Implementation of Design Thinking to Improve Organizational Agility in an SME

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This research shows that the application of the creative innovation approach Design Thinking (DT) in corporate development projects fosters organizational agility (OA). Our study reveals that due to DT, an agile subculture arises in a small and medium sized company (SME), which over time, is spread throughout the company, and ultimately stimulates OA in three focal areas: (1) communication and pursuit of organizational goals, (2) organizational culture, and (3) operational activities.
This paper presents a framework to explain the interrelations of key themes of DT and aspects of OA by evaluating and presenting the results of a two-year research project on the implementation of DT and its effects on OA in an SME. This exploratory framework may be used as a basis for further studies.

Organizational Agility, Design Thinking, SME, Agile Management, Organizational Transformation, Case Study

Implementierung von Design Thinking zur Verbesserung der organisationalen Agilität in einem KMU

Dieser Beitrag befasst sich mit der Anwendung von Design Thinking (DT) in kleinen und mittleren Unternehmen (KMU), die deren organisatorische Agilität (OA) verbessert. Unsere Studie zeigt auf, dass sich in traditionell organisierten KMUs durch den Einsatz dieses kreativen Innovationsansatzes agile Subkulturen bilden können, die sich im Unternehmen über die Zeit ausbreiten und so die drei Kernelemente von OA positiv beeinflussen. Dies umfasst die OA-Elemente (1) Kommunikation und Streben nach organisationsbezogenen Zielen, (2) die Organisationskultur und (3) die betrieblichen Aktivitäten.
In diesem Beitrag werden die funktionalen Beziehungen und Abhängigkeiten zwischen DT und OA anhand einer Langzeitstudie in einem KMU aufgezeigt. Die Ergebnisse unserer zweijährigen Fallstudie spiegeln sich in einem explorativen Forschungsrahmen wider, der als Basis für die weitere Erforschung von Beziehungen und Abhängigkeiten zwischen DT und OA dienen kann.

Organisationsbezogene Agilität, Design Thinking, KMU, Agiles Management, Organisationale Transformation, Fallstudie

1. Introduction

Grashiller *et al.* (2017) state that agile approaches, such as Design Thinking (DT), have the power to change the organizational agility (OA), which is important for companies as they are in need to adapt their innovation ecosystem to react to turbulent environments (*Martin* 2009). Consequently, DT, as an agile, systematic approach for innovation development that inherently relies on user-focus, creativity, and collaboration (*Brown* 2009) has become increasingly popular for firms to respond to rapid changes, e.g. customer demands, technological advancements or changing markets (*Conforto et al.* 2016).

So far, there is a lack of empirical studies on the interconnections and relationships between DT and OA as well as on the implementation of DT in small and medium-sized enterprises (SMEs) (*Morris et al.* 2009). Against this backdrop, we examined *how OA in SMEs is affected when implementing DT.* In this paper, we present the results of our exploratory research based on a qualitative longitudinal single-case study to analyze how DT influences OA over a period of two years in an SME. Our research was conducted on an SME that operates in the European energy sector, which is a market with high competition and dynamically changing environment which has no former experience with agile practices. We evaluated internal documents, observed DT workshops, participated in internal discussions, and conducted 30 semi-structured interviews with five department managers and two members of the management board over a two-year period.

Our research reveals that DT is able to create an agile subculture, which diffuses in a company over time and which ultimately changes the OA in three focal areas: (1) the communication and pursuit of organizational goals (CPOG), (2) organizational culture (OC), and (3) operational practices (OP).

In the following section, we present the theoretical foundations of DT and its relation to OA. We then lay out our methodological approach for our research in section 3. In section 4, we present our findings on DT and its relation to OA. Section 5 discusses the results in light of the theoretical foundations. Finally, we conclude our research and present implications for future research.

