studies on organizational routines incorporate a comparable or smaller number of routines (e.g., Feldman, 2000; Howard-Grenville, 2005), any generalizations drawn from our study should consider this limitation. For example, we cannot claim that our sufficient solutions apply to every type of written rule enacted for every routine in every form of organization. Another potential limitation is that all organizational routines in our sample are executed within internal-medicine departments at German university hospitals. However, the calibration procedure included in our fsQCA analysis mitigates this shortcoming, since the set membership values were not defined according to our sample's means, but rather according to exogenous standards (e.g., population means). This design reduces the necessity of employing a representative sample for generalization (Fiss, 2011). Therefore, our findings should also apply to treatment routines in other hospital departments or non-university hospitals.

Since hospitals are an extreme in terms of knowledge-intensive and competitive-service organizations, they offer substantial learning opportunities for comparable service organizations (cf., Adler, 2003). That said, we refrain from generalizing our findings to organizational routines that are executed within industrial organizations, settings which provide an interesting area for further research. Furthermore, our study draws on data aggregated across individual routine participants. Given that organizational routines are usually performed within a social context constituted by more or less experienced actors, we consider our measure appropriate for the present study. We would welcome future research to expand on our findings and employ ethnographic methods to study the interaction of multiple actors and their interaction processes causing the persistence of rules in routines more closely. Such research seems particularly promising when considering the impact of prior ethnographic work on hospitals (Kellogg, 2009) and the initial implementation of written rules in routines (Lazaric and Denis, 2005; Reynaud, 2005).

5 Overcoming Creative Failure for Creativity: The Importance of Socio-emotional and Informational Team Resources for Sustained Employee Creativity

5.1 Introduction

Employee creativity, defined as the production of novel and useful ideas, is widely regarded an important driver of organizational innovation, competitiveness, and ultimate survival (Amabile, 1988; Oldham and Cummings, 1996; George, 2007). Researchers have therefore sought to identify those factors that spur or thwart employee creativity (Amabile, 1983; George, 2007; Zhou and Shalley, 2008). One such factor may be creative failure—the rejection of employees' ideas because they are insufficiently novel or useful (Amabile et al., 2005; Zhou, 2008). Because of the risky and uncertain nature of creativity (Weick, 1995a; Simonton, 1999; Fleming, 2001; Kelley and Littman, 2001; Sutton, 2001; March, 2010), creative failure is common and relevant for employees who seek to be creative. In light of this fact, and the notion that prior failure experiences have been identified as having a significant impact on subsequent behavior in areas such as learning (Edmondson et al., 2001) and performance (Brunstein, 2000), it is surprising that we know little about the relationship between creative failure and subsequent creativity.

The present chapter addresses this issue. We bring together ideas from the failure, creativity, and teams literatures to argue that the team social context in particular influences whether prior creative failure triggers or stifles employees' subsequent creative performance behavior (i.e., activities concerned with generating ideas) and succeed in producing creative outcomes (i.e., ideas that are new and useful). Specifically, we posit that if employees experiencing creative failure work in teams that are *psychologically safe* (i.e., teams that are safe for interpersonal risk taking; Edmondson [1999]), such employees receive the encouragement and support needed to overcome potential threats to self-efficacy beliefs and threat-rigidity reactions, resulting in sustained creative performance behavior and creative outcomes. Additionally, we propose that, beyond socio-emotional support, teams that are safe for interpersonal risk-taking may also encourage employees with failure experiences to seek out advice and information from, and confide in, their team colleagues. Provided that teams hold distributed and unique expertise (Wegner, 1987), these informational resources may help employees to

better understand the causes of their failed creative efforts and further fuel subsequent creativity (Richter et al., 2012).

Following calls for objective creativity measures (Amabile and Mueller, 2008), examination of cross-level interactions on creativity (Shalley et al., 2004), and longitudinal creativity research (Zhou and Shalley, 2008), we contribute to the creativity and teams literatures in various ways. We first and foremost contribute to the literature on employee creativity by elucidating the link between creative failure and subsequent creative performance behavior and creative outcomes. By adopting a person-in-situation perspective (Hirst et al., 2009), we also provide answers to the question of how employees can overcome prior creative failure. Given that prior research has traditionally treated psychological safety and transactive memory system as predictors of team level outcomes (Edmondson, 1999; Ren and Argote, 2011), we extend this perspective by highlighting the relevance of these factors as cross-level moderators for individual-level outcomes. Finally, we provide advice to managers about how to create team environments that sustain employee creativity.

5.2 Theory: Creative Failure and Creativity

Creative failure is a common experience for employees who seek to be creative. Although creative performance behavior may eventually lead to novel and useful ideas, it typically encompasses an enduring struggle with bad ideas, mistakes, and setbacks (Amabile, 1988; Kanter, 1988). Research on employee suggestions, one form of creative performance behavior (Amabile, 1983; Mumford and Gustafson, 1988; Montag et al., 2012), for example, found that over 40 percent of employees' creative efforts result in failure experiences, as suggestions are rejected due to insufficient newness or usefulness (Frese et al., 1999; Arthur and Huntley, 2005; Ohly, Sonnentag and Pluntke, 2006).

The impact of such failure experiences on subsequent creativity is controversial. On the one hand, creative failure may serve as a motivational impetus stimulating employees' subsequent creative performance behavior and outcome. Because failure may increase the perceived difficulty of a subsequent task, and difficult tasks associated with positive outcomes may present attractive challenges (Bélanger et al., 2013), failure may provoke an increase in effort in order to achieve positive outcomes (Brehm et al., 1983; Wright and Brehm, 1989). From this perspective, creative failure signals a positive challenge for developing ideas that are novel and useful (cf. Locke and Latham, 1990). In a similar vein, failure may provoke intra-individual tensions and negative emotions that motivate indi-

viduals to overcome these adverse internal states by creating novel and useful outcomes (Runco, 1994). For example, Amabile et al. (2005) reported suggestive evidence from a small sample of employees that experiences of frustration due to repeated failure spurred the development of creative thoughts in order to resolve the problem at hand. The authors suggest that frustration resulting from failure may enhance employees' motivation to triumph over failure and increase their creative performance behavior. In line with these findings, one employee from the company we studied recalled that discovering a solution for an inefficiency within a particular segment of an operating routine he is responsible for almost became a "question of honor" for him, after the two suggestions he made to solve the problem had been rejected. Experiencing creative failure may therefore foster creativity via enhanced persistence and motivation.

On the other hand, creative failure may thwart creativity. Failure experiences may call into question employees' ability to accomplish creative tasks, and thereby lower creative self-efficacy beliefs (cf. Tierney and Farmer, 2011). Reduced self-efficacy and threat-rigidity reactions likely discourage further engagement in creative performance behavior (Amabile, 1983). This argument is in line with research on learned helplessness (i.e., loss of faith in one's ability to conquer adversity), suggesting that harmed self-efficacy and decreased control expectations reduce the likelihood that individuals engage in efforts to change unpleasant circumstances despite promising opportunities (Seligman, 1975; Mikulincer, 1994). Additionally, creative failure may be perceived as a threat to an individual's interests, such as maintaining self-esteem or solving a pressing problem in an important operating routine. In their analysis of human reactions towards threatening situations, Staw et al. (1981) argue that individuals may respond to threats such as failure experiences by exhibiting threat-rigidity reactions characterized by limited information processing and constriction of control. Employees who show threat-rigidity reactions usually avoid activities that trigger potentially unfamiliar changes (Ocasio, 1995). Such conservative and risk-averse behavior is likely to thwart subsequent creative effort because creativity involves risk-taking and uncertainty (Simonton, 1999; Fleming, 2001). In line with this reasoning, another participant clearly stated that rejections cause frustration and doubt, and recalled several employees who, after having received rejections, felt resigned and stopped submitting ideas to the suggestion system for several years.

In sum, we believe that creative failure may either spur or thwart creativity. In order to elucidate this relationship, we will argue in the following sections that the socio-emotional and informational resources provided by employees' proximal work team may affect whether employees turn prior creative failure into sub-

sequent creative performance behavior and outcome. We will develop these ideas into the hypotheses that the relationship between employee creative failure and subsequent creativity is moderated by team psychological safety and team transactive memory system.

5.3 Hypotheses

5.3.1 Moderating Effect of Team Psychological Safety

The proximal work team represents an almost ubiquitous social environment where employee creativity is enacted (Hirst et al., 2009), and in which help-seeking is a commonly employed problem-solving strategy (Hargadon and Bechky, 2006; Mueller and Kamdar, 2011). Teams may represent a resource for the provision of social support and advice and thus help employees to engage in creativity after having made experiences of creative failure. Specifically, fellow team members may provide social support to employees that reveal failure experience and encourage them to continue engaging in creativity, which may increase their self-efficacy beliefs and lower threat-rigidity reactions. One employee in the organization that we studied, for example, explained that rejections cause frustration because the development of suggestions is effortful. However, he also reported that his fellow teammates, with whom he had openly discussed his failure experience, successfully encouraged and motivated him to continue developing and submitting suggestions.

However, employees will not necessarily share prior creative failure experiences with their fellow team members. As research on teams in varying organizational contexts shows, employees may hesitate to reveal failures to coworkers to avoid potential damage to their image, such as being seen as incompetent, or a sense of threat that confessing failure may result in embarrassment (Edmondson, 1996; Edmondson, 1999; Edmondson et al., 2001; Lee et al., 2004). Whether individuals reveal failure experiences in order to receive team support and resources to cope with failure experiences therefore depends on the social norms and consequences related to reporting and discussing failure experiences within the team (Schein and Bennis, 1965; Weick and Sutcliffe, 2007).

In teams with a climate of psychological safety—defined as the "shared belief that the team is safe for interpersonal risk taking" (Edmondson, 1999: 354)—we expect employees to feel safe to engage in interpersonal risk taking and confident that the team will not embarrass, reject, or punish them for admitting failure experiences. Psychological safety helps employees to confront data that disconfirm their expectations or hopes without engendering defensiveness (Schein, 1985), to

seek help from coworkers, and to discuss failure openly (Edmondson, 1996; Edmondson, 1999). Highlighting the role of psychological safety for coping with prior creative failure, one employee from the company we studied emphasized that openly discussing rejections is no problem in his team. He argued that his teammates show respect for the effort made irrespective of the outcome. This context helped him "to get the rejection off his chest" without having to fear embarrassment and allowed him to continue making suggestions. Psychological safety neither implies friendship among team members, nor suggests an absence of problems. Rather, it indicates that team members relax their impression management and openly discuss failure because the team harbors a climate where others will respond positively to self-exposition, for instance through provision of encouragement or advice (Edmondson, 1999).

In contrast, low levels of psychological safety suggest that team members are focused on impression management due to fear of embarrassment (Edmondson, 1999). Another employee from the company we studied reported that he deliberately avoided talking about suggestions and rejections with his work team, as these conversations usually turn into a source of mischief. Such environments convey a sense of threat, resulting in increased caution and reduced motivation to disclose personal failures (Edmondson, 1999; Edmondson, 2004). Given that feelings of shame lie at the core of fear of failure (McGregor and Elliot, 2005), individuals may be too embarrassed to discuss experiences of failure with coworkers in team environments with little safety for interpersonal risk taking. In teams with low levels of psychological safety, revealing failure may increase chances of being framed as incompetent and powerless (Edmondson, 1996; Lee, 1997; 2002).

We therefore expect that team psychological safety moderates the relationship between creative failure and creativity. Specifically, we propose that in teams with low levels of psychological safety employees may either avoid to share failure experiences in order to evade putting themselves at risk of being socially sanctioned (cf. Milliken, Morrison and Hewlin, 2003). Conversely, we expect that employees who work in teams that are psychologically safe will openly discuss failure experiences without negative consequences. In such teams, the encouragement and social support provided by team colleagues likely serves to minimize threat-rigidity reactions and bolster employees' self-efficacy beliefs, resulting in increased creativity (Edmondson, 1999; Madjar, 2008). Thus, teams that are psychologically safe may help employees to reframe failure as an attractive challenge that spurs subsequent creative performance behavior and outcome.

