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Comprendre les capacités dynamiques : la perspective des micro-fondations
Understanding Dynamic Capabilities: The Microfoundations Perspective
Entendiendo las Capacidades Dinámicas: la perspectiva de las microfundaciones

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Résumé de l'article

L'article insiste sur quatre catégories tout à fait importantes des micro-fondations des capacités dynamiques (DC) : (1) le comportement des leaders, (2) l'interaction dans les équipes, (3) la capacités individuelles, et (4) les caractéristiques du poste. Nous étudions si les micro-variables opèrent au niveau spécifique de l'entreprise quand elles installent des capacités dynamiques, et comment elles s'articulent les unes aux autres. Les données sont issues d'une enquête par questionnaire (486 répondants) conduite dans 5 organisations allemandes. La comparaison inter-firmes basée sur des analyses discriminantes révèle que les micro-variables qui constituent les DCs construisent souvent des configurations spécifiques à chaque firme parmi un ensemble plus large de variables. Seules la mise en capacité structurelle (empowerment) et la fonction d'apprentissage en équipe représentent des points communs entre ces entreprises. Nous concluons sur le lien entre ces spécificités d'entreprises et l'explication des avantages concurrentiels.

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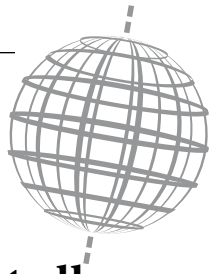

Micro-variables des capacités dynamiques, et comment elles se mettent en oeuvre. Une exploration de la spécificité des formes et des points communs inter-firmes

Micro-variables de capacidades dinámicas y cómo afectan – Explorando la especificidad de la empresa y puntos en común entre empresas

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ABSTRACT

This paper gives emphasis to four categories most relevant for microfoundations of dynamic ca-pabilities (DCs): (1) leadership behavior, (2) team interaction, (3) individual capabilities, and (4) job characteristics. We study whether micro-variables operate firm-specifically when constituting DCs and how they relate to one another. Data result from employee surveys (n = 486) conducted in five German organizations. The cross-firm comparison based on discriminant analyses reveals that micro-variables that constitute DCs often build firm-specific configurations in a broader set of variables. Only structural empowerment and team learning function as cross-firm commonali-ties. There is evidence to consider firm-specificity when explaining competitive advantages.

Keywords: microfoundations, individual capabilities, team interaction, leadership behavior, empowerment, commonalities, configuration

RÉSUMÉ

L'article insiste sur quatre catégories tout à fait importantes des micro-fondations des capacités dynamiques (DC) : (1) le comportement des leaders, (2) l'interaction dans les équipes, (3) la capacités individuelles, et (4) les caractéristiques du poste. Nous étudions si les micro-variables opèrent au niveau spécifique de l'entreprise quand elles installent des capacités dynamiques, et comment elles s'articulent les unes aux autres. Les données sont issues d'une enquête par questionnaire (486 répondants) conduite dans 5 organisations allemandes. La comparaison inter-firmes basée sur des analyses discriminantes révèle que les micro-variables qui constituent les DCs construisent souvent des configurations spécifiques à chaque firme parmi un ensemble plus large de variables. Seules la mise en capacité structurelle (empowerment) et la fonction d'apprentissage en équipe représentent des points communs entre ces entreprises. Nous concluons sur le lien entre ces spécificités d'entreprises et l'explication des avantages concurrentiels.

Mots-Clés : micro-fondations, capacités individuelles, interaction au niveau des équipes, comportement du leader, mise en capacité (empowerment), points communs, configuration

RESUMEN

Este artículo se concentra en las cuatro categorías más relevantes para las microfundaciones de capacidades dinámicas (CDs): (1) comportamiento de liderazgo, (2) interacción del equipo, (3) capacidades individuales y (4) características del puesto. Estudiamos si las micro-variables operan en las especificidades de la firma cuando constituyen CDs y cómo se relacionan entre sí. Los datos son el resultado de encuestas de empleados (n = 486) realizadas en cinco organizaciones alemanas. La comparación entre empresas basada en análisis discriminantes revela que las micro-variables que constituyen las CDs a menudo construyen configuraciones específicas de la empresa en un conjunto más amplio de variables. Sólo el empoderamiento estructural y el aprendizaje en equipo representan puntos en común entre empresas. Existe evidencias para considerar la especificidad de la empresa como explicación a las ventajas competitivas.

Palabras Clave: microfundaciones, capacidades individuales, interacción en equipo, comportamiento de liderazgo, empoderamiento, puntos en común, configuración

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The dynamic capability view (DCV) has become the leading paradigm in strategic management research since there is great interest in how firms find new ways of resource allocation in order to cope with changes in business systems and to accumulate new competences for generating and sustaining competitive advantages (Teece, Pisano & Shuen, 1997; Teece, 2007). The DCV emphasizes processes and activities that constitute such organizational adaptation and strategic renewal. Dynamic capabilities (DCs) describe a firm's ability and capacity to purposefully integrate, build, and modify its resource base, routines, and ordinary capabilities (Barreto, 2010). DCs are understood to be higher-level capabilities that come into effect to address – and possibly shape – rapidly changing business environments (Teece, 2012; Helfat & Winter, 2011).

Teece's (2007) process perspective further refines the DCV and encourages scientists to take micro-variables into account in order to advance the understanding of differences in firm performance (Augier & Teece, 2008; Felin & Foss, 2006). Teece classifies DCs into three clusters: (a) sensing opportunities and threats, (b) seizing opportunities, and (c) transforming or reconfiguring business enterprises' assets (Teece, 2007). The specification of process components has been recognized to be an important step in theory development (Helfat & Peteraf, 2009) and serves as a framework for underpinning DCs. Consequently, lower-level entities have received increasing attention by the microfoundations, which emphasize actions and interactions at the individual- and group levels (Felin *et al*., 2012; Foss, 2011) as well as organizational and managerial processes, procedures, and structures (Teece, 2007) in addition to managerial cognition (Gavetti, 2005; Helfat & Peteraf, 2015).

Broadening the field of research often results in some limitations, which need to be elaborated upon in future research. With respect to the process perspective and its microfoundations, these limitations in the current research can be identified with respect to (1) underdeveloped theoretical coherence and (2) underdeveloped empirical validation.

(1) Further need for theoretical coherence: The theoretical outline currently lacks demarcation and tends to integrate more and more variables (Barney & Felin, 2013); moreover, there is still no clear distinction between what microfoundations are and what they are not. It remains unclear exactly which constructs enhance the discussion on microfoundations and which constructs are general issues of organizational behavior that are not necessarily linked to a firm's competitiveness. There is conceptual vagueness since the current discourse encompasses a variety of aspects in human agency, team interaction, and structural factors of the social context (Hodgkinson & Healey, 2011; Pitelis & Wagner, 2015; Sprafke, 2016) that call for coherence between these additional, more actor-related constructs (Barney & Felin, 2013). Salvato & Vassolo (2017) suggest a more structured perspective for the sub-categories as constituent factors of DCs. The authors address the theoretical vagueness that results from the assumption that dynamics can be explained primarily by routines (Salvato & Vassolo, 2017). This definition would exclude certain variables that describe individual cognition and behavior and that have recently gained more attention on the basis of the process perspective (Hodgkinson & Healey, 2011; Helfat & Peteraf, 2015). The process perspective contributes substantially to connecting the research on DCs with research on organizational behavior yet requires further clarification and theoretical coherence (Salvato & Vassalo, 2017).

(2) Further need for empirical validation: Thus far, the process perspective has not clarified whether micro-variables can be understood to be antecedents of higher-order DCs or whether they function as moderators or characterize specific interactions (Danneels, 2008; Salvato & Rerup, 2011; Salvato & Vassolo, 2017). Moreover, there is no sufficient answer to the question of whether micro-variables are firm-specific drivers that provide sustainable competitive advantages or whether they can be understood to be commonalities allover different firms. This issue matters as the resource-based view of the firm (RBV) (Barney, 1991) – the theoretical origin of the DCV – argues that only firm-specific bundles of resources that are inimitable and non-substitutional allow for gaining sustainable competitive advantages. The consideration of firm-specificity can be directly transferred to lower-level entities in terms of micro-variables. Microfoundations provide an illustration of firm-specificity. With respect to Eriksson (2013), methodological rigor is needed to sharpen the understanding of which conceptual terms are most influential and how they relate to one another. Current conceptual vagueness and empirical underdevelopment are a clear source of open questions in the field of micofoundations.

In our study, we address these open questions. In acknowledgement of the state of the art we research different types of organizations in order to find out 1) which type of micro-variables constitute DCs, 2) how these crucial variables interrelate, and 3) whether the identified micro-variables are firm-specific or general components of DCs across firms. We go beyond the currently dominant qualitative case-study research by making use of cross-sectional survey data from five German organizations in different industries. There is a special need for cross-firm comparisons to cope with the issue of firm-specificity.