2. Theoretical Foundations

2.1 Organizational Agility (OA)

Organizations are forced to apply methods and develop abilities to respond to external stimuli, e.g. technological advancements or changing customer demands (*Teece* 2007). The ability to react swiftly to such changes is depicted as OA (*Harraf et al.* 2015). OA relies on the ability to continuously identify and address customer or stakeholder needs as well as market or technology developments to remain competitive in a dynamic and innovative environment (*Conforto et al.* 2016). However, becoming an agile organization is a persistent, non-deterministic process without a definite end (*Alzoubi et al.* 2011). OA represents firms' core competencies, which are reflected by organizational goals (vision, strategic direction, market analysis, and response), by the organizational culture (innovative mindset, tolerance for ambiguity, empowerment, and development of a learning organization), as well as by efficient and effective operational practices (OP) (change management, operations management, structural fluidity, and communication) (*Doz/Konsonen* 2008; *Harraf et al.* 2015; *Burchardt/Maisch* 2018).

Communication and Pursuit of Organizational Goals (CPOG) is about the development, formulation, and communication of clear and well-known objectives in a company (*figure 1*, left box). A clear vision fosters constant work towards an overarching collective goal, while a strategic direction provides clear and explicit guidelines for effective and efficient decision-making. The resulting clarity about organizational goals supports market analysis and responses, the activity of evaluating external environments, and the formulation of appropriate answers.

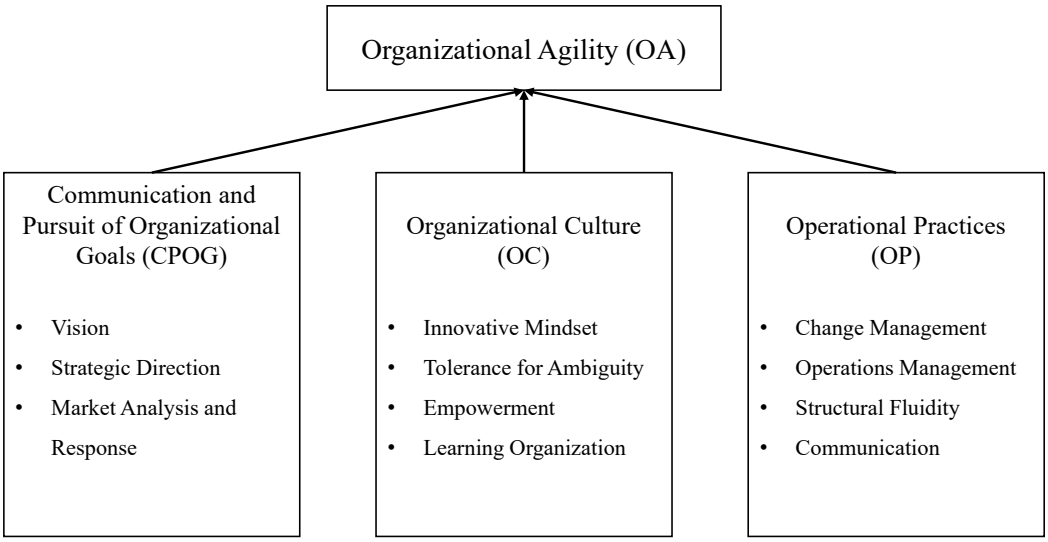

Figure 1: Core aspects of Organizational Agility (adapted from *Harraf et al.* 2015)

Hussman (2004) and *Tolfo et al.* (2011) describe that employing agile methods has a positive effect on OA in general and that its long-term success relies on building and maintaining an adequate agile OC. Turning from a traditional to an agile OC is challenging since an OC is deeply rooted in basic assumptions shared across an organization (*Schein* 1985). To change the OC, *Boisnier/Chatman* (2002) suggest developing an internal subculture in certain organizational units that build on core aspects of agility to provide creativity and flexibility to foster innovation in critical areas *(figure 1*, middle box). According to *Anderson and Schragenheim* (2004), these subcultures should promote an agile, innovative mindset that critically assesses potential improvements in the organization and beyond. This mindset depends on the empowerment of employees, as the top management alone cannot rely on their individual ability to sense and respond effectively to all internal and external changes. If employees constantly aspire to improve and transform, inertia is reduced and a learning organization will be established, as failures are seen as learning opportunities (*Darrin/Devereux* 2017; *Pereira and Russo* 2018). By that, tolerance for ambiguity is increased and uncertainty, as well as complexity, are answered by short-term activities that are refined iteratively to address changes and learnings (*Harraf et al.* 2015).