Although we propose a positive moderating effect of team psychological safety on the relationship between creative failure and subsequent creative performance behavior and outcome, we do not expect this effect to be linear. Specifically, we believe that once a certain threshold of psychological safety is reached that allows an employee to reveal his or her failure experience, additional increases in psychological safety comfort the employee to reveal more personal feelings regarding his or her failure experiences—but will result in little additional effects on his or her creative performance behavior and outcome. We thus propose a diminishing positive moderating effect of psychological safety on the relationship between creative failure and subsequent creativity, such that in team environments with medium to high levels of psychological safety there will be a more positive relationship between prior creative failure and subsequent creative performance behavior and creative outcome than in teams with low level of psychological safety.

Hypothesis 1 (H1): Team psychological safety has a positive but diminishing moderating effect on the relationship between prior creative failure and subsequent (a) creative performance behavior and (b) creative outcome.

5.3.2 Interaction between Transactive Memory System and Psychological Safety

Although we expect the social support that employees receive to alleviate their ability to overcome prior creative failure for subsequent creativity, we believe that social support is not the only relevant resource that may be provided in team contexts that are sufficiently psychologically safe. Specifically, team members may not only offer encouragement and social support but also provide useable knowledge and information that may help employees to understand why creative failure occurred, and foster richer and broader perspectives on new and potentially valuable ideas. Another employee from the organization that we studied illustrated this mechanism. He reported that having suggestions rejected is particularly frustrating when it is hard to understand the fallacies that caused the submission to be rejected. He further explained that talking about the reasoning provided for the rejection with fellow team members helped him to understand the mistakes that he had made and substantially improved his subsequent submissions.

The quality of the informational support provided by team members for employees with failure experiences, however, likely also varies across teams, and may depend on how knowledge is stored within a team's collective knowledge structure. This distribution of unique knowledge across members of a team is captured by the notion of a team's transactive memory system, which refers to the shared

'meta-knowledge' of distributed expertise (i.e., of who knows what) in a team (Wegner, 1987). A transactive memory system provides a team with a system for distributing, storing and retrieving knowledge based on team members' individual areas of expertise, where team members serve each other as memory aids (Brandon and Hollingshead, 2004; Kozlowski and Ilgen, 2006: 85). A transactive memory system allows team members to access and use distributed information and expertise that they do not possess individually by locating and soliciting this information from team colleagues (e.g., Libby, Trotman and Zimmer, 1987; Faraj and Sproull, 2000). Previous research has demonstrated that groups may develop a transactive memory system to efficiently share cognitive loads (Wegner, Giuliano and Hertel, 1985; Wegner, 1987; Liang, Moreland and Argote, 1995).

Although transactive memory systems have previously been applied to team level outcomes (for reviews, see Lewis and Herndon, 2011; Ren and Argote, 2011), access to distributed expertise may similarly facilitate the development of novel ideas by individual employees (Richter et al., 2012). Specifically, employees working in teams with a well-developed transactive memory system may benefit from creative failure through provision of uniquely held information and expertise (e.g., by reviewing operating routine setups and suggesting alternative hypotheses, or by providing domain-specific advice [Larson, 2010; Lewis and Herndon, 2011]). Because a well-developed transactive memory system may serve employees to identify the causes of prior failure and thus to develop novel perspectives and insights, teams with well-developed transactive memory systems bear the potential to foster the creative activities of employees with creative failure experiences.

However, the mere availability of a well-functioning transactive memory system in and of itself may not help employees to understand the reasons for their prior creative failure and develop new perspectives on what is needed to come up with new and valuable ideas. Rather, employees will only benefit from their team's transactive memory system in learning from prior creative failure, if they reveal prior failure experiences to the team. Whether or not employees with creative failure experiences capitalize on the informational benefits of a transactive memory system will therefore depend on the level of team psychological safety realized within the team. Consequently, we propose a three-way interaction between team psychological safety, team transactive memory system and employees' prior creative failure on their subsequent creativity. Specifically, we propose that when psychological safety exceeds the threshold for employees to openly share their failure experiences, the informational benefits of a transactive memory system will have a positive moderating effect on the relationship be-

tween employees' creative failure experiences and their subsequent creative performance behavior and creative outcome.

Hypothesis 2 (H2): In teams with a sufficient level of psychological safety, the relationship between prior creative failure and subsequent (a) creative performance behavior and (b) creative outcome will be positively moderated by team's transactive memory system.

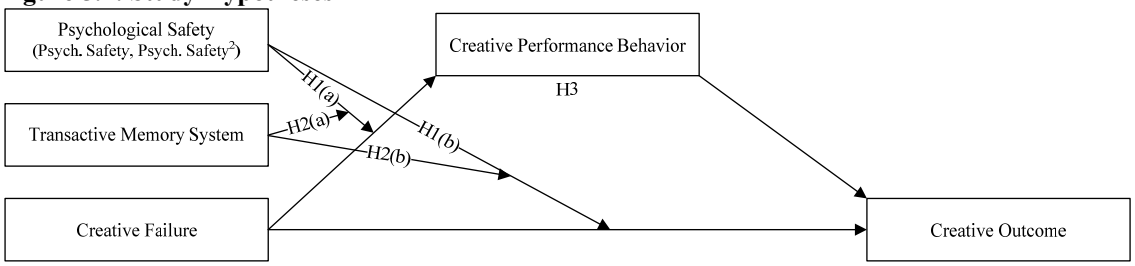
5.3.3 Mediating Effect of Creative Performance Behavior

Creative outcomes are the potential result of creative performance behavior (Amabile et al., 2005; Montag et al., 2012). We therefore expect that the interactive effects of team contextual factors and prior creative failure on creative outcome will be mediated by creative performance behavior.

Hypothesis 3 (H3): Creative performance behavior will mediate the interactive effects of psychological safety, transactive memory system, and creative failure on creative outcome.

Figure 5.1 summarizes our study hypotheses.

Figure 5.1: Study Hypotheses



5.4 Sample and Method

5.4.1 Sample Selection and Description

We collected data from one site of a large German chemical company. In line with the notion that employee creativity is crucial for firm competitiveness and survival in the chemical industry (Rammer, 2007), our sample company encourages employees to come up with creative ideas for improving products, services, and production processes by means of a suggestion system that has been in place for over thirty years. Representatives of the company told us that their suggestion system has been in place for this long time because the ideas submitted have a

significant positive economic impact for the company. All suggestions made by employees are evaluated by management representatives and representatives from the workers' council (cf. Arthur and Aiman-Smith, 2001). Accordingly, the evaluation of ideas is strictly disconnected from the suggestion submitter. Each suggestion is scrutinized through a formalized decision process that is designed to produce a rational estimate of the company's potential profit from implementing the suggestion. Employees receive the evaluation of their suggestions in their private company mail. If an idea is considered new and valuable and thus accepted for implementation, employees are rewarded by receiving a premium reflecting the idea's economic benefit for the company. Suggestions made at the time of this study were complex and included proposals about how to increase the efficiency of operating routines (e.g., to reduce the amount of mercury needed and emitted in the production process), how to increase the flexibility of site logistic routines (e.g., a change in weighting procedures for return shipments of raw materials), and how to increase the effectiveness of chemical-analysis routines (e.g., higher precision in chlorine analysis). As several employees confirmed, developing such suggestions typically takes a considerable amount of time and effort.

To ensure support for our research, we had meetings with the company's senior managers and employee representatives, presented our research design and questionnaire, and offered a summary of the main study findings upon study completion to the management. This procedure gave us access to the 51 teams comprising 299 employees working in the production and service areas of the company site under study. While production teams are responsible for running and improving chemical and other operating routines, service teams are responsible for running and improving the infrastructural routines. For example, service teams arrange the logistic activities required to transport needed raw materials to the production site and chemical products to customers.

Employee participation in our study was anonymous, voluntary, and not incentivized. In total, 267 employees (89.3% response rate) from 48 teams returned questionnaires. We used Dawson's (2003) selection rate to exclude groups with low group-level response rates from further analyses. Following earlier research (Richter et al., 2006), we chose a selection rate ([N-n]/Nn) of .32 as cut-off point, which suggests that the data from our sample correlated with true scores to .95 or higher. In total, six teams did not meet this cut-off point and were excluded from further analysis. The final sample thus included 42 production and service teams (218 respondents). On average, teams had eight members (SD = 3.25), and employees had worked on their jobs for 14 years (SD = 10.49). Respondents were on average 44 years old (SD = 9.42). 204 (94%) employees had completed pro-

fessional schooling, and 24 (11%) master craftsmen training. 196 (90%) respondents were male.

In addition to the survey, we were allowed to use archival data on the suggestions made by those employees that took part in our study. Specifically, based on a matching process employing an anonymized code issued by the company, we received information on the suggestions made by employees in a two-year timespan, as well as information on whether the suggestions were rejected or accepted, and the bonus payments that were granted for every suggestion that was accepted. For testing our hypotheses, we could thus rely on archival data indicating prior creative failure, subsequent creative performance behavior, and the resulting creative outcome, in two subsequent years (year 1, year 2). The moderators, as well as several control variables, were based on survey data that were collected in the first half of year 2. All survey items used were translated and back-translated following the procedures described by Brislin (1980). Prior to the main study, we additionally discussed the entire survey with managers and employee representatives and conducted a qualitative pre-test with employees that did not participate in the main study. This pre-test consisted of a think-aloud protocol to receive structured feedback on the validity and comprehensibility of the questionnaire (Sudman et al., 2010). Following a consultation with employee representatives, the final pen-and-paper survey was distributed to all team members by the researchers. Finally, we conducted several in-depth interviews with employees from different teams in order to cross-validate the interpretation of our findings.

5.4.2 Measures

Dependent Variables. We followed recent calls for using objective indicators of creativity (e.g., Amabile and Mueller, 2008) and relied on archival data from the firm's suggestion system to capture our dependent variables. Consistent with prior work (Oldham and Cummings, 1996; Montag et al., 2012), we measured *creative performance behavior* by counting the suggestions an employee submitted in year 2. Following Liao et al. (2010), we captured employee *creative outcome* by the sum of bonus payments employees received for accepted suggestions submitted in year 2.

Independent Variable and Moderators. To capture *creative failure*, we counted the number of rejections each employee received for his or her submissions in year 1. Following earlier research (Nembhard and Edmondson, 2006; Detert and Burris, 2007; Tucker, Nembhard and Edmondson, 2007), we relied on a shortened and context-adapted version of Edmonson's (1999) scale to assess *psycho-*

logical safety. The items we used are: "Members of this team are able to bring up problems and tough issues", "No one on this team would deliberately act in a way that undermines my efforts", "It is difficult to ask other members of this team for help (reverse-coded)", and "If you make a mistake on this team, it is often held against you (reverse-coded)" Answers ranged from 1, "strongly disagree," to 5, "strongly agree". Items formed a single scale (Cronbach's alpha = .72). We measured teams' *transactive memory system* using Lewis's (2003) 15-item scale ranging from 1, "not at all correct," to 5, "completely correct." A sample item is, "I know which team members have expertise in specific areas." Consistent with prior research (Lewis, 2004; Gino et al., 2010) the items formed a single scale (Cronbach's alpha = .78).

As psychological safety and transactive memory are both considered team-level constructs, we assessed levels of inter-rater agreement within teams, as well as significant variance between teams (Bliese, 2000). Inter-rater agreement analyses by means of median $r_{wg(j)}$ tests across teams (James, Demaree and Wolf, 1984; LeBreton and Senter, 2008) revealed adequate within-team agreement for psychological safety (.82) and transactive memory system (.95). One-way ANOVAs further revealed significant between-team variance for psychological safety ($F = 2.68$, $p = .00$) and transactive memory system ($F = 2.98$, $p = .000$). This result was confirmed by intra-class correlation coefficients for psychological safety (ICC[1] = .24, ICC[2] = .63) and transactive memory (ICC[1] = .29, ICC[2] = .66), which are acceptable for teams as small as the ones in our sample (James, 1982; Bliese, 2000; Klein et al., 2000). Overall, results suggest that the aggregation of both measures to the team level is justified.

Controls. In all analyses, we controlled for several individual and team-level variables that have previously been associated with employee creativity and team processes (see Zhou and Shalley, 2008, for an overview). At the individual level, we controlled for employees' *age*, *gender*, *job tenure*, and *risk propensity*. We measured risk propensity with a six–item scale developed by Hao et al. (2005). A sample item is: "I am willing to take significant risk if the possible rewards are high enough." Response categories ranged from 1, "strongly disagree," to 5, "strongly agree". Items formed a single scale (Cronbach's alpha = .70). Additionally, we controlled for employees' prior *creative performance behavior* and *creative outcome* by including the number of suggestions made, as well as the number of *suggestions accepted*, and the bonus payments employees received for their accepted suggestions in *year 1*.