State-Of-The-Art in Microfoundations Research

The call for a deeper examination of microfoundations began with authors such as Felin and Foss (2006), who emphasize that links between macro-variables are influenced by individual actions. The authors point to a missing explanation of collective constructs, such as routines and capabilities, by considering lower-level entities – particularly individuals and their interactions.

Discourses on Constructs for Microfoundations and Variable Relationships

There are a number of contributions on microfoundations in the DCV with various theoretical backgrounds, primarily in the psychological and HR literature (e.g., Argote & Ren, 2012; Gärtner, 2011; Hodgkinson & Healey, 2011; Ployhart & Hale, 2014). The challenge is that existing contributions do not build on one specific model or theoretical outline (e.g., Teece's process perspective) and that there is a scarcity of empirical research (Eriksson, 2013). In order to better understand the current discourse, we refer to the scholars' motivation as to why microfoundations should come into play. The three selected discourses are interrelated but reveal different directions of argumentation.

a. A first group of authors aims at specifying the relevant actors with respect to managers, ordinary employees, and team membership.
b. Other contributions primarily aim at specifying relevant constructs (of behavior) at the micro-level.
c. A third group of contributions aims at a more methodological discourse on the relationship between variables.

A) The literature review reveals that the specification of constructs depends on the group of actors that is considered most critical (Augier & Teece, 2008; Felin *et al*., 2012; Rindova, Taylor, & Petkova, 2015; Salvato & Rerup, 2011). Authors such as Eggers and Kaplan (2013) and Helfat and Peteraf (2015) address

managers in their role as decision-makers and therefore focus on dynamic managerial capabilities and managerial cognition as the most relevant constructs. In contrast, Hallin, Andersen, and Tveteråas (2012) and Rothaermel and Hess (2007) emphasize the contribution of frontline employees in terms of their human capital and sensing activities and reveal their relevance in innovation and performance on an empirical basis. According to Salvato (2009), the activities of individuals at all hierarchy levels are crucial in shaping processes of new product development and the dynamic adaptation of this capability. Salvato (2009) has empirically shown that adaptive renewal is premised on day-to-day activities carried out by individuals within and around the organization. He thus argues that management should encourage individuals at all levels to participate in experimenting with novel solutions. These findings point to a substantial role of leadership. Since leaders have a direct impact on employees by defining contextual work factors and by sharing an organization's vision, their style of leading affects not only individual actions but also the long-term organizational outcome. Leadership can thus be seen as a direct channel for the interpretation of organizational policies and practices by the individual (Tuuli *et al*., 2012) and is particularly associated with employees' motivation and their encouragement to change conditions and enhance both innovation and organizational learning (Elenkov & Manev, 2005; García-Morales, Jiménez-Barrionuevo & Gutiérrez-Gutiérrez, 2012).

It is not possible to limit the search for actors to individuals since collective actors have to be taken into consideration, as well. With respect to knowledge-sharing and diffusion, team interactions are an essential source of learning and organizational effectiveness (Leonard-Barton, 1995; Senge, 1990). Teams that feel psychologically safe collaborate and learn in ways that are conducive to innovations (Edmondson & Nembhard, 2009). Hülsheger, Anderson, and Slagado (2009) have shown that team-process variables, such as external and internal communications, vision, task orientation, and cohesion, display a strong relationship to creativity and innovation. Moreover, the responsiveness of firm-internal networks to strategic change facilitates organizational coordination and adaptation (Kleinbaum & Stuart, 2014). In such networks, individuals can act as integrators through their collaborative skills and their position within the network (Grigoriou & Rothaermel, 2014).

B) The specification of relevant constructs is influenced by the specification of relevant actors but goes further since overall attitudes and components of behavior are of key concern to this group of authors. Constructs such as motivation, cognitions, emotions, knowledge, skill differences, and decision-making are conceptualized as individual yet related contributions to firms' DCs (Corbett & Neck, 2010; Eisenhardt, Furr & Bingham, 2010; Gavetti, 2005; Gottschalg & Zollo, 2007; Helfat & Peteraf, 2015; Hodgkinson & Healey, 2011; Teece, 2012).

Felin and Hesterly (2007) emphasize skills and individual capabilities in greater detail because these are heterogeneous among individuals and can therefore explain differences in organizational performance. Felin, Foss, and Ployhart (2015) highlight individual's KSAOs (knowledge, skills, abilities, other characteristics) as a potential source of DCs and thereby refer to a concept that originates from psychological work analysis and competency research. Sprafke, Externbrink, and Wilkens (2012) follow a similar route by focusing on individual capabilities as meta-constructs of individual behavior. In a case study, they demonstrated that the individual capability to cope with complex and uncertain situations enhances the perceived firms' capability to persist in dynamic environments. Their operationalization includes individuals' capability to cope with complexity, self-reflection, knowledge combining, and cooperation with others. Other authors specifically emphasize the role of knowledge and the ability to share, integrate, and combine knowledge (e.g., Felin & Hesterly, 2007). Chirico und Salvato (2008) have shown that firms' willingness and ability to integrate their members' specialized knowledge positively affects the recombination of the resource base. Additionally, sense-making and learning can be seen as influential variables when developing DCs (Pandza & Thorpe, 2009).

Another important aspect discussed in the literature is associated with organizations' social context and structure, which affect individual and collective behavior as well as performance at different levels (Barney & Felin, 2013; Hodgson, 2012). Individuals and/or groups that are equipped with information, resources, and the freedom to experiment are more likely to be aware of changes, be creative, speak up about their observations and ideas, and learn and take action in an entrepreneurial manner (Foss *et al*., 2008). Activities, practices, and attitudes related to experimenting with novel solutions, such as reducing bureaucratic control, strengthening face-to-face communication, and promoting diversity, relational engagement, and trusting relationships, are highlighted as relevant factors (Salvato, 2009; Salvato & Vassolo, 2017; Pablo *et al*., 2007). Moreover, empowering working conditions encourage employees to serve the collective interests of the firm (O'Toole & Lawler, 2006) and enhance the innovative behavior of employees, teams, and organizations (Spreitzer, 2008; Chen *et al*., 2007; Çakar & Ertürk, 2010). Such working conditions also foster knowledge sharing (Srivastava, Bartol & Locke, 2006) and motivate employees to take more responsibility for work tasks, goal-setting, and managing their own interpersonal processes (Maynard, Gilson & Mathieu, 2012). Taking the characteristics of the working environment into account seems reasonable to the microfoundations of DCs.

In summary, regarding the discourse on micro-variables with respect to actors and constructs, it is obvious that various variables on different levels are highly interrelated and cannot be treated separately (Table 1). The selection of variables depends on the perspective on human agency in terms of whether managers or ordinary employees are considered relevant and whether there is a specific interest in group interaction and in the social context. Innovation is primarily associated with employees and teams, while leaders and contextual factors create a supportive environment for realizing renewal. This overview implies that micro-variables are interrelated and simultaneously constitute DCs. A more methodological view is therefore needed to specify their relationships. Moreover, there is clearly a need for an integrative theoretical framework of microfoundations that combines existing assumptions, especially according to the interaction between organizational members.

TABLE 1
Micro-variables in the current discourse

Micro-level	Micro-variables	Conceptualization of dependent variables or success factors
Leaders / managers	– Dynamic managerial capabilities – Managerial cognition – Decision-making – Mindfulness – Employees' encouragement – Transformational leadership	– Sensing, seizing, reconfiguring – Long-term outcomes – Employees' motivation – Employees' contribution to renewal – Entrepreneurial behavior – Intrapreneurship – Organizational learning
Team	– Mindfulness – Interaction – Psychological safety – Communication – Vision – Task orientation – Cohesion – Responsiveness – Skill-differences – Position in (internal) networks	– Learning – Organizational effectiveness – Innovation – Creativity – Adaptation
Individuals / Employees	– Human capital – Knowledge and skills – Collaborative skills – Individual capabilities (coping with complexity, self-reflection, combination of knowledge, cooperation) – Specialized knowledge – Knowledge sharing and combination – Sense-making – Learning – Skill differences – Mindfulness – Motivation – Cognition – Emotion	– Sensing – Innovation – New product development – Dynamic adaptation – Organizational capabilities – Recombination of resources
Context / job characteristics	– Procedures for knowledge integration – Access to information and resources – Empowerment – Support for knowledge sharing, risk taking, and culture of failure – Reducing bureaucratic control – Face-to-face communication – Diversity – Trusting relationships	– Recombination of resources – Sensitivity for change – Creativity – Voice – Entrepreneurial behavior – Novel solutions – Innovation – Team innovation – Motivation – Responsibility – Goal orientation – Self-management

C) Explaining micro-macro links lies at the very core of microfoundations (Barney & Felin, 2013); therefore, complex interactions, aggregation mechanisms, and emergent outcomes have to be taken into consideration (see also Felin *et al.*, 2015). The relationships between DCs and micro-variables might have different structures: On the one hand, micro-variables can be considered antecedents of DCs – for example, when top managers' capabilities mainly predict the organization's asset orchestration or response to external change (see Helfat & Peteraf, 2015). On the other hand, it is also plausible that micro-level action and interaction mediate links between DCs and organizational outcomes (Abell, Felin & Foss, 2008; Pavlov & Bowman, 2014). For example, the joint motivation of organizational members affects the sharing of knowledge, which, in turn, may positively influence work productivity and innovation performance (Foss & Lindenberg, 2013).