In order to remain competitive, an organization also has to thrive for efficient OP (*figure 1*, right box). Thus, operations management needs to constantly seek to improve the efficiency and flexibility of business operations. To allow these changes, an organiza-

tional structure should be fluid, i.e. be modifiable to support modes of collaboration and practices that may be needed to respond to market changes (*Harraf et al.* 2015). This structural fluidity relies not only on proper organizational design but as well on the ability to perceive, implement, and test changes in the organization (change management) (*Williams et al.* 2014). One key aspect to successfully initiate and implement change is a proper external as well as both horizontal and vertical communication within the organization.

The fundamental pillars of agility can also be found in DT that encompasses principles as open-mindedness, collaboration, continuous learning, iterative development, user- and customer integration, and, thus, is considered a powerful approach to empower organizational change towards OA (*Brown* 2009; *Martin* 2009; *Grashiller et al.* 2017).

2.2 Design Thinking (DT)

DT represents a creative approach to collaboratively develop user-centered innovations and to solve complex problems with a systematic procedure applied in workshop settings (*Brown* 2009; *Carlgren et al.* 2014). The DT approach is commonly conceptualized by trained facilitators, who apply a DT process, appropriate methods from various fields and facilitate the collaboration in a heterogeneous team by promoting core themes of DT that define how the team is working (see *figure 2*) (*Brenner et al.* 2016; *Redlich et al.* 2019).

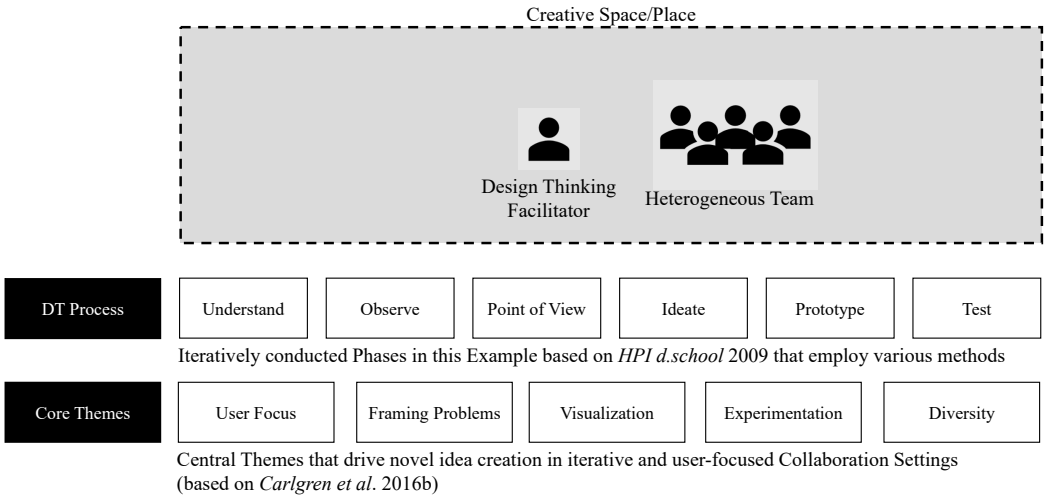

Figure 2: Design Thinking Process, Methods, Themes and Workshop Settings (adapted from *HPI D-School* 2009, *Carlgren et al.* 2016b)

While there are several DT process models with a varying number of phases, *figure 2* shows the HPI *D-School* process (2009) that employs six phases.[1] The phases are: *Understand, Observe, Point of View, Ideate, Prototype* and *Test,* thereby, conveying the focus of their respective activities. In each of these phases, methods are employed that draw from various fields (*Redlich et al.* 2019). Despite processual, contextual, and industry-related

1 The *HPI D-School* process model is described here, as it was employed by the facilitators in this case study.

differences, DT employs five characteristic themes that depict how firms can foster innovativeness, and adapt their practices based on (1) user focus, (2) problem framing, (3) visualization, (4) experimentation, and (5) diversity (*Carlgren et al.* 2016b) (see *figure 3*). These themes are connected to a diverse set of principles/mindsets, practices and techniques that are linked to one or several themes (*Carlgren et al.* 2016a).