At the team level, we controlled for *team size*, *team job tenure*, and whether the team operates in a *production or service setting*. Additionally, we included a dummy variable indicating whether the team participated in a *quality circle* project which had been introduced in the beginning of year 2, as quality circles may shift the focus from individual-level to team-level suggestions. Finally, we controlled for prior experiences with the suggestion system on a team level by including the number of team members that *submitted ideas* and the number of team members that had *ideas accepted* in *year 1*.

5.5 Results

Table 5.1 displays the descriptive statistics and correlations among individual-level (Level 1) as well as among team-level (Level 2) variables. Similar to prior research using suggestion systems with voluntary employee participation (e.g., Oldham and Cummings, 1996; Frese et al., 1999; Arthur and Aiman-Smith, 2001; Ohly et al., 2006), we find that, on average, one-third (.40 for year 1; .30 for year 2) of the employees in our sample submit a suggestion every year. Also consistent with prior research (Frese et al., 1999; Arthur and Huntley, 2005; Ohly et al., 2006), we observe that a considerable percentage of the suggestions made by employees are rejected due to insufficient newness or usefulness.

Table 5.1: Means, Standard Deviations, and Correlations

Variables	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
Level 1: Individual Level											
1. Job Tenure	13.74	10.49									
2. Age	44.30	9.42	.486**								
3. Gender	.10	.30	-.076	-.189**							
4. Risk Propensity	2.69	.75	-.065	-.138*	.078						
5. Creative Performance Behavior (yr. 1)	.40	1.22	.052	-.161*	-.085	.059					
6. Accepted Suggestions (yr. 1)	.24	.68	.040	-.143*	-.072	.061	.863**				
7. Creative Failure (yr. 1)	.14	.58	.042	-.145*	-.079	.045	.882**	.552**			
8. Creative Outcome (yr. 1)	57.80	260.17	.087	.001	-.055	-.124	.554**	.718**	.285**		
9. Creative Performance Behavior (yr. 2)	.30	.95	-.025	-.117	-.073	.075	.488**	.406**	.431**	.178**	
10. Creative Outcome (yr. 2)	54.89	354.97	-.035	-.086	-.043	-.029	.263**	.286**	.204**	.215**	.538**
Level 2: Team Level											
1. Team Size	7.76	3.25									
2. Production Team	.55	.50	-.157								
3. Team Members: Submissions (yr. 1)	.79	.65	.126	.070							
4. Team Members: Accepted Sub. (yr. 1)	.69	.64	.080	.084	.894**						
5. Quality Circle	.52	.51	.182	.187	.353*	.211					
6. Team Job Tenure	13.58	5.83	.033	-.120	.225	.185	.185				
7. Psychological Safety	4.10	.56	-.121	.211	.248	.235	.130	-.164			
8. Transactive Memory System	3.75	.36	-.079	-.101	.179	.250	-.075	-.162	.659**		

Notes: *N* employees = 218, *N* teams = 42; ** p ≤ .01 (two-tailed); * p ≤ .05 (two-tailed).

Across years 1 and 2, we observe significant correlations between our measures for creative performance behavior (r = .488, p = .00) and creative outcome (r =

.215, p = .00). This correlation suggests that including the lagged-dependent variables into our analysis may be necessary to rule out potential biases due to unobserved heterogeneity (Katila and Ahuja, 2002; King and Lenox, 2002; O'Brien, 2003). Within year 1, however, we also find strong correlations between creative failure and our lagged-dependent variable creative performance behavior (r = .882, p = .00). This correlation follows from the fact that the number of rejected submissions is a subset of the total number of submissions made by an employee in the respective year. Including such highly correlated variables in one model may potentially result in multicollinearity issues, such as large standard errors and unstable coefficients (Belsley, Kuh and Welsch, 2005; Wooldridge, 2009). While we included employees' creative performance behavior (year 1) into our analyses to address potential unobserved heterogeneity in our results, we ruled out potential instability of our results due to multicollinearity by conducting additional tests. Specifically, we followed earlier research (Echambadi, Campbell and Agarwal, 2006; Yue, Luo and Ingram, 2013) and tested for the stability of our results by re-running our models with different sets of control variables, one of which excluded creative performance behavior (year 1) and the number of team members with suggestion submissions (year 1). These additional tests clearly demonstrated that the findings presented below are stable. Also, considering that we employed a software package (HLM, version 7.01) that is particularly susceptible to multicollinearity (Choi, 2007; Aryee et al., 2008) when running all our models, we are confident that our findings are not affected by multicollinearity. Finally, we observe a significant correlation between the moderator variables addressed in our study—psychological safety and transactive memory system (r = .659, p = .00)—and thus checked for their discriminant validity by means of confirmatory factor analyses. These analyses suggest that a model with psychological safety and transactive memory as separate but correlated factors (χ^2 = 181.77, *df* = 108; TLI = .90; CFI = .94) demonstrates good overall, as well as a significantly better fit than a one-factor solution (χ^2 = 235.81, *df* = 107; TLI = .82; CFI = .90; $\Delta\chi^2$ [Δdf] = 54.04 [1]; p = .00).

To check whether our data require multilevel analyses, we examined whether significant variance in creative performance behavior and creative outcome resided between teams. We first calculated a null model and the corresponding ICC (1) (Aguinis, Gottfredson and Culpepper, 2013). Results suggest that 29 percent (ICC1 = .29, p = .01) of the variance in creative performance behavior, as well as five percent (ICC1 = .05, p = .00) of the variance in creativity, resided at the team level. We then examined whether significant between-group variance resided in the slopes describing the relationships between prior creative failure and subsequent creative performance behavior, as well as creative outcome. Such

variance would suggest examination of cross-level moderators. Results of a random-slope model analysis (Aguinis et al., 2013) revealed significant team-level variance in the creative failure-creative performance behavior slope (u_1 variance = 4.42, χ^2 [15] = 196.73, p = .00), as well as the creative failure–creative outcome slope (u_1 variance = 10.01, χ^2 [15] = 1221.90, p = .00), thus suggesting examination of cross-level interaction effects.

To test our hypotheses, we specified slopes-as-outcomes models (Hofmann, 1997), group-mean-centered individual-level variables, except for the dummy variables (Hofmann and Gavin, 1998; Enders and Tofighi, 2007), and standardized our team-level variables prior to calculating cross-level interaction terms. Following earlier research (Hirst et al., 2009; Breugst et al., 2012), we resorted to a model specification that includes linear as well as quadratic one-way and two-way interaction terms, and tested our hypotheses based on a final model for every dependent variable. This is due to three reasons: First, we hypothesized a diminishing moderating effect of team psychological safety on the relationship between prior creative failure and subsequent a) creative performance behavior and b) creative outcome. Second, we proposed a positive moderating impact of team transactive memory system provided that teams have sufficient levels of psychological safety. Third, as higher order interactions whose true effects are nonzero have to be included to avoid biasing the estimation of lower order terms (Aiken and West, 1991; Jaccard and Turrisi, 2003), we had to test our hypotheses in one model. Table 5.2 shows the models and the results of our analyses.

Table 5.2: HLM Results for Effects of Cross-Level Interactions of Psychological Safety and Transactive Memory System with Creative Failure (yr. 1) on Employee Creativity (yr. 2), Employee Creative Performance Behavior (yr. 2), and the Mediation Model

	Model 1: Creative Performance Behavior[19]		Model 2: Creative Outcome[20]		Model 3: Mediation Model	
	Coefficient	**s.e.**	**Coefficient**	**s.e.**	**Coefficient**	**s.e.**
Intercept	-2.45**	.48	.14	.20	.17	.20
Level 1 Controls						
Job Tenure	-.03	.02	.00	.00	.00	.00
Age	-.05	.03	.00	.00	.00	.00
Gender (Dummy)	-.62	.67	-.07	.07	-.05	.07
Risk Propensity	.15	.33	.01	.03	-.02	.01
Creative Outcome (yr. 1)	.00	.00	.00*	.00	.00*	.00
Creative Performance Behavior (yr. 1)	-2.44	1.97	-3.09*	1.50	-1.74**	.42
Number of Accepted Suggestions (yr. 1)	3.08	1.93	3.58**	1.35	1.84**	.42
Creative Performance Behavior (yr. 2) (Mediation)					.66**	.08
Level 1 Main Effect						
Creative Failure (yr. 1)	4.12	2.32	3.82	2.17	2.47*	.95
Level 2 Controls						
Team Size	-.06	.08	-.05*	.03	-.05**	.02
Production Team	-.81	.52	.56*	.24	.23	.16
Team Members: Submissions (yr. 1)	.44	.57	.16	.20	.67*	.25
Team Members: Accepted Suggestions (yr. 1)	.25	.46	.13	.16	-.39*	.16
Quality Circle (Dummy)	.32	.52	-.30	.19	.00	.11
Team Job Tenure	-.08	.05	.04	.02	.03*	.01
Psychological Safety	2.10	1.13	.40	.27	.14	.31
Psychological Safety²	-.04	.39	-.29	.16	-.12	.16
Transactive Memory System	-1.70	.99	.40	.39	.28	.26
Two-Way Interaction Terms						
Psychological Safety x Transactive Memory System	.15	.37	.03	.12	-.12	.15
Psychological Safety² x Transactive Memory System	-.22	.35	-.24*	.12	-.12	.12
Creative Failure (yr. 1) x Psychological Safety	9.74*	3.89	4.66*	1.89	.08	1.48
Creative Failure (yr. 1) x Psychological Safety²	-4.05*	1.82	-1.90*	.94	-.59	.73
Creative Failure (yr. 1) x Transactive Memory System	2.02	3.77	3.38	2.51	2.41	1.38
Three-Way Interaction Terms						
Creative Failure (yr. 1) x Psychological Safety x Transactive Memory System	2.50*	1.22	1.41*	.60	.35	.51
Creative Failure (yr. 1) x Psychological Safety² x Transactive Memory System	-1.91*	.78	-1.44*	.69	-.64	.50

Notes: ** $p \leq .01$ (two-tailed); * $p \leq .05$ (two-tailed).

Hypothesis 1. Hypothesis 1 (a) proposed that psychological safety has a positive, but diminishing moderating effect on the relationship between prior creative failure and subsequent creative performance behavior (Hypothesis 1 [a]) and creative outcome (Hypothesis 1 [b]). In support of our hypotheses, Table 5.2 reveals a significant positive effect of the interaction between psychological safety and prior creative failure on subsequent creative performance behavior ($\gamma = 9.74$, $p = .02$, Model 1), whereas the effect of the interaction between psychological safety² and prior creative failure is negative and significant ($\gamma = -4.05$, $p = .03$, Model 1).

[19] To estimate Model 2, we used a Poisson sampling model with log-link function and constant exposure (Raudenbush and Bryk, 2001) and allowed for the estimation of a level-1 dispersion parameter, because our measure for creative performance behavior is a count variable whose variance is smaller than assumed by the traditional Poisson distribution (Gardner, Mulvey and Shaw, 1995).

[20] To increase the interpretability of our results, we standardized the creative outcome (yr. 2) before testing our hypotheses (Liao et al., 2010).

Similarly, Table 5.2 reveals a significant positive effect of the interaction between psychological safety and prior creative failure on subsequent creative outcome ($\gamma = 4.66$, $p = .02$, Model 2), whereas the effect of the interaction between psychological safety² and prior creative failure is negative and significant ($\gamma = -1.90$, $p = .05$, Model 2). Thus, Hypothesis 1 (a) and 1 (b) were supported.

Table 5.3: Results of Simple Slope Analyses for Hypothesis 1

		Creative Performance Behavior	Creative Outcome
		Simple Slope	*Simple Slope*
Psychological Safety	Low	-5.39^{+}	-.69
	Medium	4.12*	3.82*
	High	5.53*	4.53*

Notes: * $p \leq .05$ (one-tailed); $^{+}$ $p \leq .10$ (one-tailed).