The aggregation of activities and capabilities at the micro-level may thus be simple and additive, but it can be highly complex in many settings with respect to interaction, interdependencies, and mutual influences (Barney & Felin, 2013; Devinney, 2013; Salvato & Vassolo, 2017). Micro-variables may be viewed as enabling elements of DCs, as constituent parts of DCs, or as more-or-less independent antecedents or drivers of DCs. Moreover, micro-variables might interact in a manner that leads, for example, to mutually reinforcing or suppressing effects. It can be assumed that there are moderated and mediated relationships between individual and team capabilities, leadership behavior, and job characteristics. Many such effects are shown in organizational behavior, psychology, and HR research.

The research aim of explicating microfoundations is thus connected not only to the specification of actors and variables at the micro-level but also to researching the complex

relationships between variables that may be found on several analytical levels below the construct of DCs. This is associated with methodological considerations in empirical multilevel research in strategic management (e.g., Molina-Azorin, 2014), but, as Devinney (2013) has concluded, microfoundational thinking goes beyond merely arguing for multilevel analysis: It also requires connecting conceptions of the different levels (see also Salvato & Vassolo, 2017). As Barney & Felin (2013) point out, the effects of interaction and aggregation among micro-variables can be positive or negative and are sometimes surprising. Therefore, the relationships of micro-variables and DCs deserve detailed attention in empirical research in order to enable our understanding of organizational performance.

Implications for Empirical Research on Microfoundations

The extensive enrichment to the discourse on microfoundations is coupled with major challenges for empirical research: On the one hand, intense conceptual enrichment bears the risk of considering all actor-related issues and subjects of organizational behavior to be microfoundations (Barney & Felin, 2013). On the other hand, an overly narrow pre-selection of variables enhances the risk of biased results when we aim to identify the constituent parts of DCs. Thus, there is not only a risk of overloading a study, but also of the study's oversimplification. This does not mean, of course, that we need to integrate all kinds of variables, but rather that we need to take the different categories of micro-variables into consideration (Table 1): (1) leadership behavior, (2) team interaction, (3) individual capabilities, and (4) job characteristics. A strict selection of variables should not be made a priori as it may influence the findings; instead, the analytical procedure should empirically uncover the relevance of the variables.

Additionally, it is crucial that the research design and the analytical procedure allow for recognizing firm-specificity while simultaneously reflecting the fact that there might be commonalities across firms and industries (Eisenhardt & Martin, 2000; Jantunen, Ellonen & Johansson, 2012; Strauss, Lepoutre & Wood, 2017). Some micro-variables may have an effect in some organizations yet have no effect or quite a different effect in other organizations. In order to shed more light on this open issue concerning the uniqueness of micro-variables, empirical analysis should aim at integrating different types of organizations. Empirical studies dealing with DCs often refer to similar industries, such as pharmaceuticals and biotechnology (e.g., Bruni & Verona, 2009; Rothaermel & Hess, 2007) as well as the computer and electronics industries (e.g., King & Tucci, 2002; Macher & Mowery, 2009; Tsai, 2004), or they are conceptualized as single-case studies. The research basis thus does not allow for clearly distinguishing between conceptual generalization, firm-specificity, or branch-specificity. Finally, studying the interrelatedness of micro-variables means searching for configurations of individual and collective activities as well as influential job characteristics or leadership behavior. This search implies making use of a primarily inductive approach. Whether or not a clear distinction between levels should be made depends on the explored configuration (Molina-Azorin, 2014; Salvato & Rerup, 2011).

The implications for field work and data evaluation concerning the micro-variables of DCs can be summarized as follows:

- the integration of a set of variables from different micro-levels (especially individual capabilities in terms of individual behavior, skills and competencies, team interaction, job characteristics, and leadership behavior) in order to avoid oversimplification,
- realizing an explorative process of data evaluation in order to specify the interrelatedness of variables, and
- the integration of different types of organizations in order to take the possible firm-specificity of the microfoundations of DCs into account.

Research Method

The aim in our empirical study is to specify the relative importance of and relationships among the theoretically identified micro-variables of DCs: (1) leadership behavior, (2) team interaction, (3) individual capabilities, and (4) job characteristics. To cope with the outlined implications for empirical research on microfoundations, we realized an explorative multiple-case study (Eisenhardt, 1989) in a primarily inductive approach. We examined the distinct and joint impact of leadership behavior, team interaction, individual capabilities, and job characteristics on DCs by applying discriminant analyses. Case comparison enabled us to search for cross-firm commonalities and firm-specific idiosyncrasies. Figure 1 displays the research design.

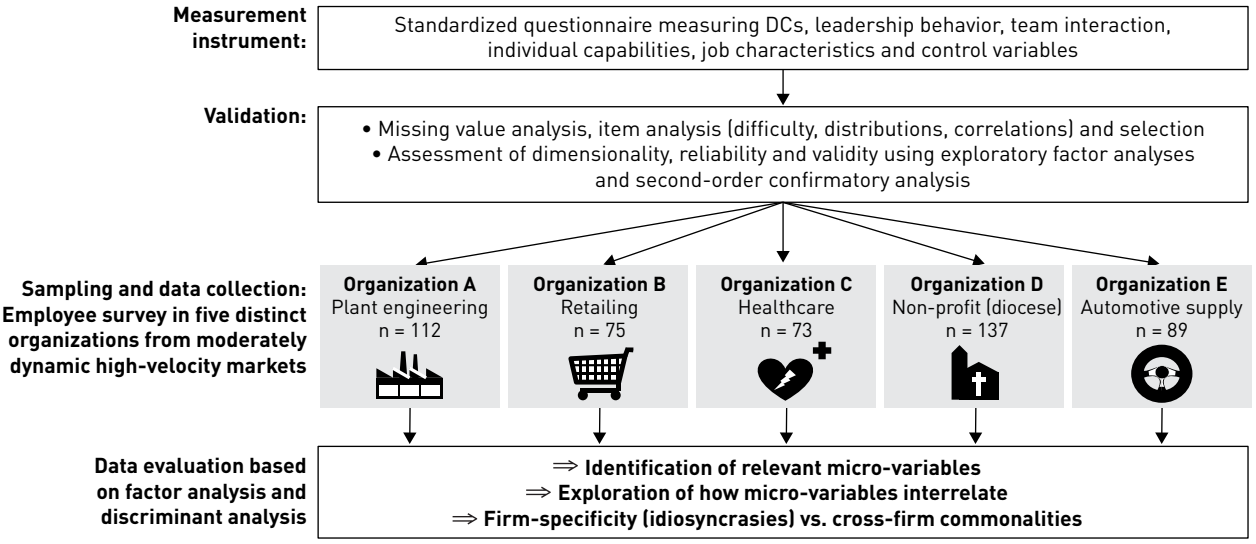
Sample and Data Collection

We used data that had been collected in the context of a publicly funded research project.[1] For this study, we selected data from five participating organizations on the basis of theoretical sampling (Eisenhardt, 1989). The data were collected from 2010 to 2012. Following Eisenhardt and Martin's (2000) classification, a central criterion was that the organizations operate in moderately dynamic or in high-velocity markets characterized by great pressure to innovate and/or by increasing and changing competition in the market. In structured interviews with key informants (CEO, technical director, HR manager) and by studying internal documents, we explored the characteristics of the markets in which the organizations operate (boundaries, identifiability of competitors, frequency of shift of competitors, complexity of environment, predictability of change). Though each organization in our sample had to deal with dynamics, the sampling led to sufficient variance in firm characteristics (Table 2). We aimed to include different types of organizations since this is a prerequisite for taking the possibility of firm-specificity into account. The industrial contexts in our sample were plant engineering, retailing, healthcare, nonprofit (diocese), and automotive supply.

In summary, our data basis consisted of 486 questionnaires from five German organizations in moderate or highly volatile markets. We surveyed all employees within the organizations in order to avoid single-informant bias and to cope with social complexity in perceiving organizational reality and thus to get to the core of actions and interactions in the organizations.

1. The project CCM² was funded by the German Federal Ministry of Education and Research (BMBF) and ran from 2009 to 2013. It aimed to investigate competence and confidence management as complementary practices used in providing a balance of flexibility and stability needs in SMEs.