Core Themes of Design Thinking

Core Theme	*Description*
(1) User Focus	Empathize with users to understand latent needs by using qualitative, context specific approaches to do user research. Interaction with users in, for example, research, ideation and idea testing.
(2) Problem Framing	Challenge and reframe the initial problem, to expand both the problem and solution space, through various synthesis activities that include pattern finding and ideation.
(3) Visualization	Make ideas and insights visual and tangible, to externalize knowledge, communicate and create new ideas, through, for example, visual structuring techniques, rough mock-ups and role-play. 'Thinking by doing'.
(4) Experimentation	Iterative divergent and convergent work style. Prototype quickly and often to learn (simple and rough representations), and test solutions quickly by sharing prototypes with users. Fail often and fail soon. Playfulness and humor.
(5) Diversity	Creation of diverse teams with a climate where every opinion counts and decisions are taken jointly. Collaboration with external entities and seeking diverse perspectives from a variety of fields. Democratic spirit.

Figure 3: Core Themes of Design Thinking (adapted from *Carlgren et al.* 2016b)

In line with the framework of DT themes from *Carlgren et al.* (2016a), there are several potential benefits of DT on OA. *Lawson and Dorst* (2013) describe DT as a powerful approach to re-evaluate problems and opportunities to reach a user-perspective. The strong consideration of user needs provides a clearly defined organizational goal to create a mutual overarching objective for employees and a strategy to foster decision-making (*Abildgaard/Christensen* 2018; *Lew et al.* 2019). *O'Driscoll* (2016) depicts DT as a practical, efficient, and effective approach to identify problems and to achieve innovation developments. DT fosters a culture of learning by increasing the awareness towards finding and fixing shortcomings in products, services, and processes by integrating customer feedback and ideas (*Carlgren et al.* 2014; *Gurusamy et al.* 2016; *von Leipzig et al.* 2017; *Arar et al.* 2018). DT's iterative process even increases the positive effect on a culture of learning by making testing, failing, and eventually succeeding all valuable parts of the innovation process (*Rudzinski/Maisch* 2018; *Micheli et al.* 2019). DT is proposed to foster openness towards change *(Grots/Creuznacher 2016)* and tolerance towards ambiguity, which are described as inherent traits that are ingrained in the DT mindset (*Carlgren et al.* 2016b; *Grots/Creuznacher* 2016; *Micheli et al.* 2019).

To examine the effects on OA in an SME when implementing DT in a structured way, a research framework was developed, which links the three aspects of OA (CPOG, OC, and OP); including their aspects with the identified five core themes of DT (*figure 4*). Thereby, this research framework serves to identify causal relationships between the DT and OA aspects.