We further analyzed these findings by means of simple slope analyses (Aiken and West, 1991; Preacher, Curran and Bauer, 2006). As depicted in Table 5.3, these analyses provided additional support for Hypotheses 1 (a) and 1 (b). Simple slope analyses revealed significant positive relationships between prior creative failure and subsequent creative performance behavior, as well as creative outcome, at medium and high levels of team psychological safety. In contrast, we did not find a positive relationship between prior creative failure and subsequent creative performance behavior or subsequent creative outcome under conditions of low psychological safety. Figures 5.2 and 5.3 provide illustrative plots for our simple slope analyses.

Figure 5.2: Interaction of Creative Failure (yr. 1) and Creative Performance Behavior (yr. 2) in Teams at Low, Medium and High Psychological Safety

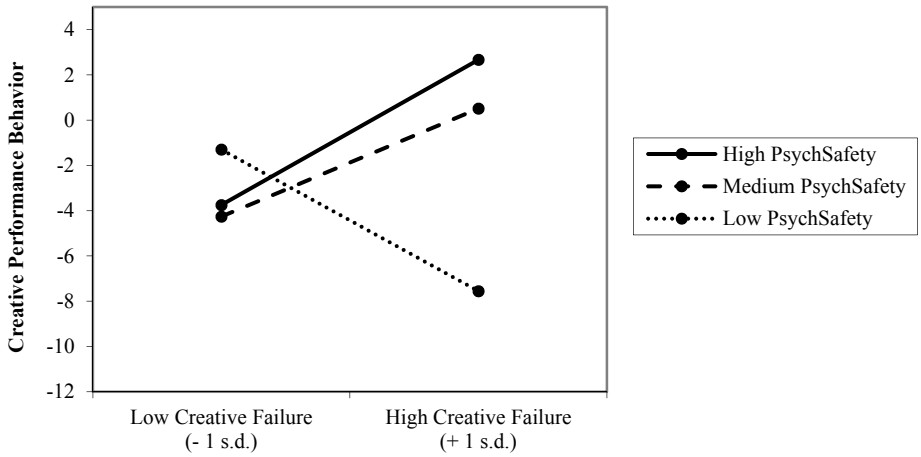
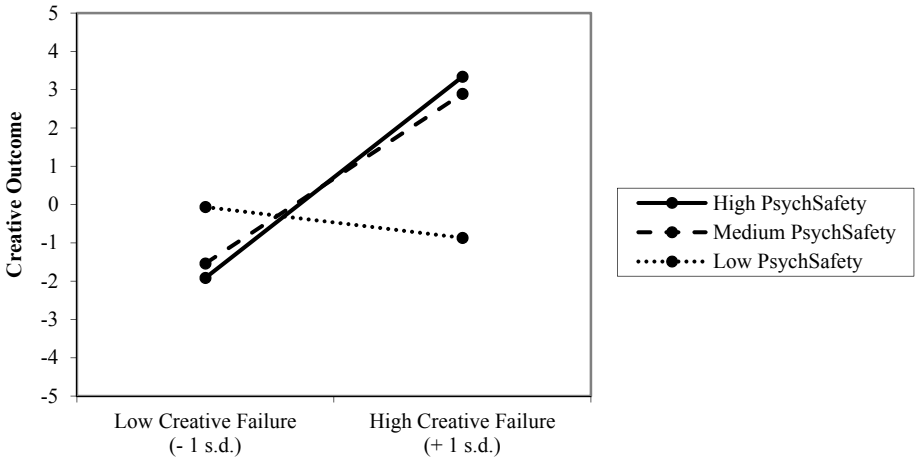


Figure 5.3: Interaction of Creative Failure (yr. 1) and Creative Outcome (yr. 2) in Teams at Low, Medium and High Psychological Safety



Hypothesis 2. Hypothesis 2 stated that team transactive memory system has a positive moderating effect on the relationship between prior creative failure and creative performance behavior (Hypothesis 2 [a]) and creative outcome (Hypothesis 2 [b]) when team psychological safety exceeds the threshold for revealing failure. Table 5.2 provides first evidence for these hypotheses. Specifically, our analyses reveal a significant positive effect of the three-way-interaction term that includes prior creative failure, team psychological safety and transactive memory system on subsequent creative performance behavior ($\gamma = 2.50$, $p = .05$, Model 1), and on creative outcome ($\gamma = 1.41$, $p = .03$, Model 2). Additionally, our analyses reveal significant negative effects of the quadratic three-way interaction term comprising prior creative failure, team psychological safety², and team transactive memory system on creative performance behavior ($\gamma = -1.91$, $p = .02$, Model 1), as well as on creative outcome ($\gamma = -1.44$, $p = .05$, Model 2).

We further probed Hypotheses 2 (a) and (b) by means of simple interaction and simple slope analyses (Cohen et al., 2003; Richter et al., 2012). As depicted in Table 5.4, these analyses do not confirm Hypothesis 2(a) but provide confirming evidence for Hypothesis 2 (b).

Table 5.4: Results of Simple Interaction and Simple Slope Analyses for Hypothesis 2

			Creative Performance Behavior (yr. 2)		**Creative Outcome (yr. 2)**	
			Simple Interaction	*Simple Slope*	*Simple Interaction*	*Simple Slope*
Psychological Safety	Low	Low *TMS*	-10.15^{+}	-1.72	-4.48*	.93
		High *TMS*		-9.06^{+}		-2.32
	Medium	Low *TMS*	2.02	3.38^{+}	3.38^{+}	2.59*
		High *TMS*		4.85^{+}		5.05*
	High	Low *TMS*	3.64	4.21*	3.29*	3.34*
		High *TMS*		6.86^{+}		5.72*

Notes: * $p \leq .05$ (one-tailed); $^{+}$ $p \leq .10$. (one-tailed).

Specifically, we did not observe significant moderating effects of transactive memory system on the relationship between prior creative failure and subsequent creative performance behavior at medium or high levels of psychological safety (Hypothesis 2 [a]), but (marginally) significant positive moderating effects of transactive memory system on the relationship between prior creative failure and subsequent creative outcome at medium, and high levels of psychological safety (Hypothesis 2 [b]). As depicted in Table 5.4, as well as Figures 5.4 and 5.5, these results are supported by simple slope analyses.

Figure 5.4: Interaction of Creative Failure (yr. 1), Transactive Memory System (TMS) and Psychological Safety on Creative Performance Behavior (yr. 2)

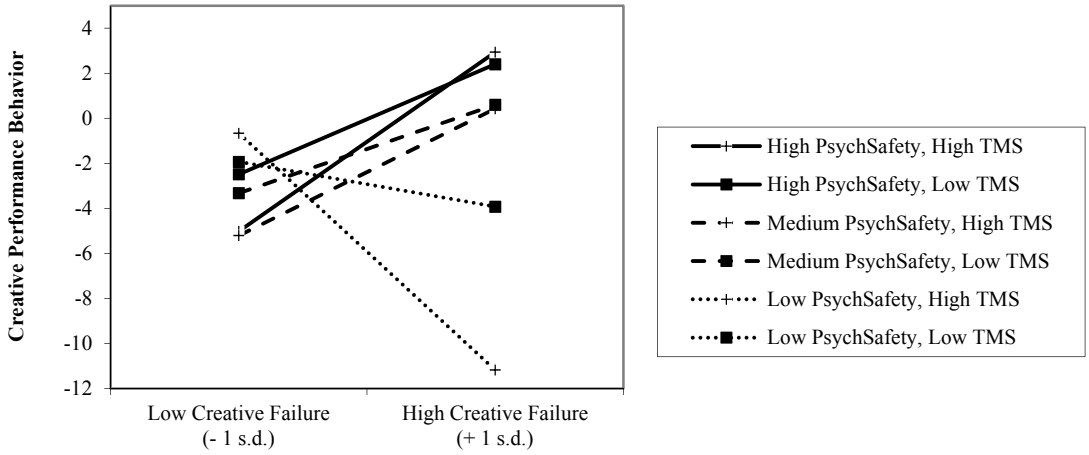
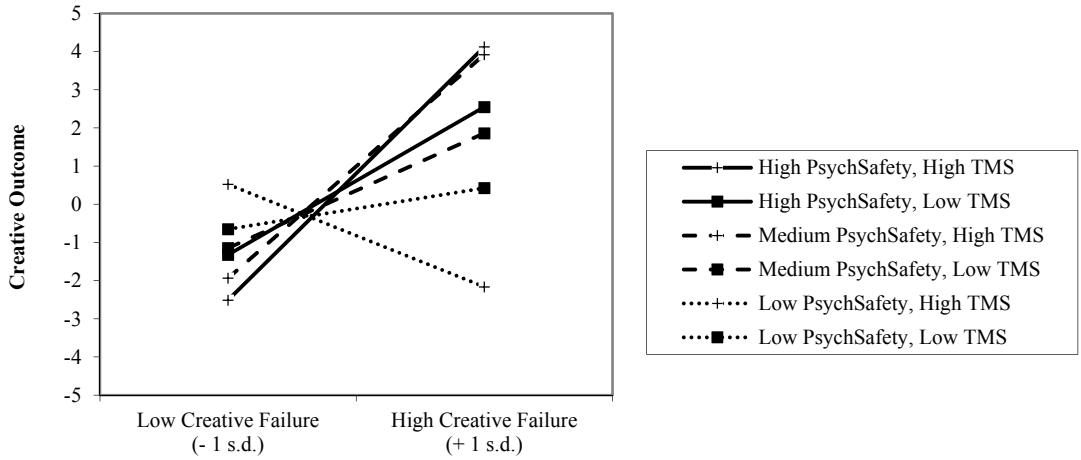


Figure 5.5: Interaction of Creative Failure (yr. 1), Transactive Memory System (TMS) and Psychological Safety on Creative Outcome (yr. 2)



Interestingly, simple interaction analyses also reveal (marginally) significant negative moderating effects of transactive memory system on the relationship between prior creative failure and subsequent creative performance behavior, as

well as on the relationship between prior creative failure and subsequent creative outcome at a low level of psychological safety, which are also confirmed by simple slope analyses. We return to this unexpected finding in the discussion section.

Hypothesis 3. Hypothesis 3 stated that creative performance behavior will mediate the effects proposed by our first two hypotheses. We tested this mediation hypothesis by adopting the procedure described by Mathieu and Taylor (2007). The first two criteria demand that the hypothesized effects are significant for the mediator as well as the dependent variable. As demonstrated above, both criteria are met by our data. The third and fourth criteria required for a mediation effect are also met. Specifically, the mediation model (Table 5.2, Model 3) reveals a significant relationship ($\gamma = .66$, $p = .00$), between creative performance behavior, our mediator, and creative outcome, our dependent variable (criterion 3). Furthermore, we find that the previously significant two-way interaction effects of prior creative failure and psychological safety ($\gamma = .08$, $p = .96$), prior creative failure and psychological safety² ($\gamma = -.59$, $p = .42$), as well as the three-way interaction effects comprising prior creative failure, psychological safety, and transactive memory system ($\gamma = .35$, $p = .50$), and prior creative failure, psychological safety², and transactive memory system ($\gamma = -.64$, $p = .20$) are substantially reduced in magnitude and become non-significant, when entering creative performance behavior—our mediator—to the equation (criterion 4).

Following earlier research (Van Der Vegt and Bunderson, 2005; Cho and Hambrick, 2006; Bakker and Xanthopoulou, 2009), we cross-verified this result by applying Sobel (1982) tests. Confirming our mediation hypothesis, Sobel tests revealed significant indirect effects of our interaction terms on creative outcome that are mediated by creative performance behavior. Specifically, we found significant indirect effects for the interaction terms comprising prior creative failure and psychological safety ($Z = 2.45$, $p = .01$), prior creative failure and psychological safety² ($Z = -2.02$, $p = .04$), creative failure, psychological safety, and transactive memory system ($Z = 2.32$, $p = .02$), and prior creative failure, psychological safety², and transactive memory system ($\gamma = -2.07$, $p = .04$) on creative outcome that are mediated by creative performance behavior.

5.6 Discussion

In support of our hypotheses, the results of our analyses paint a picture of how team resources may help employees to overcome creative failure for sustained creativity. Specifically, the creativity of employees with failure experiences benefited from teams with medium to high levels of psychological safety. As pro-

posed, we additionally observe that in teams with a sufficient level of psychological safety for revealing failure, employee creative outcome was further enhanced by the distributed expertise across employees' fellow team members. These findings have implications for theory and practice concerning employee creativity in team contexts.