FIGURE 1
Research design



Single-informant studies bear a high risk of biased data. The identification of the drivers of DCs in terms of micro-variables cannot be deduced from a single expert view or by "treating the organization as a unitary actor and appealing to 'emergent' (but unexplained) collective effects" (Barney & Felin, 2013, p. 148). Therefore, Salvato and Vassolo (2017) suggest the execution of more bottom-up research approaches. One method of adequately dealing with this challenge was to question the entire workforce of an organization. By surveying all kinds of employees, it was possible to capture the variance of different perceptions within an organization. This method is of particular interest since magnitudes of micro-variables, such as the perception of the working environment or of leader behavior, can be assumed to differ within an organization depending on whom is asked. This approach of exploring the collective mind of organizational members is an adequate method of dealing with a firms' social complexity (King & Zeithaml, 2001; Wilkens, Menzel & Pawlowsky, 2004).

Moreover, this approach enabled the simultaneously inquiry into a large number of micro-variables within a quantitative survey. The comparability of the results was ensured by using the exact same operationalization in all cases. This was essential when exploring firm-specific idiosyncrasies and cross-firm commonalities according to our multiple-case approach. We used a questionnaire that had been pre-tested for the purposes of the study. In order to avoid ambiguity and ensure the understandability of the questionnaire, all instructions were discussed previously with key individuals within the organizations (e.g., workers' council, CEO, HR manager). Where necessary, items were added with case-specific examples. Several measures were taken to minimize possible common-method biases through cross-sectional analysis and self-descriptions (Podsakoff *et al*., 2003). For example, anonymity and data confidentiality were assured via data privacy statements, the fact that there were no right or wrong answers was emphasized, and all instructions followed the principle of social comparison (e.g., "Rate the level in comparison with an average successful organization in your industry").

We achieved an average response rate of 52%, which ranged from 36% to 87% from case to case (Table 2). The samples widely reflect the organizations' characteristics. The gender distribution seems to vary according to industry, from 10% female participation in the automotive supply industry to 40% in both the hospital association and the diocese. Most of the respondents were between 40 and 49 years old (35%), 29% were between 50 and 59, 21% were between 30 and 39, 10% were between 20 and 29, and the remaining 5% were over 60. Job tenure differed greatly corresponding to the age distribution. The sample showed a nearly equal distribution of low, middle, and highly experienced employees. Most of the employees surveyed were qualified workers who held a university degree or had received vocational education.

Measurement of DCs and Micro-Variables

We treated DCs as a dependent upper-level variable and micro-variables (leadership behavior, team interaction, individual capabilities, and job characteristics) as potentially constituent constructs of DCs. In line with Eisenhardt *et al.* (2010), who define microfoundations as "underlying individual-level and group-level actions that shape strategy, organization, and, more broadly, dynamic capabilities, and lead to the emergence of superior organization-level performance" (p. 1263), our measurement was focused on routines in individual and collective action and interaction.

We decided to adopt the scales provided by Wilkens and Gröschke (2008a, 2008b) to measure three fields of variables: DCs as an organizational variable on the one hand and individual capabilities and team interaction as two of the four identified micro-variables on the other hand. These scales were selected as their authors focus on descriptions of routinized action at the individual-, team-, and organizational level (English version available at http: //www.skmcommunity.org/dca/scale15.html). This selection is in close keeping with the theoretical outline found in the DC literature (Eisenhardt & Martin, 2000)

TABLE 2
Overview of case organizations

Case	Industry	Main products / services / activities	Market characteristics and main sources of dynamics and complexity	Number of employees / sample size	Gender (male / female)	Perceived change rate of market players[b]	Perceived environmental complexity[b]	Perceived frequency of market change[b]	Perceived predictability of market dynamics[b]
A	Plant engineering 	Ready-to-use non-woven machinery products	Defined boundaries; identifiable but constantly shifting global players; frequent political and technical changes; new business models; high investment level; specialized project work in heterogeneous teams	171/112 (65.50%)	85.6% / 14.4%	100	50	50	50
B	Retailing 	Specialist sports products	Defined boundaries; identifiable but often-shifting players; growing number of competitors (esp. online services); fast societal, technical, and legal changes; often-predictable, changing distributive channels; increasing complexity of market	86/75 (87.21%)	73.6% / 26.4%	80	80	80	60
C	Healthcare 	Hospital association	Overlapping market boundaries; stable and mostly identifiable players; legal, political, and technical changes; mostly predictable, complex guidelines yet little standardization; small sub-units with highly specialized knowledge	139/73 (52.52%)	60.0% / 40.0%	20	70	30	75
D	Non-profit (diocese) 	Administrative services for and management of a diocese	Blurred boundaries; ambiguous yet stable players; fast societal and political changes that are only partly predictable; change of values in society; distributed sub-units	376/137 (36.44%)	57.6% / 42.4%	20	100	90	40
E	Automotive supply 	Steering systems, R&D	Stable and identifiable boundaries and players; mostly predictable technical changes; strong power position of customers leading to high dependency; complex matrix structure; specialized knowledge; changing quality requirements; globalized market	162/89 (54.94%)	90.5% / 9.5%	10	80	40	80
				486[a] (52.03%)	73.3% / 26.7%				

[a] After examining the distributions for all items and missing values in the data, 23 datasets were excluded from the sample. Values reported here refer to the originally collected data.
[b] Results from structured interviews with key informants of the organizations; assessment by respondents on a scale from 0 (not at all) to 100 (fully).

and anticipates the interrelatedness of different levels, which is crucial in the discourse on microfoundations (Teece, 2007). At the organizational level, operationalization addresses routines and processes that are linked to organizational adaptation and change (e.g., "In our organization, we systematically analyze environmental conditions."). With respect to individual capabilities and team interaction, the scales address cross-situational action and problem-solving activities that are targeted at dealing with changing demands (e.g., individual capability: "In order to develop new solutions to problems, I often make use of creative approaches"; team interaction: "We are successful at using our experiences to collectively address new problems"). The measurement integrates actor-oriented perspectives regarding how to adapt to environmental changes; however, the scales did not evolve solely from DCV. The underlying capability model (Wilkens, Keller & Schmette, 2006) was inspired by the theory of complex adaptive systems (Kauffman, 1993) with respect to organizational DCs and the social-cognitive theory in terms of self-efficacy (Bandura, 1989) with respect to individual capabilities and collective efficacy (Bandura, 2000) for team interaction (for more information, see Table 3). The scales for DCs, individual capabilities, and team interaction have been applied in previous studies and have undergone different steps of validation (e.g., Sprafke *et al*., 2012; Sprafke & Wilkens, 2014; Sprafke, 2016). These scales refer to four dimensions: dealing with complexity, creative problem-solving, reflection and adaptation, and cooperation at all levels (at the individual-, the team-, and the organizational level). For the organizational level, this taxonomy is generally in line with Teece's (2007) description of sensing, seizing, and reconfiguring, but it goes further by emphasizing the relevance of collaborative activities by postulating "cooperation" as a fourth dimension (see Sprafke *et al*., 2012, for greater elaboration on the overlap with Teece's conceptualization).

In order to capture job characteristics as a further field of micro-variables, we adapted scales from empowerment research that are associated with HR practices that are supportive of innovation. We employed items from both Spreitzer (1995, 1996) and Laschinger *et al*. (2001) that cover not only structural empowerment – which is associated with the job characteristics model (Hackman & Oldham, 1980) – but also psychological empowerment – which is tied to Bandura's (1989) work on self-efficacy.

The final field of micro-variables – leadership behavior – was measured with items developed by Arnold *et al.* (2000) in the "Empowering Leadership Questionnaire." The scale was empirically constructed in order to describe and measure a new set of roles and responsibilities that managers have to take on when faced with an increasing need for flexibility. The scale examines behaviors that are necessary to effectively lead employees and teams in modern organization (i.e., semi-autonomous or self-managing teams in empowered or flat organizations). It addresses the factors of Coaching, Informing, Leading by Example, Showing Concern/ Interacting with the Team, and Participative Decision-Making.

Table 3 provides detailed descriptions of the scales. All items were measured on seven-point scales (1 = does not apply at all; 7 = applies fully) with numerical anchors to illustrate equidistance (Rohrmann, 2007). The scales generate self-reported data from employees' assessments of the execution of everyday activities on an item-by-item basis. As each employee can best report on his/her own work practices and acts according to a perceived environment, there is sufficient informant accuracy (Homburg *et al*., 2012). The interrelatedness between DCs and micro-variables is an outcome of empirical testing.

Procedure of Data Evaluation

Our analyses were based on two major steps: First, we established the measurement models by performing exploratory factor analyses (EFA) and confirmatory factor analyses (CFA). Second, we applied discriminant analyses to examine which micro-variables contribute to the explanantion of DCs in which configurations.