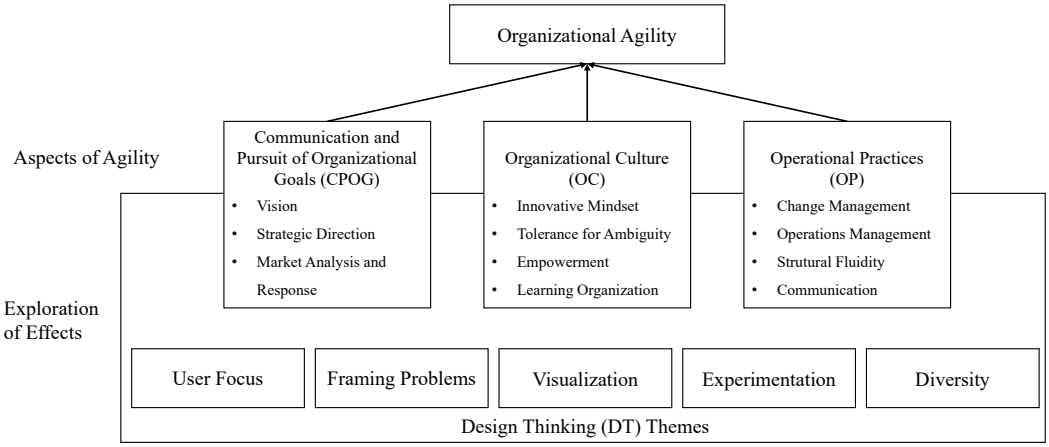

Figure 4: Exploratory Research Framework

3. Research Design

3.1 Methodology

Our research is motivated by a lack of scientific observations regarding the implementation of DT in SMEs and the call for research on examining the influence of agile approaches on OA. Therefore, we formulate the research question: *How is OA affected by the implementation of DT in an SME?* In this context and to answer our research question, we adopted an explorative, longitudinal single-case study, which lasted over a period of two years. As *Yin* (2003) states, single case studies are appropriate for the exploration of yet scarcely considered research on causal relationships (in this case the effect of DT on OA), and as a prelude to further studies.

3.2 Case Study Setting

The analyzed company, depicted as *Power* for the remainder of this article, is a German SME specialized in providing B2B services in the energy sector. *Power* was founded 20 years ago and has about 250 employees, as of March 2019. Its market is highly dynamic and volatile due to legal dependencies, changes in legislation (e.g. changes in public funding schemes for renewable energy projects), and fierce global competition (including dumping and subsidies of, e.g., solar cells) that affects prices and price sensitivity. Over the last decade, *Power* has been growing severely in terms of employees and revenues. However, organizational growth comes with some challenges related to maintaining OA (*Harraf et al.* 2015).

In search of a vital research object to explore the effect of DT implementation on OA, we considered companies that have not yet adopted DT nor other agile approaches, and that operate in dynamically changing environments in markets with high competition. *Power* is an organization that continuously adapted its business model and related core competencies over the last decade while growing from under 20 in 2010 to about 250 employees, as of 2019. The changes were fueled by the management board's vision, and through dense communication among the initially small team of employees. In 2010, a

common understanding of goals and broad awareness existed about ongoing projects. However, as *Power* increased in size and added new departments, the management board became increasingly distant to daily businesses, as organizational siloes formed. This decreased the awareness about the overarching vision and strategic goals of *Power* among the employees. Here, the management board perceived the need to improve the entrepreneurial activity of managers to drive exploration and exploitation in the dynamic and highly competitive market. To invoke a transformation towards a more agile organization, the DT approach was gradually introduced from 2017 until 2019, replacing unstructured ad-hoc project management without initial evaluation phases to innovate. The management board openly supported DT, and two department managers, as well as one member of the management board, were responsible for planning and participating in DT workshops that were applied in innovative, cross-departmental initiatives.

3.3 Data Collection

To collect data and generate insights on the impact of DT on the development of OA within the SME, we developed a semi-structured interview guideline. Interviews were held with five department managers and two members of the management board on specifically set points (after reaching pre-defined milestones for the implementation of DT) during the period from January 2017 (before the implementation of DT), until March 2019 (after the implementation of DT). Seven DT workshops (following the approach by the *HPI D-School* (2009) depicted in *figure 2*) spanning two to five days were conducted by professional DT coaches to introduce the innovation approach. Managers and experts that participated in DT workshops were trained in applying the DT process, methods, and in understanding the core themes of DT. Over time, they initiated own workshops and work phases in their respective departments to address issues in groups. A total of 30 face-to-face interviews and 7 group discussions after the DT workshops (see *figure 5*) were conducted to observe and compare developments related to OA.