5.6.1 Theoretical Implications

Although failure is a common experience for employees who engage in the risky and uncertain nature of creative activity, prior research has barely focused on the impact that creative failure may have on employees' subsequent creative performance behavior or outcome. As such, our research contributes first and foremost to the literature on creativity. By showing that a team's socio-emotional and informational resources shape the relationship between creative failure and creativity, we highlight the importance of the social context for employees to overcome creative failure. Given the importance of the social context for the creative failure-creativity relationship, an interesting extension of this work may be to examine the role of employees' social network relations with colleagues inside or outside their teams (e.g., Perry-Smith, 2006) to overcome creative failure for sustained creativity.

Although this research has been concerned with creative failure in particular, we believe our findings may similarly inform research on failure in other content domains, such as failure to reach performance targets (Shepherd, Patzelt and Wolfe, 2011). Specifically, our findings point to the relevance that resources within the proximal team environment may have for employees who seek to improve their performance after failure experiences. Because previous studies have been overly concerned with individual difference variables at the expense of contextual variables (e.g., Bélanger et al., 2013), failure research may benefit from consideration of team contextual variables that may affect the failure – performance relationship.

Our study also more directly contributes to research on team psychological safety and transactive memory systems. Prior studies have predominantly focused on examining the effects of both team level constructs on collective team level outcomes (e.g., Edmondson, 1999; Ren and Argote, 2011), and thereby neglected how shared team environments influence processes and outcomes on an individual level. By showing that employees in team environments that differ with respect to psychological safety and team transactive memory system differ in their responses to creative failure, we illustrate how employees may benefit from team socio-emotional and informational resources. Future research on teams and crea-

tivity may similarly adopt such a person-in-situation perspective to employee creativity (cf. Hirst et al., 2009; Hirst et al., 2011) in order to facilitate our understanding of the complex interplay between individual differences and the team context. Conversely, future research on transactive memory system and psychological safety may more explicitly consider differential effects on individual employees.

Before we discuss the managerial implications of our findings, we additionally like to zoom in on the unexpected finding that transactive memory systems negatively affected creative performance behavior and creative outcome at low levels of psychological safety. A plausible post-hoc explanation of this finding could be that in work teams with high levels of distributed knowledge, the ability of employees to cope with failure rests to an even larger extent on the informational resources provided by colleagues. In a situation characterized by a low level of team psychological safety, which prevents employees from capitalizing on team informational resources, this may further decrease the probability that employees overcome prior creative failure for subsequent creativity. This finding points to an underexplored direction for future research, namely the conditions under which transactive memory systems can have detrimental effects on employee outcomes.

5.6.2 Managerial Implications

Managing creativity in organizations bears the challenge to keep employees motivated to stay creative in the face of prior creative failure. The present study provides clear managerial advice with respect to the design of work teams for enhanced employee creativity. Our results suggest that managers should create sufficiently high levels of psychological safety within their teams, in order to facilitate the creative efforts of those employees who experienced creative failure. Moreover, our findings suggest that creating a well-functioning transactive memory system in and of itself may not be enough to spur the creativity of employees with failure experiences. Rather, managers should be aware of the necessity to develop both their team's socio-emotional and informational resources to optimally support the creative efforts of their employees.

5.7 Conclusion and Limitations

Overall, we believe that the current study has several strengths that help to provide a reasonable test for our hypotheses. First, we drew on multiple data-sources (survey and archival data) in measuring key study variables, which minimizes common source biases (Podsakoff et al., 2003). Second and related, we drew on

objective indicators of creativity (Montag et al., 2012) in order to eliminate rater biases that are common in creativity research (Amabile and Mueller, 2008). Third, drawing on a longitudinal design allowed us to rule out potential endogeneity issues related to reverse causality and unobserved heterogeneity thus providing us with greater confidence with respect to the causal interpretation of our results than conventional cross-sectional designs do (cf. Shadish, Campbell and Cook, 2010). And finally, we tested our conceptual model using appropriate analytical methods that matched the nested and multilevel nature of our data. Despite these notable strengths, our study has some limitations that point to additional avenues for future research.

Although desirable, it was not possible for us to gather information regarding the type of creative failure that caused idea acceptances or rejections. As such, we were not able to analyze whether failure characteristics (e.g., ignorance of operating routine interdependencies or ignorance of technical properties) might have spurred or thwarted employees' subsequent engagement in creative performance behavior. Furthermore, the company we studied communicated creative failure using private letters exclusively. Future research may examine characteristics of the feedback media used to transmit messages on creative failure (e.g., personal communication or private letters). Complementing our research that focused on the role of team resources for overcoming creative failure, and accounted for (unobserved) individual differences by controlling for employees' risk propensity and including measures for lagged creativity in the analyses, further research might also shed more light on the potential role of individual-level variables for the relationship between prior creative failure and subsequent creativity. Specifically, it might be fruitful to empirically address the role of affect and creative self-efficacy as potential mediators of the relationship between prior creative failure and subsequent creativity.

Creative failure is inherent to the risky and uncertain nature of creative activity. Our findings suggest that creative failure may either spur or thwart subsequent creative performance behavior and outcome, subject to the socio-emotional and informational resources available in employees' proximal work teams. As such, our research provides scholars and managers with new insights regarding how creative failure can be turned into creative performance behavior and outcome.

6 How Managers Talk about their Consumption of Popular Management Concepts: Identity, Rules, and Situations

6.1 Introduction

Managers are routine users of popular management concepts[21] such as Total Quality Management and Lean Production (Watson, 1994; Abrahamson, 1996; Kieser, 1997). Their engagement with abundant yet ambiguous advice dates back (at least) to the early consultant models of Frederick Winslow Taylor (1911) (cf. George, 1972). Ever since, popular concepts have been promoted as well-tested principles of good management (Kieser, 1997). Reports of increased organizational performance following concept adoption (cf. Womack, Jones and Roos, 1990; Hammer and Champy, 1993; Siebers et al., 2008), as well as the international diffusion and transient popularity of concepts (Abrahamson and Fairchild, 1999), sparked an extensive research interest over the last few decades (Clark, 2004; Heusinkveld et al., 2011). Early research in particular centered on managers' motives for adopting popular ideas (Abrahamson, 1996; Bikhchandani, Hirshleifer and Welch, 1998; Strang and Macy, 2001; Sturdy, 2004).

While this research has significantly advanced our understanding of why managers adopt popular concepts, we still know little about what happens to popular concepts after they have been adopted by an organization (Heusinkveld et al., 2011; Røvik, 2011). In observing this shortcoming, researchers recently shifted their attention towards the consumption and usage of popular concepts within organizations (e.g., Gabriel, 2002; Nicolai and Dautwiz, 2010; Corbett-Etchevers and Mounoud, 2011). These researchers are particularly interested in depicting concept consumers as "involving a variety of different groups with their own specific backgrounds, local problems and interests" (Heusinkveld et al., 2011: 144). Focusing on the consumption of concepts moves the actors responsible for the enactment of a popular concept within an organization to the forefront of inquiry (cf. Corbett-Etchevers and Mounoud, 2011). We contribute to this emerging stream of research by analyzing the discourses that result when managers talk about how popular management concepts are enacted within their organizations. While consuming concepts involves many actors within an organization, our study focuses on managerial discourses. Managers are not only held responsible for what happens with popular concepts after their adoption, but also have to ac-

[21] Throughout this chapter, we refrain from applying the term "management fashion". Because our work does not build on the sociology of fashion, we chose to use the more neutral term "popular management concept".

count for the consumption of concepts to a wide audience of stakeholders. Managerial accounts therefore provide a promising vantage point from which to explore the local problems and interests that underlie the consumption of popular concepts within organizations. This chapter makes two contributions to the research on popular management concepts. First, we establish the logic of appropriateness as a fruitful perspective for understanding the underlying rationale for the managerial consumption of concepts. The logic of appropriateness explains human reasoning based on matching actions to situations by means of identity-based rules (March and Olsen, 1989; March, 1994). We argue that this perspective on human reasoning is capable of incorporating the local translation of popular concepts (Czarniawska and Sevón, 2005) and accurately reflects the indeterminateness of organizational change following the adoption of popular concepts (March, 1981). When studying the consumption of concepts, the logic of appropriateness therefore seems superior to the deterministic logic of consequence perspective on human reasoning—a perspective that still dominates management literature.

Second, we provide a better understanding of how managers account for concept consumption. We do so by presenting and analyzing four discourses that we identified after conducting an empirical inquiry among top managers in Germany. In applying the logic of appropriateness to these data, we find that these narratives are based on norms of managerial identity and socially defined rules about how rationality is realized in typical management situations. These findings urge researchers to pay close attention to the central yet situational character of managerial rationality when studying the consumption of concepts. Hence, by pursuing the appropriateness perspective, we provide a broader view than does existing research about the rationales that circumstantiate the managerial consumption of concepts.

6.2 Theory: Managers' Rationales for Consuming Popular Concepts

How do managers rationalize, to themselves and others, their consumption of popular management concepts? To answer this question, researchers sometimes apply theories that can be summarized as following a logic of consequence (cf. March, 1994: 2). This perspective suggests that managers act based on the anticipated consequences of alternative choices: the logic of their actions is assumed to be consequential and preference based. Seen from this perspective, managers explain, or rationalize, their consumption of management concepts based on the advantageous consequences that are expected to result from their proper imple-

mentation. Being an alleged source of superior management techniques, these popular concepts suggest that, when applied properly, they can close performance gaps of an organization (Teece, 1980; Abrahamson, 1996; Jackson, 2001). Social scientists often support this notion, providing mostly quantitative evidence that specific concepts "undoubtedly ma[k]e a contribution to the rationalization of managerial practice" (Nicolai and Röbken, 2005: 418). For example, Huselid (1995) argues, based on a sample of nearly 1000 firms, that concepts related to high performance work practices have a significant positive influence on corporate financial performance and employee metrics such as turnover and productivity. Seemingly "backed up by rigorous research but also company practice" (Clark and Greatbatch, 2004: 413), popular concepts are designed to appeal to a consequential approach to management (cf. Røvik, 2002; Heusinkveld, 2004; Sturdy, 2004). Theories applying a logic of consequence do not neglect the notion that concepts have to be implemented in the organization before taking effect—but from a consequential perspective, the implementation of a management concept is foremost a matter of aggregating the individual and group interests affected by the concept via processes such as bargaining and coalition formation (cf. March and Olsen, 1989; March and Olsen, 1998).

While research following the logic of consequence perspective on human behavior offers valuable insights into the adoption and usage of popular concepts in a parsimonious way (e.g., Bikhchandani, Hirshleifer and Welch, 1992; Bloom and Van Reenen, 2007), we think that the assumption of consequential models of managerial behavior unduly limits our understanding of the managerial reasoning behind concept consumption. While most managers are indeed used to "explain[ing] their own actions in terms of their alternatives and the consequences of those alternatives for their preferences" (March, 1994: 3), we doubt that managers' consumption of popular concepts can be adequately understood without further considering the social context in which the concept is put into use. Context matters when exploring managers' consumption of popular concepts, and we believe there are at least two related arguments that support our assertion. First, management concepts cannot be installed and put to use like machinery. There is always a need for what Czarniawska and Joerges (1996) call "local translation": management concepts require local adaptation to the particular needs of an organization (Benders and Van Veen, 2001). Empirical evidence for the translation and adaptation of concepts is provided by Røvik (1996) and Giroux (2006), who investigate the changing meaning of concepts as they travel in and out of organizations, how the content of an idea changes when it moves from one context to another and how it changes over time. Even if most people in an organization share a relatively homogeneous understanding about the core of a concept, the

actual use of a concept differs according to the situation in which it is applied (Nicolai and Dautwiz, 2010). If the practices constituting a legitimate enactment of a popular concept vary over time, between and even within organizations, it remains quite unclear which iteration represents the concept. In other words, if managers can customize and adapt the elements of a management concept, and do so differently within an organization, it becomes difficult to objectively measure and compare outcomes, such as costs and benefits. In such situations, this information can only be collected and evaluated for the manager's immediate scope of supervision where the popular concept is put to use. The need to translate and adapt a popular concept to a specific context in order to be able to judge its consequences is at cross-purposes with a logic of consequence, where a popular concept is assumed to consist of a fixed set of specific practices ("superior management techniques") that allow a manager to account for his or her consumption of a popular concept on the basis of standardized means–end relationships.