Factor Analyses for Establishing the Measurement Models

As preparatory step, the measures for DCs and micro-variables were subjected to factor analyses in order to test the factor structures. We assessed dimensionality, reliability, and the validity of the scales. We performed the factor analyses at the level of our overall sample and not for the subsamples as our aim was to establish generally valid measurement models (in contrast to firm-specific measures). We inspected missing values, item distributions, means, standard deviations, difficulty, and item-total correlations. Following the missing-value analyses, we excluded 23 datasets with more than 10% missing values and completed the dataset with the EM algorithm (Dempster, Laird & Rubin, 1977; Little, 1988). Since common method variance might have caused systematic errors in the measurement because all data were self-reported and collected via the same questionnaire with a cross-sectional research design (Podsakoff *et al*., 2003), we first conducted exploratory principal component analyses and principal axis analyses with all items as intended in the Harman one-factor test. No general factor was apparent; thus, common method variance is unlikely to have confounded the results.

For the operationalization of DCs, the indicators were expected to belong to the same latent factor, and axes were thus not required to be orthogonal. We applied principal axis analyses with promax rotation. As will be shown in the findings, the results of the EFA support this second-order structure for DCs. Therefore, the measurements were subjected to CFA that estimated a reflective second-order model (maximum likelihood algorithm, AMOS 21). The key challenge was to conduct an overall valid measurement while considering the fact that our sample originated from five organizations. To ensure that the measurements could be applied to the different organizations but would not be biased by the statements from one organization, we performed a multi-group CFA. We estimated multi-group models and compared the fit of unconstrained measurement models with the baseline model using delta CFI as a fit index (Cheung & Rensvold, 2002). This method is well-established for examining measurement invariance (Byrne, Shavelson & Muthen, 1989), which is a prerequisite for all kinds of cross-group comparisons but is quite rarely applied in organizational research (Vandenberg & Lance, 2000).

For the empirical categorization of the micro-variables and to establish their discriminant validity, we applied EFAs separately as well as jointly for the items and scales measuring individual capabilities, team interaction, job characteristics, and leadership behavior. We used principal component analyses with varimax rotation due to our goal of categorizing variables.

Discriminant Analyses for Analyzing the Contribution of Micro-Variables to the Explanation of DCs

In this step, we analyzed which micro-constructs were able to distinguish between high- and low-pronounced indicators of DCs. If a micro-variable discriminated between high and low values, it was assumed to contribute to the constitution of DCs. Furthermore, we considered the notion that micro-variables as constituent parts of DCs might be tightly and mutually reinforcing and thus build specific configurations. Comparing the micro-variables' isolated impact and combined effects was as a prerequisite for exploring their interrelatedness. This comparison could be realized in discriminant analyses by using a stepwise procedure with integrated ANOVA (Borgen & Seling, 1978). This procedure first selects the most important of all variables, removes the variance in the dependent variable, and then selects the second-most important variable until the selection of an additional variable does not increase the goodness of fit. Only variables that led to a significant improvement in the discrimination – allowing for all other variables – were entered into the model. Thus, micro-variables that showed no relative importance for DCs when considering the configuration were identified and excluded.

We performed six discriminant analyses: one for each organization and another one for the overall sample as comparison. The groupings for high and low values of DCs were performed using the median split technique, which led to nearly equal group sizes. We applied this technique in every subsample since a test for the invariance of the measurement intercepts revealed that the scores for DCs differ between the cases. Thus, the degree and effectiveness of the DCs may vary with regard to the industry in which the organization operates. We used canonical correlation, Wilks' Lambda, eigenvalues, and a comparison of hit ratio with maximum chance criterion (MCC) and proportional chance criterion (Cpro) to determine the goodness of fit in discriminant analyses. As discriminant analysis is sensitive to the equality of group covariance matrices, we used Box's M test.

Findings

We present the findings of our study in two steps: First, we specify DCs and micro-variables as a result of the factor analyses. Second, we show the relative importance of the different micro-variables in constituting DCs and their interrelatedness as a result of discriminant analysis.

TABLE 3
Measurement of DCs and micro-variables

Scale	Description	No. of items, example*	Theoretical and empirical foundation
Dynamic Capabilities (DCs)			
Dealing with Complexity	An organization's capability to absorb and structure environmental change through a sensible selection of information and a reflection of existing options of actions. This dimension is aimed at the following routines: – Gathering, filtering and prioritizing information – Developing action plans (feasibility, time) – Controlling progress and staying goal-oriented – Making high-quality decisions when faced with complex information	5 *"In our organization, we systematically analyze environmental conditions."*	Scales provided by Wilkens & Gröschke (2008a, 2008b) and Wilkens *et al.* (2006), based on the capability model of Wilkens, Keller and Schmette (2006). Scales theoretically built on: – theory of complex adaptive systems (Kauffman, 1993) – Teece' process perspective of DCs (2007)
Reflection and adaptation	An organization's capability to monitor their own development process and to initiate change regarding the application or adjustment of routines based on feedback from the environment. This dimension is aimed at the following routines: – Activating sources for feedback – Evaluating performance and routines – Actively implementing improvements based on the evaluation	5 *"In our organization, we critically assess the effectiveness of completed projects."*	
Creative problem-solving	An organization's capability to apply knowledge to various problem situations and, if necessary, to recombine existing knowledge. This dimension is aimed at the following routines: – Implemented techniques for creative ways of problem solving – Integrating new knowledge and strategies – Applying experiences and knowledge to new situations – Customizing existing and established methods	5 *"In our organization, we succeed in using existing know-how to solve new problems."*	
Cooperation	An organization's capability to build and maintain relationships with external partners in order to expand the options to act This dimension is aimed at the following routines: – Establishing relationships with subject-matter experts – Shifting perspectives and adapting to others – Showing reliably and demanding it from partners	6 *"Important contacts are maintained continuously in our organization."*	
Leadership Behavior			
Empowering leadership	Leadership behaviors that are associated with effective leadership in empowered environments, i.e., implementing conditions that enable sharing power with employees by delineating the significance of the employees' jobs, providing greater decision-making autonomy, expressing confidence in the employees' capabilities, and removing hindrances to performance. It is aimed at the following activities: – Leading by example – Participative decision-making – Coaching – Informing – Showing concern / interacting with the team	12 *"My superior shows me how to solve problems on my own."*	Scales from the Empowering Leadership Questionnaire (ELQ) developed by Arnold *et al.* (2000). Scales theoretically built on: – change in managers' roles and responsibilities in empowered environments (Lawler, 1986) – in DCV conceptualized as freedom to experiment, face-to-face interaction styles, trust, and reducing bureaucratic control (Foss *et al.*, 2008; Salvato, 2009)
Team Interaction			
Dealing with Complexity	A team's ability to absorb and structure information and a reflection of existing options of actions. This dimension is aimed at the following activities: – Gathering, filtering and prioritizing information – Developing action plans (feasibility, time) – Controlling team progress and staying goal-oriented – Making high-quality decisions when faced with complex information	5 *"In our team, we set priorities according to the task environment."*	Scales provided by Wilkens & Gröschke (2008a, 2008b) and Wilkens *et al.* (2006), based on the capability model of Wilkens, Keller and Schmette (2006). Scales theoretically built on or aligned to: – social cognitive theory of Bandura; collective efficacy (2000); – theory of complex adaptive systems (Kauffman, 1993); – team climate inventory (Anderson & West, 1998), especially in the field of task orientation
Reflection and adaptation	A team's ability to monitor team development process and to initiate change regarding the application or adjustment of routines based on feedback from the environment. This dimension is aimed at the following activities: – Actively initiating and asking for feedback – Evaluating own performance and behavior – Actively implementing improvements based on the evaluation	6 *"In our team, we regularly think about how we can optimize our processes."*	