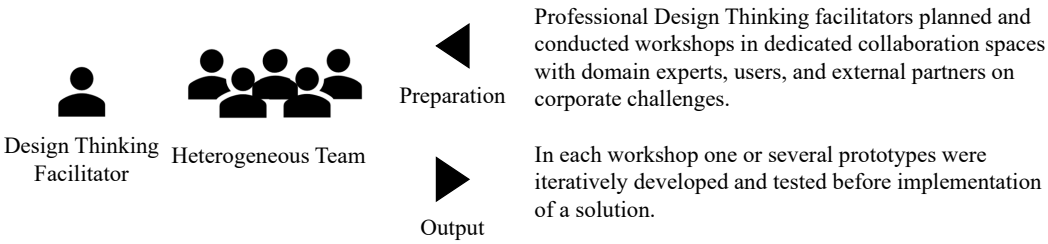

Figure 5: Design Thinking Workshop Settings

Two department managers and one executive manager were interviewed in each phase of the examination, in such a way that we could collect overarching information, and thus, lay out the progression and observe the improvements towards their projects by applying the DT approach. All interviews were tape-recorded, transcribed, anonymized, and then coded and analyzed by using the software "MAXQDA". Further information regarding data collection and analysis is depicted in *figure 6*.

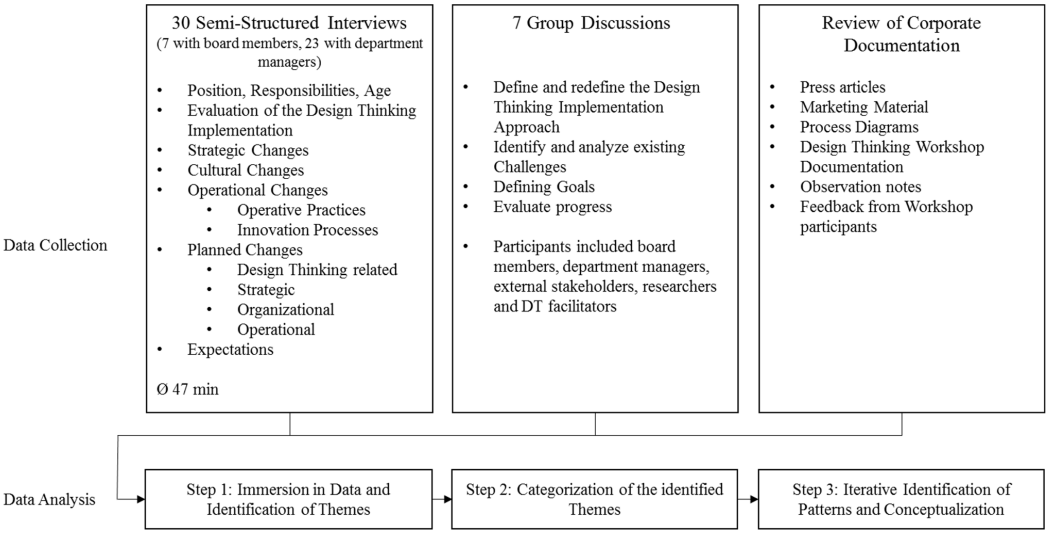

Figure 6: Data Collection and Analysis

Two board members and five department managers were selected based on their expertise and active involvement in seeking out business opportunities and driving internal change. Thus, we argue they possess skills, abilities, and knowledge to contribute valid information to our case study (*Wilson et al.* 2003; *Monette et al.* 2008). Nevertheless, to triangulate data, we also interviewed managers who were not directly involved in the DT implementation to obtain data from several perspectives and, therefore, reduce the biases of people directly linked to the DT implementation for a better assessment about the diffusion of information and differentiated sentiments. Additionally, *Power's* internal documents and marketing material were reviewed. Through a constant comparison of data from different sources, congruent and conflicted information was evaluated to enhance the interpretation of findings.

While explorative single case studies provide phenomenological insights to knowledge and theory building, they are limited in comparability and generalization (*Yin* 2003). We addressed a possible bias of interviewees by including responsible managers as well as all other department and top managers that were not directly involved in DT implementation. Including staff members from a more diverse hierarchical spectrum could further avoid potential response bias. Thus, we propose to conduct further studies in SMEs to reject, support, or enhance our research findings.

4. Findings

In the following section, we lay out DT induced changes related to (1) CPOG, (2) OC, and (3) OP, as well as their underlying core aspects of agility. Our findings are derived through an iterative examination of several data sources. Additionally, interview excerpts illustrate the sentiments as well as the perceived influence of DT in this section. The structure of this section follows the presented order of the core aspect of OA in *figure 1*. For clarification, the core aspects of agility are highlighted in the remainder of this text by *italic print*.