The second reason that context matters is that the way a popular concept is actually put to use in an organization is to a large extent outside a manager's control (cf. Brunsson and Olsen, 1997). In this regard, research on organizational change and innovation has shown that "[organizations] rarely change in a way that fulfills the intentions of a particular group of actors" (March, 1981: 563). While processes of aggregating individual and group interests might shape the initial decision to adopt a popular concept (as suggested by the logic of consequence), "many uncertainties cannot be resolved until an innovation actually has been tried in practice" (Nelson and Winter, 1977: 61). Instead of following the wishes and intentions of management, the people engaged in the routines of the organization shape the use of these concepts when they carry out their daily tasks (Lozeau et al., 2002; Feldman and Pentland, 2003). Feldman (2004) provides an illuminating case study on the limits of managerial intentionality when implementing organizational change. She analyzed a managerially driven intervention in an existing organizational routine where "there was a high degree of readiness and, indeed, enthusiasm for the change" (ibid: 306). Nevertheless, the managerial intentions as described in her case failed to materialize because resistance to change emerged when "the consequences of the change [...] became apparent gradually over several years" (ibid). This study suggests that even though change might be welcome, repeated patterns of interaction seldom change according to managerial intentions. How a popular concept is put to use in an organization in the long run is less about aggregating individual and group interests of those affected by the change than it is the result of collective evolutionary processes whose outcomes can hardly be determined by the manager (cf. Van de Ven and

Sun, 2011). As a result, we suggest that managers are less mechanical at implementing and using concepts in the way that the logic of consequence requires.

Taken together, we argue that a logic of consequence as a perspective for interpreting managerial accounts for consuming concepts is limiting because it overestimates the influence that managers have on the actual use of a concept within the organization. Furthermore, this interpretation is blind to the need for "custom adaptation, domestication and reconfiguration to make them [popular concepts] meaningful and suitable within specific organizational contexts" (Ansari et al., 2010: 67f.). The managerial consumption of popular concepts thus seems to be subject to the same complex social processes and heterodox influences that characterize all managerial behavior (Cohen, March and Olsen, 1972; Mintzberg, 2004; Nicolai and Dautwiz, 2010). Interpreting the consumption of concepts as following a logic of consequence does not adequately address the complexities of managing. Thus, we argue that the logic of appropriateness is a more suitable explanation for elucidating the rationales for consuming popular management concepts because it takes account of the social context in which managers act. Interpreting managers' rationales using the logic of appropriateness framework does not view these accounts as based on exogenous preferences and calculated consequences as a logic of consequence does, but rather as matching rationales to situations by means of identity-based rules (cf. March, 1994). Seen from this perspective, accounts draw on necessity, not preference (March and Olsen, 1989; Messick, 1999). In illustrating this alternative approach to human reason, March and Olsen (2008: 689) suggest that actors are driven by rules of appropriate or exemplary behavior, organized into institutions. The appropriateness of rules includes both cognitive and normative components (March and Olsen, 1995: 30-31). Rules are followed because they are seen as natural, rightful, expected, and legitimate. Actors seek to fulfill the obligations encapsulated in a role, an identity, a membership in a political community or group, and the ethos, practices and expectations of its institutions. Embedded in a social collectivity, they do what they see as appropriate for themselves in a specific type of situation. Following this kind of reasoning, the situation faced by an actor guides the set of possible and appropriate accounts given the identity that an actor follows. By placing the individual in a social context, the appropriateness perspective highlights the interaction between situational factors and the identity an actor adopts. Therefore, the logic of appropriateness is better able to capture the complex social context managers deal with than is the logic of consequence. Identity—the core around which the self of an individual is organized—provides the conceptual basis of the

logic of appropriateness framework (March, 1994: 62).[22] Adopting an identity implies imposing a socially constructed order upon one's self: "identities and their contentions come all wrapped in larger structures and processes that predate them" (White, 1992: 6). Such larger structures and processes are, for example, socially defined roles that shape what pertains to a specific identity an individual decides to follow (March, 1994; Weber, Kopelman and Messick, 2004). Such socially defined roles "create expectations about how a person or group of people ought to think, feel, and behave. They tend to be defined externally (e.g. in formal job descriptions or informal codes of conduct) but are internalized by individual group members [...]" (Haslam, 2001: 2). While there are business schools and job descriptions for managers, management is neither science nor profession, but rather a craft; hence the social expectations connected to a managerial identity are learned on the basis of social interaction and management experience (cf. Mintzberg, 2004; Khurana, 2007). People following the identity of a manager are expected to be rational (Townley, 2002). Rationality is the basic social criterion a manager must comply with (Kärreman, Sveningsson and Alvesson, 2002; Cabantous, Gond and Johnson-Cramer, 2008). From the logic of consequence perspective, rationality is related to universal communication, measurability, predictability and controllability (Van Hees and Verweel, 2006: 16). However, viewed from the logic of appropriateness perspective, rationality is a matter of language, not of calculation (March and Olsen, 2008: 691). Managers are accepted as rational actors when they are able to account for their actions in a convincing manner (Weick and Browning, 1986; Czarniawska-Joerges, 1997). Effective managers are therefore able to replace uncertainty and not-knowing by certainty and knowing (Streatfield, 2001: 127). Through such discursive processes of "differentiating, fixing, naming, labeling, classifying, and relating" (Chia, 2000: 513) organizational rules, strategies and actions come into existence (Weick, 2004; Abolafia, 2010).

Being able to effectively use language to account for managerial action is anything but trivial, given that management is about "the messy stuff—the intractable problems, the complicated connections [...]" (Mintzberg, 2004: 13). While managers are ideally expected to have things "under control" and to evaluate themselves as well as their peers using such rational norms, the ideal is widely sought but rarely attained (Koot, 2006: 116). The situations managers face in their daily work challenge managers because these situations are often unclear,

[22] Identity theory in itself is a complex and large field of research in organization studies (for an overview see Alvesson, Ashcraft and Thomas, 2008). As we focus on analyzing managers' accounts for the consumption of management concepts by the logic of appropriateness, we focus on the research closely related to March's (1994) notion (for a critical review of the logic of appropriateness, see Goldmann [2005] ; Sending [2002]).

unstable or contradictory (Jackall, 1988; Watson, 1994; Thomas and Linstead, 2002). There is no single line of argument that managers can rely on, as "no discourse is sufficiently strongly backed up by material and social support to offer a powerful grip over the subject" (Sveningsson and Alvesson, 2003: 1167). Against this backdrop, we argue that managerial narratives provide a suitable pathway to analyze how managers account for the consumption of concepts, because "giving voice to the perspectives and practices of consumers may reveal more of their roles, discourses and logics and of how management ideas are part of the social world of organizations more generally (Gabriel, 2002)" (Heusinkveld et al., 2011: 142).

6.3 Sample and Method

Because research on popular management concepts to date has not broadly elaborated on the consumption of popular concepts within organizations, we conducted an exploratory study. We adopt an interpretative perspective in order to step into the managerial frames of reference and better understand concept consumption (Golden-Biddle and Locke, 2006; Yanow, 2006). As a method of data collection, we interviewed managers, visited their offices and production sites, and collected promotional and other material. While interviews are a widely accepted approach to data collection in interpretive studies, they are always laden with expectations and interests of both interviewer and interviewee (Alvesson, 2003). Although we approached our interview partners with a knowledge-producing logic that was influenced by our prior reading of management concepts literature, we strictly avoided any statements indicating our theoretical approach as researchers. A guideline structured our loosely framed, yet issue-focused interviews. Our interviews began with questions designed to gather information about the individual respondent and his or her general understanding of management concepts. (For example, one of our questions was, "Are you familiar with the term 'management concept'?" If yes, we followed up with the question, "What does this term mean to you?") By raising such questions, we ensured that our interviewees shared a sufficient common understanding of the relevant construct in our inquiry. Also, we were interested in the general application of management concepts within the manager's organization. (For example, we asked, "Which management concepts have been introduced under your supervision?", "What functional elements did the concept entail?" and "When did the implementation process commence?") While the guideline was designed for the interviewer to give him a rough frame of reference for a guided conversation, all interviews were conducted in a very open manner. Thereby we sought to stimulate the interviewees to engage in the process of accessing narratives about their experiences

in consuming popular concepts. To reduce common errors introduced by narrations, our questions focused on past facts and behavior (Golden, 1992). As Burke (1950) reminds us, it is hardly possible to ask people about their general motives for a certain behavior, as peoples' motives vary from context to context and from time to time.[23] Accordingly, we only investigated what people state about their motives with reference to a particular time and context. To do so, we used a last-incident approach. Hence, our questions focused on the last management concept introduced under the interviewee's command.[24] We did not impose any further restrictions upon the participants regarding the management concepts they would be questioned about. We also assured the interviewees of their complete anonymity and acknowledged that all identifying information was to be removed upon transcription of the interviews. All interviews were conducted in German, the native language of the interviewer and all interviewees. We selected experienced top managers as interview partners, most of whom had two to three decades of management experience. In view of their seniority, we expected them to be knowledgeable and experienced with regard to management concepts. We decided to allow considerable spread in terms of company size and location. Also, our sample included a broad range of professional training qualifications (business degrees in human resources, finance and accounting; doctors of chemistry; and engineers). In this way, we attempted to ensure that our data reflected the interviewees' identity as managers and was not simply the consequence of training in business administration or limited to a particular industry and company size. Table 6.1 provides an overview of the interviews we conducted.

Table 6.1: Description of Interview Data

Nr.	Interviewee	Industry	Employees (approx.)	Management Concept
01	General Manager	Automotive	350	Lean Production
02	Head of Human Resources	Chemicals	600	Management by objectives
03	Head of Human Resources	Consumables	650	Management by objectives
04	Head of Procurement	Consumables	400	ISO 9000
05	General Manager	Automotive	200	ISO 9000
06	Head of Human Resources	Synthetics	250	Lean Production
07	Head of Human Resources	Chemicals	900	Management by objectives
08	General Manager	Synthetics	200	ISO 9000
09	Head of Human Resources	Pharmacy	11,000	Management by objectives
10	Operations Manager*	Chemicals	95,000	Value driver Concept
11	Operations Manager*	Chemicals	95,000	Value driver Concept
12	Operations Manager*	Chemicals	95,000	Value driver Concept
13	Operations Manager*	Chemicals	95,000	Value driver Concept

Note: An asterisk (*) denotes interviewees who worked for the same company group but were responsible for different departments.

[23] We thank one of the reviewers for pointing out this critical issue to us.

[24] While this approach implied that every interviewee had recent and direct experience with using the concept about which he or she was questioned, we received accounts of different management concepts.

Each of these 13 interviews lasted about an hour and a half and was taped and transcribed shortly after to ensure reliability (Eisenhardt, 1989). While these data represent an important source for our inquiry, we also conducted site visits and, whenever possible, collected artifacts related to the enactment of the management concept in the organization (e.g., booklets distributed among the employees). Data were also collected in more informal conversations, e.g. over lunch. The initial step of analyzing our interview data was done by coding about 400 pages of transcript using both inductive and deductive approaches (Eisenhardt and Graebner, 2007). While our inductive approach focused on developing themes and grouping managerial discourses around how managers account for their consumption of popular management concepts, our deductive approach was guided by our interest in the manager's identity as someone who exerts control over organizations by rational means. Following the method suggested by Ernst and Kieser (2002), who together investigated the concept of control in a management consulting context, our deductive approach was based on an established category scheme developed in control psychology by Rothbaum, Weisz and Snyder (1982). Alternating between our deductive scheme and our data, we developed themes and codes that allowed us to categorize findings (Miles and Huberman, 1994). In the course of analyzing the data and theorizing about its meaning, our focus shifted from control psychology to the consumption of popular concepts. In doing so, we turned to the literature on narratives to develop managerial discourse categories on popular-concept consumption (Czarniawska-Joerges, 1997; Alvesson and Kärreman, 2000). Approaching managerial consumption of concepts in a story-like way seems to be a sensible method because this approach allows us to better understand the managers' multiple and different lines of argumentation when reflecting on concept consumption. This approach also resonates with Czarniawska's (2008: 126) thesis that such "rhetoric of reflection" is fed by the logic of appropriateness. In order to strengthen the credibility of our interview material and to substantiate our analysis, one author conducted follow-up meetings with managers from two companies from our sample. These meetings allowed us to discuss and corroborate our interpretations of the managerial discourses on popular-concept consumption.