TABLE 3
Measurement of DCs and micro-variables

Scale	Description	No. of items, example*	Theoretical and empirical foundation
Team Interaction			
Creative problem-solving	A team's ability to apply knowledge to various problem situations and, if necessary, to recombine existing knowledge to create a new knowledge base. This dimension is aimed at the following activities: – Using new, creative ways to solve problems – Integrating others' knowledge and strategies – Applying experiences and knowledge to new situations – Customizing existing and established methods	6 *"We are successful at using our experiences to collectively address new problems."*	
Cooperation	A team's ability to build and maintain relationships with other actors in order to expand existing options to act. This dimension is aimed at the following activities: – Establishing relationships with subject-matter experts – Communicating comprehensively and precisely – Dealing constructively with conflicts – Shifting perspectives and adapting to others – Showing reliably and demanding it from others	7 *"Our team succeeds in cooperating with external partners in a constructive manner."*	
Individual Capabilities			
Dealing with Complexity	An individual's ability to select, absorb and structure information and reflect existing options to act. This dimension is aimed at the following activities: – Gathering, filtering and prioritizing information – Developing action plans (feasibility, time) – Controlling progress and staying goal-oriented – Making high-quality decisions when faced with complex information	5 *"Even if the situation is vague, I am able to estimate how much time it will take to finish a task."*	Scales provided by Wilkens & Gröschke (2008a, 2008b) and Wilkens *et al.* (2006), based on the capability model of Wilkens, Keller and Schmette (2006). Scales theoretically built on: – social cognitive theory of Bandura; self-efficacy (1989); – theory of complex adaptive systems (Kauffman, 1993); – feedback and self-regulated learning (van den Boom, Paas & van Merriënboer; 2007)
Reflection and adaptation	An individual's ability to monitor the own development process and to change practices and routines based on feedback from the environment. This dimension is aimed at the following activities: – Actively initiating and asking for feedback – Evaluating own performance and behavior – Actively implementing improvements based on the evaluation	5 *"I actively seek feedback from others in order to increase my performance."*	
Creative problem-solving	An individual's ability to apply the knowledge to various problem situations and, if necessary, to recombine existing knowledge to create a new knowledge base. This dimension is aimed at the following activities: – Using new, creative ways to solve problems – Integrating others' knowledge and strategies – Applying experiences and knowledge to new situations – Customizing existing and established methods	5 *"In order to develop new problem solutions, I often make use of creative approaches."*	
Cooperation	An individual's ability to build and maintain relationships with external partners in order to expand own options to act. This dimension is aimed at the following activities: – Establishing relationships with subject-matter experts – Communicating comprehensively and precisely – Dealing constructively with conflicts – Shifting perspectives and adapting to others – Showing reliably and demanding it from others	8 *"In the face of problems, I do not hesitate to seek others' assistance."*	
Job Characteristics			
Empowering working conditions	Working conditions that foster the feelings of being empowered and that show social-structural characteristics that enhance the power of employees. It is aimed at the following cognitions and activities: – Psychological empowerment: experiencing meaning in one's work as well as self-determination, having an impact on strategic, administrative, or operating outcomes and perceiving self-efficacy – Structural empowerment: having access to information, receiving support, having access to resources necessary to do the job, and having the opportunity to learn and grow	Structural empowerment: 5 *"I have access to the resources I need to do my job well."* Psychological empowerment: 16 *"If an unexpected situation occurs, I am confident about my ability to do my job."*	Items provided by Spreitzer (1995, 1996), Laschinger *et al.* (2001) and Schwarzer and Jerusalem (1999). Scales theoretically built on: – HR practices supportive of innovation (Çakar & Ertürk, 2010) – structural empowerment that is associated with the job characteristics model (Hackman & Oldham, 1980) – psychological empowerment tied to self-efficacy (Bandura, 1989)

*All items were measured on seven-point scales, where 1 = does not apply at all and 7 = applies fully.

Specification of DCs

Our analysis reveals four factors that specify DCs: dealing with complexity, creative problem-solving, reflection and adaptation, and cooperation. This factor solution from EFA is in full accordance with Wilkens *et al.'s* (2006) theoretically postulated structure. Dealing with complexity comprises the organizational activities of observing, absorbing, and structuring environmental change. Moreover, it refers to the sensible selection and systematic elaboration of information and to the regulation of responsibilities. Creative problem-solving includes activities that are targeted at experimenting with novel approaches, integrating new strategies, and using creativity techniques to create new solutions. Reflection and adaptation describes the activities of analyzing, evaluating, and adjusting the effectiveness of organizational development processes, structures, and projects. Cooperation refers to the activity of purposefully building and maintaining relationships with other actors on the market in order to expand the organization's options to act and to reinforce intra-organizational collaboration. These four factors of DCs explain 75% of the variance in the EFA. The factors are highly internally consistent and reliable with regard to the values of Cronbach's alpha (≥ .70), the corrected item-total correlation (ITC; ≥ .40), and inter-item correlation (IIC; ≥ .30). The factor structure illustrates ideal loading patterns; thus, the four factors discriminate sufficiently (Table 4).

As expected, the factors highly correlate (> .71) since they display different facets of DCs while belonging to DCs as a common latent factor. The estimation of a second-order model (CFA) provides statsistical support for the propositoin that DCs are a higher-level construct and have four dimensions: dealing with complexity, creative problem-solving, reflection and adaptation, and cooperation. The covariance values between the first-order factors are all significantly different from zero (values between .74 and .86). The second-order model displays a good fit (χ^2/df = 2.836, CFI = .978, TLI = .969, SRMR = .029, RMSEA = .063). All factor loadings are significant at the 0.01 level. Good model fit indices provide evidence of convergent validity and unidimensionality. The models display reliability since the values in each model exceed the recommended level of > .40 for indicator reliability (Bagozzi & Baumgartner, 1994) and are above the threshold of. 60 for composite reliability (Bagozzi & Yi, 1988; Table 4). The average variance extracted (AVE) for all factors clearly exceeds the requirement of > .50 (Fornell & Larcker, 1981; values range between .72 and .84). Cronbach's alpha for the overall scale is.96; thus, the indicators are sufficient in their representation of the constructs. Furthermore, our analyses demonstrate that this model of DCs is applicable to different organizations following the results of multi-group CFA (Table 5). We can assume configural and metric invariance as well as partial invariance for the measurement intercepts (Byrne *et al.*, 1989).

TABLE 4
Specification of DCs: indicators, reliability, and validity (second-order model)

Factor	Description	No. of items[1]	IIC	Alpha	ITC	1st-order factor loadings	AVE	2nd-order factor loadings
Dealing with complexity	Activities of observing, absorbing, and structuring environmental change; sensible selection and systematic elaboration of information; and the regulation of responsibilities	5	.70	.92	.66-.85	.69-.91	.72	.95
Creative problem-solving	Activities targeted at experimenting with novel approaches, integrating new strategies, and using creativity techniques to create new problem solutions	4	.70	.90	.75-.82	.85-.90	.75	.82
Reflection and adaptation	Activities of analyzing, evaluating, and adjusting the effectiveness of organizational development processes, structures, and projects	3	.82	.93	.82-.89	.89-.94	.84	.88
Cooperation	Activities targeted at purposefully building and maintaining relationships with other actors on the market in order to expand the organization's options to act and to reinforce intra-organizational collaboration	4	.75	.92	.77-.86	.82-.92	.77	.88

Composite reliability is.93; AVE is.780; [a] all loadings significant at p =.001; Cronbach's Alpha =.96.
[1] Five items have been excluded due to weak commonalities and/or weak loadings.

TABLE 5
Specification of DCs: results for measurement invariance (multi-group CFA)

Organizational-level activities of renewal	χ^2	p	χ^2/df	RMSEA	CFI	ΔCFI
Unconstrained (configural invariance)	816.016	.00	1.876	.044	.942	-
Measurement weights (metric invariance)	891.203	.00	1.845	.043	.938	.004
Measurement intercepts (scalar invariance)	1230.710	.00	2.250	.052	.896	.046
Measurement intercepts (partial scalar invariance)	1055.294	.00	2.049	.048	.918	.024

Identification of Micro-Variables

The categorization of the measured micro-variables in EFA reveals 12 factors that specify individual capabilities, leadership behavior, job characteristics, and team interaction (Table 6). All 12 factors exhibit satisfying values with regard to Cronbach's Alpha and ITC. The analysis reflects the explored inherent categorization of the microfoundations discourse (Table 1). The most important detail here is that the joint analysis of all items clearly divides into individual capabilities, team interaction, leadership and job characteristics. It provides a solid empirical categorization and foundation for examining the interrelatedness of micro-variables. With respect to individual capabilities the items divide into four factors and most items load exactly according to the underlying capability model. As a few items are categorized in a new manner we titled the four factors: individual cooperation skills, individual cognition and reflection, individual methodological skills and creativity, and individual dealing with complexity. Three instead of four factors were extracted with respect to team interaction. According to the item loading they are named as: team problem-solving, team learning, and team cooperation. One factor refers to empowering leadership. The remaining four factors display job characteristics: self-efficacy, autonomy and impact, access to resources / information, and meaning.

Relative Importance of Micro-Variables

The discriminant analyses[2] reveal that nearly all micro-variables differentiate between high and low values of DCs when they are considered in an isolated manner (see Table 7, univariate analyses). However, if we apply the stepwise procedure (i.e., if we consider all micro-variables simultaneously to discriminate DCs), we encounter remarkably different results. Here, the number and kind of variables that were entered in the discriminant function clearly differ between the cases (Tables 8 and 9). Thus, there is evidence for different constituting bundles, and we find an important difference between an isolated consideration of micro-variables and their relative importance when considering the interrelatedness of micro-variables.