4.1 Influence of DT on CPOG

The rapid growth of Power in the last decade led to a decreased awareness of organizational goals among employees. While department managers and the management board members exchanged ideas and project updates on a weekly basis, employees rarely communicated across departmental borders or with board members. DT workshops and projects increased the awareness about not only mutual problems and respective ongoing projects in different departments through the diversely compiled small teams but also helped to create an aligned *vision* for organizational development. Through the collaborative formulation of problems, goals, and solutions, employees became increasingly aware of overarching issues outside their silos, as well as *strategic direction,* and got familiar with the company's vision.

One major goal of the implementation of DT was to act more proactively and address changes in the highly competitive market. According to board members, *Power*'s success depended on the initiative of department managers and employees to sense customer needs and evaluate business opportunities, which is a key indicator for success related to adopting the innovation approach. Through DT workshops, managers and employees were sensitized to the need for a holistic analysis of the market, stakeholder, and technology.

> "In our market, there is a constant need for innovation. We need to look for a way to survive in this market, and we can use DT as a valuable tool in this regard." – *Department Manager 1*

The use of DT also changed how *Power* seized opportunity sensing and responded towards a more structured customer-/user-centered pro-active approach throughout the organization.

> "Before, we mostly observed things from above and acted upon these observations. This is changing right now. The departments use DT themselves and analyze the current situation with the customer. Based on that, we choose the direction. This is more user-centered than before already… so then, we prepare new solutions and test them with the customers regarding its value for them and then we pursue this project together." – *Department Manager 2*

Managers started to regularly search for new solutions from a user-perspective and develop drafts to evaluate their market analysis with stakeholders, thus, enhancing the ability to sense business opportunities and address changing customer needs. By that, they intended to establish closer relationships and conduct potential mutual projects with customers that promised to be a strategic advantage, as the risk of unwanted innovations could be reduced.

4.2 Influence of DT on the OC

While the perceived risk of unwanted innovations was reduced by an early integration of customers and their ideas, needs, and opinions in the innovation process, the explorative yet structured nature of DT helped risk-averse employees and managers to become more open towards new ideas.

> "DT can be imagined as a handrail for some of my colleagues that feel uncomfortable to leave their comfort zone. Using DT … as guidance enables them to come up with new solutions more openly." – *Department Manager 3*

Thus, DT also fostered the *tolerance for ambiguity* in complex situations with unclear outcomes, as it provided a more structured process to address imperfect information by engaging opportunities.

> "It is specifically about risk-taking and opportunities, so not only seeing the risk but also the chances. Exactly this mentality is what I want in this organization." – *CEO 1*

Due to the high workload and required speed of market adoption in the energy sector to maintain competitiveness, the management board and department managers were perceived as pivotal for the decision-making in the company. However, in the DT projects, employees with the highest expertise in their respective fields were also enabled to influence solution formulation processes and make decisions. This more democratic and heterogeneous approach to address organizational challenges encouraged and *empowered* employees to communicate ideas, discuss problems, and assess opportunities more openly and critically with their superiors. Working on equal footing also promoted an environment of constant learning where structures and assumptions were (re-) evaluated. *Organizational learning* was enhanced among the employees, and organizational change was perceived as less risky and thus, leading to higher acceptance and participation among all users.

A department manager relates this change to

> "The different mindset we established, led us to take other approaches, to analyze, and inspire our employees to ask other questions. This is driven by DT." – *Department Manager 4*

This is in line with the atmosphere the executive board desires to establish:

> "As a company, we mainly survive because of the lessons we've learned. We give it a chance. If it fails the first time, no problem. Because we have learned something, and next time will be better. And this is something I see also in DT." – *CEO 2*

Overall, the influence of DT led to a strengthened *innovative mindset* in *Power*. By forming multidisciplinary project teams, department heads became more entrepreneurial and started projects based on customer input. Within these projects, hierarchical structures were abandoned to induce eye-level discussions, and decisions are made democratically or based on the expertise of participants with first-hand experience leading to the diffusion of traditional leadership roles. Seeking opportunities and alertness surged among employees that now feel more appreciated and informed about the strategic direction within the company. In this context...