6.4 Findings: Managers' Accounts for the Consumption of Popular Concepts

As stated above, we identified four common categories that managers refer to when questioned about the consumption of concepts: learning from others' experiences, controlling organizational change, gaining external legitimacy, and collective sensemaking. Each of these narrations on the managerial engagement

with popular concepts provides a context for examining specific discourses associated with popular concepts. Table 6.2 summarizes sample responses from our interviews.

Table 6.2: Evidence from Data Illustrating Accounts for the Consumption of Popular Concepts

Discourse Category	Example
Learning from Others' Experiences	'There is quite an exchange of experience taking place [in cross-industry workshops]. Well, you'll be talking to different people and then there will be questions—you'll be hearing about different stuff'. (P03: 591–592)
Controlling Organizational Change	'[Popular concepts are] always about one thing: do I have something to straddle on the management concept in order to bring this thing to life? If this is the case: I use it. [...] It's all about politics and show'. (P13: 421–423, 430)
Gaining External Legitimacy	'The effect [of ISO 9000 certification] is more external then internal. External in terms of letting your customers know: this company is certified, so that they can resort to it in case of being subject to an audit themselves [. . .]'. (P04: 123–126)
Collective Sensemaking	'It increases transparency—that is for sure [referring to management concept]. There are situations that might have been prevalent before but we simply were not aware of them. Now with the concept, those situations have become clearer. By now, they are comprehensible'. (P02: 158–160)

Following the insight of Lakatos that "there are and can be no sensations unimpregnated by expectations [...]" (Lakatos, 1978: 15), we refrain from presenting our interview data without theoretical interpretation. We think that Lakatos's statement on the non-existing demarcation between observational and theoretical propositions is particularly relevant to the current inquiry because our analysis and interpretation of data are guided by our interest in theorizing the managers' accounts. Therefore, in the following sections, we present excerpts from our interviews as well as theoretical arguments that help us to elaborate on each category in greater detail.

6.4.1 Discourse 1: Learning from Others' Experiences

In general, we argue that popular management concepts are designed to appear as convincing success stories to managers (cf. Røvik, 2002; Clark and Greatbatch, 2004). Building on "principles [that] appear relatively simple and clear" (Simon, 1946: 53), these concepts provide managers with the idea that ready-made solutions exist for problems they may face in the future (Mayer, 1983). As one of our interviewees stated, such concepts can give the manager an idea of how 'to attack a given problem in the correct manner' (P11: 691–692).[25] A common belief among our interviewees is that these prefabricated solutions were the result of the experiences of successful managers and companies: leaders of organizations "watch one another and adopt what they perceive as successful strategies for growth and organizational structure" (Sevón, 1996: 61). This experience is valu-

[25] Throughout this chapter, citations taken from our interviews are identified by the following scheme (P[number of interview]: [line number in the transcript]). Non-verbal events are denoted by (event).

able because managers face a need for proven know-how. As one of our interviewees said: "Management is always about trial-and-error. [...] Management concepts are little more than accumulated experience. All these books, articles and heaven know[s] what else—all this is simply an interchange of experience. In so far, they have to be considered as very useful. [...] In the end you try picking out the best from the single sources in order to use it for yourself." (P11: 694, 697–698, 702–703)

Learning from the experiences of other managers in principle implies information-collecting behavior from peers. Our interviewees commonly agreed that this kind of social authorization is crucial when judging the relevance of the conceptual information collected. When questioned about the proper sources of management concepts, they emphasized the importance of industry-wide and intra-organizational workshops. Typically, such seminars are offered by professional associations or consultants. One interviewee commented that "The DGFP [German Association for Personnel Management] offers some very good workshops on different topics. That is really helpful in terms of staying informed on new developments and new instruments" (P02: 489–491). While on the one hand sharing a specific professional context might contribute to the social authorization of a concept, on the other hand we also find our interviewees commonly referring to renowned companies or universities that lend their name to a concept (Røvik, 2002: 124f.). Consider, for example, the well-known success story of Toyota, a company intimately linked to the popular management concept lean production (Womack et al., 1990). One of our interviewees remarked on this association as follows: "Take the story of Toyota and all that: they've made their success. Otherwise, all this [using the Toyota concept in the interviewee's company] would be senseless" (P06: 694–696). When questioning interviewees about this category in more detail, we find that managers commonly offer statements entailing references to sources that grant social authorization. The stated rationale among managers connected to this discourse is thus that, if the suggested success patterns for a concept originate from a legitimate and trusted source, managers can learn to solve their problems from more experienced actors.

6.4.2 Discourse 2: Controlling Organizational Change

Our study provides evidence that managers account for the consumption of popular management concepts as instruments to exert control over other members of the organization. Central to this discourse is the notion that managers understand individuals as being controllable by means of rational language (cf. Czarniawska-Joerges and Joerges, 1988; Drucker, 2007). When talking about organizational change, our interviewees commonly provided narrations on how managers could

exert vicarious control by employing popular management concepts. However, it became obvious that the way our interview partners disclose intended goals and actions when exerting control varied in their narrations. On one hand, the managers argue to use concepts to convince subordinates to follow a common organizational goal. On the other hand, the use of management concepts is depicted as a way to pursue rather private goals and actions, as concepts provide a foundation to power.

6.4.2.1 Persuasion

Given that organizational change implies organized action, managers must persuade other organizational members to adopt the manager's ideas (cf. Nord and Tucker, 1987). As one of our interviewees emphasized, "The manager has got an idea how things should be done, but someone has to put it into practice" (P01: 47–48). This exertion of control cannot be achieved solely by dint of the manager's hierarchical position, because the social power available to an individual is not entirely dependent on his or her formal title in the organization's hierarchy (Barnard, 1938; Grey, 2005). Given this imperfection of hierarchical control, managers are dependent on their ability to persuade other organizational members to adopt certain behavior patterns (Judson, 1991; Ford and Ford, 1995). One of our interviewees put it forcefully: "You literally took the hand of the people affected by the change and tried to brainwash them—just like Scientology does. Convince them that the change is good for them" (P07: 629–631). As researchers, we were interested in how our interviewees rationalize the use of popular management concepts as instruments of persuasion in organizational change. In accordance with our assertions on norms of managerial rationality in organizations, a common reply referred to the use of rational arguments, particularly in the form of figures and numbers. One manager illustrated his rhetorical strategy in the following way: "You can't just say: 'We'll do this now'—rather you'll have to build up numerical material, in terms of a problem description" (P01: 677–678). Numbers and figures are powerful tools because people usually accept numbers and statistics without challenging them (Best, 2001; Bort and Kieser, 2011). Moreover, people tend to forget that most numbers and statistics are presented in such a way that they focus attention on a desired point of view. Therefore, numbers and statistics can be seen as "tools, used for particular purposes" (Best, 2001: 7). As one interviewee pointed out, management concepts commonly provide a number of such ready-made rational arguments and labels that can be used to generate such figures: "This is just the case with value-driver conceptions, cost/value analysis—that is, something catchy, something that everybody understands in terms of its necessity" (P11: 349–350). This interviewee's response illustrates how imposing frames of reference such as management con-

cepts is understood to be a means of control for organizational behavior. In this sense control is exerted through the use of symbols. As soon as people hear or read statistical figures, they tend to forget the people and the social processes that produced the figures (Best, 2001: 31). Therefore numbers take on a life of their own—they become powerful symbols. Seen in this light, management concepts serve as powerful symbols for labeling, communicating and persuading (Clark and Salaman, 1998). The interviewee's response also highlights the close connection between organizational change and power within organization, for "politics in organizations breed in times of change" (Pettigrew, 1985: 43).

6.4.2.2 Power

"Power" represents our second subcategory within the broader category of organizational change and can be defined as one person's action structuring the possible actions of other people while enforcing a private agenda (cf. Foucault, 1982). One interviewee illustrates the power rationale by describing a loophole in the company's benchmarking concept, a loophole that provided him leeway in his staffing budget: "According to the figure of [concept used by the company], this factory is nearly as big as [the biggest facility of the company], which is quite an exaggeration. [...] I can take advantage of this for myself since another colleague would actually have to explain why he needs so many employees. [...] In the event that the controlling units are about to argue for staff cuts, I've got good arguments against them." (P12: 299–303, 311–313) This statement was given by an employee of a company that was restructuring and downsizing because of a decrease in sales during the financial crisis in 2008. In such circumstances, the underlying logic of the management concept is turned against the goals of the organization in favor of the manager's personal goals, such as maintaining a larger staff, despite organizational ambitions to cut staff, thus emphasizing the power that these concepts have in peoples' minds. Not only can management concepts that have been established within the organization for some time be manipulated for personal power, but we also found evidence that concepts new to managerial consumption are rationalized as opportunities to pursue more private agendas. Here, we find that a power play can be realized by focusing the minds of the organizational members in a particular direction and their actions on a particular topic. This interpretation is illustrated by one of our interviewees, a very experienced manager of multiple factories with a PhD in chemistry, who states that: "[popular concepts are] always about one thing: do I have something to straddle on the management concept in order to bring this thing to life? If this is the case, I use it. [...] It's all about politics and show" (P13: 421–423, 430). This comment articulates well the concept of "issue selling" described by Dutton et al. (2001: 716): "In reality, organizations are a cacophony of complementary and

competing change attempts, with managers at all levels joining the fray and pushing for issues of particular importance to themselves". This discourse highlights that the consumption of popular concepts is depicted by managers as a means to exert vicarious control over other individuals. The managers we interviewed elaborated on these themes especially in the context of organizational change and innovation projects. Managerial control is suggested to be exerted by expressing commitment to a concept while at the same time working to accomplish personal or other goals that may be contradictory to the espoused organizational goals.

6.4.3 Discourse 3: Gaining External Legitimacy

Legitimacy is a critical resource that external stakeholders bestow on an organization (Dowling and Pfeffer, 1975; Meyer and Rowan, 1977; Ashforth and Gibbs, 1990; Suchman, 1995). Legitimacy is granted when an organization complies with certain rules and norms put forth by the institutional environment of the organization (Suchman, 1995; Scott, 2001). Recent work in the neo-institutional tradition substantiates the reflective and agentic character of actors towards institutional pressures (cf. Lawrence and Suddaby, 2006; Czarniawska, 2009; Heugens and Lander, 2009). In adopting this perspective, our interview partners seem well aware of the possibility of influencing the perception of stakeholders by making use of symbolic management (cf. Elsbach, 1994; Suchman, 1995; Westphal and Zajac, 1998). For example, one of our interviewees, a manager at a large international stock corporation, illustrates the relevance of such modes of communication as a way to acquire financial resources: "Being a stock corporation, increasing company value means in any case: communicating to your environment in order to make the company value actually increase" (P11: 144–146).[26] Within this discourse, the consumption of popular management concepts is depicted as a means to impress external stakeholders. One of our interviewees provides evidence for this assertion by pointing out how important it is to be up to date on the current management concepts. He calls this strategy "opinion leadership in the stock market" (P13: 354). The need to be the "opinion leader" in the stock market led this company to extensively communicate their value drivers to the financial market: "Sure, there are goal agreements or pay-for-performance programs and key performance indicators [concepts applied in his company]. But all that is rather dull. [...] These things are taken for granted nowadays. [Whereas] [a]ctually defining your value drivers—where we allocate our attention or our focus—that is no mean feat." (P11: 149–150, 154–156) Because many organizations face a variety of stakeholders, the use of management con-

[26] The importance of the financial market in the diffusion of management concepts implied here is in accordance recent findings of more macro-oriented researchers on management concepts (cf. Nicolai, Schulz and Thomas, 2010).

cepts as communication tools is often not limited to the professional environment of a given company; it also extends to the broad public and the mass media (Mazza and Alvarez, 2000). This practice is illustrated by quotes from managers of the same large, international chemical company. While this company today enjoys the status of a renowned employer in the region where it is located, throughout its history it has been associated with several hazardous environmental incidents. These incidents have shaped public opinion about the company, leading to a perception that it is potentially dangerous to nearby residents. In response to these public image issues, the company has strongly engaged in social and ecological projects. It recently began a campaign to communicate the value-based management concept of the company to the broader public. A manager of the company reflects upon the communication of values to counteract threats to the organizational legitimacy: "On a common basis, you have to face a quite negative stereotype: 'The [company name]—all this poison and what else they do.' That is a rather negative image, which you encounter on a personal level as well. [...] And that is why it is crucial that [company name] communicates: Values are important to us" (P12: 178–182).