Relevance of Micro-Variables in a Cross-Firm Comparison

For Organization A (plant engineering company), four micro-variables entered the discriminant function in the stepwise procedure (Table 8): access to resources / information, team learning, individual methodological skills and creativity, and self-efficacy. In Organization B (retailing), access to resources / information and individual methodological skills and creativity entered the discriminant function, and in Organization C (healthcare), empowering leadership and team problem-solving displayed significant importance in the stepwise procedure. In Organizations D (diocese) and E (automotive supply), the same variables were part of the discriminant function: team learning and access to resources / information. Despite the differing industries, this correspondence of micro-variables in the two organizations may be traced back to similarities in the work structure (e.g., working in distributed, mainly independent teams and sub-units) as well as to similarities concerning market characteristics (e.g., the changing rate of players and environmental complexity) (Table 2).

The results generally highlight the job characteristic "access to resources / information" as the most important variable that is positively related to DCs. This variable enters the discriminant function in four of the five cases and does so three times in the first step (i.e., the step with the highest relative importance). "Team learning" is important in three of the organizations, and "individual methodological skills and creativity" is important in two of them. Self-efficacy, empowering leadership, and team problem-solving are each important in only one organization in order to differentiate between high and low DCs.

Another interesting result appears with regard to the influences that the micro-variables exert upon one another. There are micro-variables that contribute to shared variance according to structure coefficients (Table 9; they exceed the critical value of.40; Hair *et al*., 2010) but that show no relative importance for the discriminant score when the constituting bundle is considered (Table 8). In Organization A, these variables are team problem-solving and team cooperation. In Organization B, this is the case for empowering leadership as well as for autonomy and impact. In Organization C, team learning as well as team cooperation are affected, and in Organization D, 6 other variables display structure coefficients above the threshold but do not enter the discriminant function. In Organization E, four variables are concerned, which means that the variance in DCs that these micro-variables explain is, in turn, explained by the micro-variables that appear as important discriminators (Sherry, 2006). Thus, although the influence of some micro-variables on the constitution of DCs is demonstrable, it is overshadowed by one or more other micro aspects.

In Organizations A and B, we even find suppressor effects. "Individual methodological skills and creativity" in both organizations and "self-efficacy" in Organization A demonstrate structure coefficients below the threshold of.40 but appear to be important discriminators in stepwise analysis. On a univariate basis (Table 7), individual methodological skills and creativity do not even discriminate between high and low DCs. This points to a suppression, namely the effect that these micro-variables are not directly related to the discriminant function once all intercorrelations between the other variables are considered (structure matrix). However, the micro-variables influence the discriminant score by interacting with the other predictor variables (Sherry, 2006) and hence bundle with the other variables.

It is apparent that nearly all the studied micro-variables seem to make a contribution to the constitution of DCs when considered separately. However, in the multivariate analyses that controlled for the interrelatedness among them, bundles of two or four micro-variables were crystallized. Only these micro-variables significantly contributed to the discrimination of DCs. It is remarkable that we only found an effect for individual capabilities in Organizations A and B, namely an effect that exists for individual methodological skills and creativity.

2. All six discriminant analyses yield satisfying results with regard to the statistical requirements. Only one discriminant function was estimated in all cases. All discriminant functions were significant at $p < .001$, with Wilks' Lambda varying from.561 to.836 for the five cases. The discriminatory power in terms of eigenvalue varied from.197 to.782, and the canonical correlation ranged from.405 to.663. The accuracy of classification in each of the cases was satisfying, and the hit ratios were considerably higher (1.25x) than a random classification, as indicated by the MCC and Cpro.

TABLE 6
Specification of micro-variables: results of EFA and analysis of reliability

Factor	No. of items[1]	MSA	ITC	Factor loadings	Alpha	IIC	Description
Team problem-solving	8	.94-.97	.70-.80	.47-.76	.923	.605	Coping with complex and dynamic problem situations, prioritization, and decision-making; integration of team experiences to solve problems
Team reflection and adaptation	8	.93-.98	.61-.74	.61-.77	.901	.536	Regular reflection and evaluation of results and processes achieved within the team, mutual learning through an active exchange of feedback to improve the courses of action
Team cooperation	8	.95-.98	.64-.76	.33-.72	.905	.544	Complying with / honoring agreements, efficient internal communication and mutual support, facilitating internal cooperation as well as constructive formation of external relationships (also in case of conflicts)
Individual cooperation skills	7	.88-.94	.47-.61	.47-.70	.798	.373	Actions aiming at a flexible adapting to different persons, demanding but also offering help, dealing constructively with conflicts, holding on to commitments
Individual cognition and reflection	5	.86-.94	.47-.54	.39-.74	.723	.344	Actions of reflecting and evaluating conduct and acts, inviting and putting feedback into practice, and adapting others' strategies for own improvements
Individual methodological skills and creativity	3	.80-.94	.45-.70	.59-.81	.763	.515	Actions of applying own knowledge to various problem situations, using creative methods, and forging new paths to develop problem solutions
Individual dealing with complexity	4	.87-.91	.42-.55	.42-.77	.688	.363	Actions of planning, priority setting, and monitoring tasks and steps; managing time and goals effectively; getting one's ideas across
Empowering leadership	12	.93-.97	.74-.85	.71-.86	.960	.669	Leader-empowering behaviors connected to coaching employees, informing them, leading by example, showing concern for and interacting with employees, and participative decision-making
Self-efficacy	10	.87-.95	.58-.74	.62-.81	.906	.498	Self-confidence specific to one's work, a belief in one's ability to perform work activities with skill
Autonomy and impact	4	.85-.89	.63-.75	.69-.81	.848	.584	Self-determination at the workplace; possibility of influencing action outcomes and work results
Access to resources / information	3	.92-.93	.61-.65	.65-.76	.787	.556	Access to relevant strategic information and resources in order to be able to do a good job
Meaning	2	.89-.91	.64	.72-.81	.778	.639	Perception of occupational activities as important and personally meaningful

[1] Six items had to be excluded during the analyses due to cross-loadings, weak loadings, and/or weak ITC (four items at an individual level and one each for empowerment and team interaction).

Significantly, there are also variables that contributed to DCs on a univariate basis in almost all cases but never became part of the identified configuration. This is most demonstrative with the variable "meaning." Such micro-variables seem to be related to DCs in an isolated manner but to be unrelated or weakly related when taking other variable categories into account. The implications of these results are discussed below.

Discussion, Managerial Recommendations, and Limitations

The aim of the present study was to explicate the micro-variables that constitute DCs, their relationships, and their firm-specificity. The data evaluation therefore included the search for the micro-variables that matter most when discriminating between low and high DCs, the analysis of their constitution as isolated factors or a configuration of activities, and a cross-firm comparison of whether these factors display firm-specific idiosyncrasies or cross-firm commonalities.

We discovered 12 micro-variables with a statistically relevant impact on DCs in all investigated cases in the univariate analysis. With the further analytical step of the multivariate discriminant analysis, our study also revealed that micro-variables come into effect as bundles of activities and that these effects differ between firms. In each firm of our sample, a specific bundle of only a few micro-variables constitutes the DCs. This finding has considerable implications in a theoretical and a methodological manner. The identification of firm-specific bundles of micro-variables that constitute DCs provided a compelling argument to avoid neglecting the considerations of the RBV (Barney, 1991) as the origins of the DCV, especially when it comes to microfoundations. Which micro-variables matter and how they interact cannot be reduced to a simple answer as this would ignore the firm-specific constitutions of micro-variables that are most relevant in explaining DCs. When it comes to microfoundations, it is worth to recall the RBV with its considerations on firm-specific clusters of variables for gaining competitive advantages. Even though this perspective might be too limited for strategic organizational

TABLE 7
Discriminant analysis: results for discrimination of micro-variables with regard to DCs on a univariate basis

	Overall			Organization A			Organization B			Organization C			Organization D			Organization E		
Micro-variable	**Wilks' Lambda**	**F (1, 479)**	**p**	**Wilks' Lambda**	**F (1, 106)**	**p**	**Wilks' Lambda**	**F (1, 73)**	**p**	**Wilks' Lambda**	**F (1, 71)**	**p**	**Wilks' Lambda**	**F (1, 132)**	**p**	**Wilks' Lambda**	**F (1, 86)**	**p**
Team problem-solving	.804	112.195	.000	.858	17.594	.000	.940	4.492	.038	.772	20.097	.000	.932	9.309	.003	.810	18.965	.000
Team learning	.797	117.323	.000	.807	25.338	.000	.826	14.936	.000	.773	19.983	.000	.865	19.826	.000	.793	21.175	.000
Team cooperation	.836	90.359	.000	.854	18.072	.000	.928	5.479	.022	.754	22.193	.000	.928	9.843	.002	.843	15.107	.000
Individual cooperation skills	.952	23.059	.000	.936	7.305	.008	.900	7.914	.006	.877	9.532	.003	.997	.359	.550	.877	11.335	.001
Individual cognition and reflection	.894	54.582	.000	.999	.143	.706	.852	12.335	.001	.937	4.584	.036	.953	6.288	.013	.886	10.373	.002
Individual meth-odological skills and creativity	.978	10.557	.001	.993	.785	.378	.951	3.681	.059	.974	1.840	.179	.996	.467	.496	.919	7.093	.009
Individual dealing with complexity	.901	50.820	.000	.943	6.409	.013	.936	4.830	.031	.988	.791	.377	1.000	.045	.833	.910	8.013	.006
Empowering leadership	.863	73.146	.000	.894	12.592	.001	.776	20.524	.000	.644	37.607	.000	.931	9.368	.003	.862	12.932	.001
Self-efficacy	.905	48.379	.000	.956	4.823	.030	.882	9.470	.003	.895	7.967	.006	.990	1.231	.269	.951	4.149	.045
Autonomy and impact	.915	42.576	.000	.919	9.318	.003	.804	17.331	.000	.898	7.721	.007	.942	7.860	.006	.988	.971	.327
Access to resources / information	.744	158.663	.000	.745	36.326	.000	.694	31.338	.000	.803	16.658	.000	.883	16.821	.000	.710	33.056	.000
Meaning	.869	69.723	.000	.895	12.399	.001	.865	11.098	.001	.810	15.954	.000	.972	3.609	.060	.806	19.473	.000