The enactment of popular management concepts within an organization might conflict with technical demands of production inside the organization or be at odds with expectations in other relevant institutional fields (Meyer and Rowan, 1977). These issues might lead managers to consume concepts only superficially, especially when they are using them solely to impress external organizational stakeholders (Westphal and Zajac, 2001; Nicolai and Röbken, 2005). Managers seem to be well aware of the strategic potential of symbolically using concepts in order to gain external legitimacy. We find narratives that confirm this tendency to superficially adopt concepts primarily to manage external organization stakeholders. "The effect [of ISO 9000 certification] is more external than internal. External in terms of letting your customers know: this company is certified, so that they can resort to it in case of being subject to an audit themselves [...]" (P04: 123–126).

6.4.4 Discourse 4: Collective Sensemaking

Our last discourse illustrates how popular management concepts are rationalized as means to help managers engage in collective "sensemaking". As Weick, Sutcliffe and Obstfeld (2005) eloquently put it, the process of "[s]ensemaking involves turning circumstances into a situation that is comprehended explicitly in words and that serves as a springboard into action" (ibid: 409). In this sense, consuming popular concepts is understood as a way to reduce uncertainty and ambiguity, because it allows the organization members to increase the understanding

of the environment in which they operate. Sensemaking in organizations is a demanding undertaking (March and Olsen, 1976; Weick et al., 2005). As one of our interview partners stated: "general managers are poor chaps—often, we don't have all the training and knowledge required to work off all issues in a proper manner—you have to be very self-critical on this" (P01: 537–539). The concept of sensemaking is to identify what one has to look for in order to understand why something has happened. Following the identity as rational actor, a manager cannot simply apply any arbitrary frame of reference and expect that frame of reference to be collectively accepted as a means of ambiguity reduction (March, 1994; Weick, 1995b). A manager openly framing his or her company as an organized anarchy (cf. Cohen et al., 1972) will most likely be replaced by a manager framing his or her organization as a complex, intentional, rational system aimed at generating revenue. Popular management concepts offer an attractive and socially accepted frame of reference to overcome organizational ambiguity and engage in collective sensemaking. We find two elements commonly mentioned by our interviewees that contribute to a proper managerial frame of reference: (1) terms and labels on what information to collect, and (2) conceptual frames about how such pieces of information relate to one another. The managers we questioned depicted management concepts as a way to sort out what information should be collected and what information should be discarded. One of our interviewees illustrated how concepts provide terms and labels on what information to collect by reflecting on a number of sources of information focus (such as efficiency numbers within an administrative department and throughput times): "Our goal [by implementing the concept] is to increase efficiency—especially in the administrative department. We want to optimize the workflow—create a faster workflow from order intake to shipping—reducing friction loss. The paramount goal is, of course, customer satisfaction." (P06: 88–92).

Keeping in mind the volume and possible ways to collect and sort information that organizations must cope with, the task of figuring out what to measure is not to be underestimated. As concepts are developed around central terms or labels (Kieser, 1997; Røvik, 2002), such terms are likely to receive increased attention within the organization. Accordingly, the manager can more easily allocate resources to generate information streams on these areas (Cohen et al., 1972). In addition to providing managers with terms and labels which can focus attention on what information to collect, management concepts are understood as relating pieces of information to one another. By illustrating how one piece of information relates to another, management concepts offer a way to frame ambiguous events within an organization. In this vein, management concepts provide "an understanding of the way things are and might be, a basis for engaging others in discourse about what is possible and what has happened" (March, 1994: 258).

Our interviews provide accounts of how managers account for the consumption of concepts as a way to reduce ambiguity surrounding managerial problems. One manager we interviewed offered the following anecdotal evidence about how the popular management concept "Reengineering" (Hammer and Champy, 1993) raised his awareness of organizational rules generating information not required for business: "I believe this issue was described in there [referring to Hammer and Champy, 1993]. I'm speaking of the introduction of things [like organizational rules] (laughs) which then remain about for 30 years in an organization, but no one remembers them anymore. Thus, they are never put 'ad acta'. But the company, like a machine, keeps producing this stream of information, which costs money...". (P01: 645–649) Concepts that are enacted in organizations often provide "short-cuts in decision making by enabling decision makers to omit or abbreviate some steps by filtering out some alternatives and consequences" (Brunsson, 1982: 38). Our interview data support the notion that management concepts are understood as a rational reference structure for the manager. For example, one manager we interviewed supports this point by using the metaphor of a traffic light: "There are concepts, working models which make it possible to act in the early warning area. [...] That means that we have some strong points of reference. [...] If I cross against the red light, the business will be gone" (P07: 940–942, 943–944). Thus the concept is depicted as a check on decision making that removes subjective criteria and therefore bolsters credibility of business decisions, whilst also providing an explanation when decisions turn out to be wrong (cf. Luhmann, 1995).

6.5 Discussion and Conclusion: Appropriate Accounting for Concept Consumption

We derived four discourse categories from our empirical inquiry: (1) learning from others' experiences, (2) controlling organizational change, (3) gaining external legitimacy and (4) collective sensemaking. Within these discourse categories, managers accounted for the consumption of popular concepts using highly idiosyncratic narratives. Such plurality is in line with the claim that "consumers are rarely passive recipients, but [are] typically active, ambivalent and creative in their adaptations of commodities" (Heusinkveld et al., 2011: 142). Yet, the discourses not only illustrate the cornucopia of managerial accounts for the consumption of popular concepts; when analyzed from the logic of appropriateness perspective, they also further our understanding of how managerial accounts are shaped by norms of managerial identity and socially defined rules about how rationality is realized in typical management situations. While the discourse categories are diverse, what all four have in common is that the managers account for

the consumption of concepts in terms of means and ends. These accounts support our claim that rationality is a central social norm for actors pursuing managerial identities. In the narratives in our first discourse category (learning from others' experiences), managers account for the consumption of concepts as processes of vicarious learning from experienced managers and renowned companies. Here, the consumption of concepts complies with norms of rationality in which successful actions are imitated while unsuccessful actions are avoided (Levitt and March, 1988; Denrell, 2003). The second discourse category (controlling organizational change) provides narratives on the consumption of popular concepts in the context of organizational change processes, while the third discourse (gaining external legitimacy) pertains to managing stakeholder's perception of the organization. The latter two discourse categories depict the consumption of concepts as a means to achieve control over entities particularly disinclined to managerial control (DiMaggio and Powell, 1983; Ford and Ford, 2009). The fourth discourse category (collective sensemaking) features narratives related to the comprehension of (past) organizational events. Managers account for the consumption of concepts as means to reduce uncertainty and causal ambiguity within the organization (March, 1994; Weick, 1995b).

While each of the four discourse categories accounts for the consumption of concepts in terms of means and ends, we find that even managers within the same company consuming the same concept (e.g. interviewees 10–13) do not identify a single common goal or end toward which the consumption of the concept is directed. In addition, we find that managerial accounts of concept consumption are highly contingent on particular social settings and situations, the opposite of a logic of consequence perspective, where rationality is "an abstract process, engaged in by a transcendental subject, a socially disembodied being" (Townley, 2002: 556). For example, the third discourse category (gaining external legitimacy) entails narratives of how a value-driver concept offers an opportunity to gain opinion leadership in the stock market and to counter a negative public perception. This narrative is in contrast to the logic of consequence perspective, from which one would expect managers to account for a value-driver concept as a means "to improve resource allocation, performance measurement, and the design of information systems by identifying the specific actions or factors that cause costs to arise or revenues to change" (Ittner and Larcker, 2001: 368). In the four discourses, it is not the alleged superiority of a popular concept that drives managerial narratives, but rather specific and historically developed situations that managers face while consuming a concept. For instance, the managerial narratives for the consumption of the value-driver concept in the large, international chemical company we visited draw on a history of hazardous environmental in-

cidents and a current situation which demands legitimacy management towards nearby residents. What is considered rational, and what therefore represents an appropriate account for concept consumption, depends on situations that managers face. Therefore, we argue that the discourse categories we have introduced substantiate our assertion that managers comply with norms of rationality based on their identity, but how rationality is achieved remains subject to processes of social construction. Typically, such processes follow taken-for-granted rules that provide a certain level of ontological security to actors (Meyer and Rowan, 1977; Giddens, 1991). How managers account for the consumption of popular concepts therefore depends not only on the norms of managerial identity, but also on the specific situations which the manager faces. For example, accounting for the consumption of concepts in the discourse category "learning from others' experiences" discloses discernibly different—and not necessarily compatible—rationales for concept consumption compared with the discourse category "gaining external legitimacy". While rationality in "learning from others" experiences' requires one to adopt what others have done to succeed and to avoid where others have failed, rationality in "gaining external legitimacy" requires one to adopt what corresponds to the expectations of the institutional environment.

We conclude our discussion by highlighting that the logic of appropriateness expands our understanding of how managers account for the consumption of concepts. Understanding human reasoning as following from necessity (as opposed to consequence) shifts attention to the interaction between situational factors and the identity an actor adopts. Based on our empirical inquiry, we argue that this perspective highlights the central yet situational character of managerial rationality when studying accounts of the consumption of concepts. Rationality is central in these accounts, as it pertains to managerial identity. It is also situational, because accounts of concept consumption describe specific situations that managers face in daily situations. The logic of appropriateness therefore allows us to categorize into stable entities the polyphony of fragmented accounts we found when talking to managers about their consumption of concepts, such as managerial identity and the rules that define rationality in specific situations. Our findings urge future researchers to pay close attention to the central yet situational character of managerial rationality when studying the consumption of concepts. This advice particularly pertains to studies assuming a logic of consequence perspective, since our findings fray the connection between the managerial rationales for consuming popular concepts and organizational performance. While we are convinced that organizational performance is highly relevant to managers, accounts indicating a direct effect from concept consumption on organizational performance were rare in the narratives we analyzed. We therefore suggest that

performance implications of concept consumption are rather indirect; for example, stakeholders will provide resources to more legitimate companies (Deeds et al., 2004), thereby increasing the companies' prospects of survival (Baum and Oliver, 1991). Depending on the situation a manager faces, the consumption of a concept might be largely decoupled from the organizational routines that influence the performance of an organization. Our inquiry therefore urges researchers studying the impact of concept consumption on organizational performance to carefully consider the situations that managers seek to address when they consume concepts. In general, we favor the idea that the consumption of popular management concepts should be viewed from an appropriateness perspective. Applying the logic of appropriateness allows the researcher to treat the consumption of concepts in a multifaceted way that encompasses the local translation of the linguistic content of a concept within an organization, is based on a manager's identity, and recognizes the importance of social rules of behavior in specific situations.

Our research also highlights that there is a limited range of explanations managers can provide when accounting for their consumption of concepts. Rationality, as the core of managerial identity, and rules, ingrained in the situations that managers face, require that managers not stray too far from reason when explaining their rationale for consuming concepts. Similar to Cervantes' (1866) famous knight Don Quixote, whose identity is bound up in adventurous situations of chivalry, managerial narrations draw on norms of managerial identity and socially defined rules of how rationality is achieved in typical management situations (cf. March and Weil, 2005). Therefore managers must make reasonable connections to accepted norms, in particular the norm of rationality, and common situations that managers face in organizations when accounting for the consumption of management concepts. At the same time, these accounts of concept consumption should not be confused with the necessarily improvisational practice of consumption (cf. Certeau, 1984; Bourdieu, 1990). We suggest that managerial accounts of concept consumption and the actual practice of concept consumption should not be studied as exclusive dualisms, but rather as a mutual constitutive duality, and that doing so provides a promising avenue for future research (Farjoun, 2010; Feldman and Orlikowski, 2011). As the organizational consumption of popular concepts is strongly subject to the dynamics of routine change (cf. Feldman and Pentland, 2008b), we suggest that future research on the consumption of popular concepts should also join forces with research on organizational routines. The logic of appropriateness provides a promising perspective to engage in this joint endeavor.

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