TABLE 8
Discriminant analysis: parameters of discriminant functions in the five cases and overall sample

	Overall	Organization A plant engineering	Organization B retailing	Organization C healthcare	Organization D non-profit	Organization E automotive supply
Wilks' Lambda	.623	.583	.628	.561	.836	.605
Eigenvalue	.606	.715	.592	.782	.197	.653
Canonical Correl.	.614	.646	.610	.663	.405	.629
χ^2	216.639	56.126	32.568	38.718	22.613	40.206
P	<.001	<.001	<.001	<.001	<.001	<.001

Idiosyncratic discriminant functions

Step	Variable	a	b	Variable	a	b	Variable	a	b	Variable	a	b	Variable	a	b	Variable	a	b
1	Access to resources / information	.675	.744	Access to resources / information	.719	.745	Access to resources / information	.981	.694	Empowering leadership	.792	.644	Team learning	.648	.865	Access to resources / information	.775	.710
2	Team learning	.442	.671	Team learning	.783	.637	Individual methodological skills and creativity	.518	.628	Team problem-solving	.544	.561	Access to resources / information	.515	.836	Team learning	.613	.605
3	Individual cognition and reflection	.351	.652	Individual methodological skills and creativity	-.690	.613												
4	Individual cooperation skills	-.290	.645	Self-efficacy	.474	.583												
5	Individual dealing with complexity	.210	.634															
6	Individual methodological skills and creativity	-.251	.629															
7	Self-efficacy	.222	.623															
hit ratio	78.4%			82.4%			76.7%			77.1%			62.8%			78.3%		
MCC	50.1%			50.0%			50.7%			50.0%			50.4%			50.6%		
C_{pro}	50.0%			50.0%			50.0%			50.0%			50.0%			50.0%		

a = standardized canonical discriminant function coefficient (standardized weights); b = Wilks' Lambda.

TABLE 9
Discriminant analysis: coefficients and centroids of discriminant functions in the five cases

	Overall	Organization A plant engineering	Organization B retailing	Organization C healthcare	Organization D non-profit	Organization E automotive supply
Canonical structure matrix (discriminant loadings, i.e., structure coefficients)						
Access to resources / information	.754	.692	.863	.333	.821	.791
Team learning	.648	.578	.385	.526	.891	.633
Team problem-solving	.573	.552	.245	.615	.796	.576
Team cooperation	.533	.497	.217	.494	.782	.425
Individual dealing with complexity	.427	.262	.233	.209	.320	.171
Empowering leadership	.467	.254	.571	.841	.696	.359
Self-efficacy	.416	.252	.347	.345	.261	.311
Autonomy and impact	.344	.212	.453	.363	.511	.289
Meaning	.397	.196	.245	.390	.446	.499
Individual cooperation skills	.287	.188	.280	.219	.400	.409
Individual methodological skills and creativity	.194	.102	.296	.248	.158	.369
Individual cognition and reflection	.442	.093	.339	.071	.331	.339
Functions at group centroids						
1 (DCs low)	-.778	-.838	-.770	-.872	-.443	-.808
2 (DCs high)	.775	.838	.749	.872	.437	.789
Gap	1.553	1.676	1.519	1.744	.880	1.597

development in highly volatile environments, the underlying argument can count for the constitution of micro-variables. Our findings also shed light on the question of why there are so many micro-variables in the current discourse. Each case study can identify different variables, a finding that is not incorrect but might reduce the conceptual generalization intended with the case analysis if considered to be a matter of firm-specificity.

With respect to methodology, our findings have implications for how to design the empirical access to microfoundations. Including merely a few variables (e.g., individual capabilities) would risk overestimating their effects since the relevance could disappear if further micro-variables were included. In order to avoid oversimplification, we assume that it is necessary to include all theoretically deduced fields of variables – individual capabilities, team interactions, leadership behavior, and job characteristics – in order to not exclude sets of variables that might be relevant in a bundle of activities, at least for a specific type of organization. We strongly propose integrating job characteristics into empirical studies as these characteristics tend to mainly influence how micro-variables come into effect. This recommendation is in line with authors who emphasize structure and processes in the microfoundation discourse (e.g. Teece, 2007; Felin *et al.*, 2012). It seems to be more important to analyze these more integrated constructs instead of going deeper and deeper on the micro-level.

Moreover, the case comparison implies that "access to resources / information" might be a critical factor independent of the specific context and could hence be regarded as a commonality in organizational renewal. This component of structural empowerment is part of four out of five firm-specific bundles of micro-variables, irrespective of the industry and market environment. "Team learning" might lead in a similar direction with its relevance in three out of five cases. Taking into account the controversial discussion between the protagonists of the DCV on firm-specific idiosyncrasies (Teece *et al.*, 1997) and overall commonalities in terms of routines of renewal (Eisenhardt & Martin, 2000), our findings suggest that the different positions are not necessarily contradictory as it is not a question of either/or. Structural empowerment (Sprafke, 2016) and team learning can be considered commonalities that can also be combined with other firm-specific aspects of leadership or individual capabilities to explain differences in DCs. In future research, it would be worth investing more in the search for commonalities as long as this approach does not neglect the interconnectedness with firm-specific aspects.

Moreover, our findings are of great relevance for the conceptualization of micro-variables as they go beyond existing frameworks. For example, Teece's (2007) process model allows for listing micro-variables in a systematic manner but does not provide a systematology for reducing complexity, searching for interactions, or prioritizing specific micro-variables. The empirical evidence for firm-specificity allows for elaborating on the RBV in the microfoundations discourse. In future research, this evidence might also influence how we discuss and conceptualize intra-firm units of analysis in a more distinct or integrative manner.

The findings and their framing with the RBV also have managerial implications. The key message is that it is necessary to conduct organizational diagnoses to identify the most critical factors of organizational renewal as a prerequisite for leveraging dynamics and conducting targeted interventions. It is important to know whether it is leadership, team interaction, or self-efficacy that really constitutes a firm's DCs. Interventions can be assumed to be most efficient if they are directly related to the firm-specific basis of renewal. Another implication (which should be formulated with some caution due to external validity) is that enhancing employees' access to resources and information as well as the promotion of team learning activities are context-independent, worthwhile measures for organizational development. Therefore, it seems to be important for managers to implement structures that empower their employees and enhance collective learning in order to foster strategic change. This is in line with studies measuring the outcome of empowerment (Maynard *et al.*, 2012).

The findings also allow us to refer to the introduced discussion on the role of different agents within the organization, which highlights managers (Helfat & Peteraf, 2015; Eggers & Kaplan, 2013) on the one hand and frontline employees (Hallin *et al.*, 2012; Rothaermel & Hess, 2007) on the other hand. Our findings reveal that the interdependency of these groups should be taken into consideration and that the focus depend on the type of organization. According to our findings, there are organizations that need to focus on leadership, especially in hierarchical and less-decentralized organizations (e.g., Organization C, healthcare), and there are more market-driven organizations in which it is more important to focus on frontline employees (e.g., Organization B, retailing).

With respect to future research, the suggested classification of micro-variables as more firm-specific idiosyncrasies when it comes to the individual level and more cross-firm commonalities in job characteristics and team work needs to be further validated in large-scale samples. We have to take into account that our findings are based on five cases and thus cannot be generalized beyond the described phenomena. Moreover, a certain degree of self-selection by the organizations cannot be ruled out since we selected our cases from organizations that had taken part in a publicly funded research project. In addition, important research tasks include identifying firm families with similar bundles that constitute DCs and developing a related classification based on configurations of the most important micro-variables. The explorative data evaluation in this study may lead to limitations in the development of a comprehensive research model since we were not able to determine exactly how the micro-variables interact (e.g., moderated or mediated effects). These matters cannot be realized in a single study, but the relevance of heading in this direction is a significant implication of the presented field exploration.

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