> "DT serves as a toolkit that guides you to innovative solutions." – *Department Manager 2*

Overall, members of all hierarchical levels of the organization expressed significant organizational changes and changes in colleagues' mindsets towards open-mindedness, user-centeredness, as well as a collaborative working style. There was also a mutual appreciation for contributions from various stakeholders as well as in-depth research to kick off

new initiatives. This change of mindset began within the small teams participating in the DT workshops and led to occasional collaboration over departmental borders, which was not established before.

Over the course of the two years, employees from all divisions of *Power* were invited to join DT workshops, which led to a spread of the open and user-centered DT mindset. Further, employees pro-actively asked to take part in DT workshops and allowed them to better express new ideas for improvements in daily business routines. DT is perceived as an approach, which motivates employees to introduce and implement adjustments to their daily activities. Manager 3 describes the following:

> "What we have learned through all workshops have greatly improved the character of our business. We have now changed our company and are also able to customize many of our services." – *Department Manager 3*

4.3 Influence of DT on OP

Before the implementation of DT, processual and structural change was evaluated ex-post with the employees, restricting their agency in transformational processes to giving feedback. After the implementation of DT, internal users (i.e. affected employees) were consistently included in transformational processes. By including users, their experiences, perspectives, and firsthand expertise led to a vivid exchange of information, improved cross-departmental transparency, and employees being more open towards changes that affect them.

> "We used to dictate processes and said, this is how we do it now. Right now, we are striving for process optimization, and the first step after introducing DT was to involve employees in the process. We now have new opinions, new perspectives on the process – specifically from the user itself." – *Department Manager 1*

Thereby, the *change management* related to several transformational projects was enhanced by a more participative approach that built on heterogeneous expertise stemming from different hierarchy levels.

DT employed methods, which allowed having a richer study of the customers in the early phases of projects. This was highly appreciated by the executive board, as the amount of information available on how to set future decisions to pursue projects was higher than before. However, overall, there was no perceived effect of DT on organizational efficiency and structural fluidity.

> "For several years, we have been constantly establishing new departments, changing the structure in this way or the other, in order to find the optimal way. So, we were already very flexible, and very dynamic as a company." – *Department Manager 1*

In regards to the innovation process, however, DT was perceived as a more structured and efficient approach compared to the formerly applied ad-hoc project management, despite its inherent iterations, as it helped to prevent unforeseen setbacks in later stages in the process that used to be much more costly.

> "When we develop new services, DT methods help us to work in a more structured fashion. Before, we sometimes started with some aspects that consumed extra re-

sources, but we were going nowhere. Therefore, DT and its methods are more effective to develop services." – *Department Manager 4*

The appreciation of heterogeneous expertise within the DT projects was unanimous among the interviewees. In this context, it was perceived as essential to enable small initiatives that improved department-spanning processes and assess mutual needs and challenges within the organization. This appreciation fostered *communication* with external and internal stakeholders across organizational and departmental barriers.

"In cross-departmental meetings, we assess changes in the market and in projects. We all sit together and try to figure out how certain issues affect multiple departments or the organization as a whole. This is again something linked to DT. We do not use specific tools to communicate, but we consider different perspectives, and how they are interrelated to seek out opportunities." – *Department Manager 2*

Summarizing, the managers and board members of *Power* described several positive effects of DT on OA. The role of DT themes will be specified in the upcoming subsection to condense the previous elaborations.

4.4 Role of DT Core Themes

Among the workshop participants and facilitators, there was a consent that DT has changed group dynamics and fostered an open-minded, collaborative, and multidisciplinary way of working that focuses on customer and user integration. The members of the executive board and the department managers expressed that DT not only provided a more structured approach with dedicated methods to improve innovation processes but also contribute to a change of mindset. The themes of DT (see *figure 3*) contributed to establishing a mindset that positively influences the innovativeness of organizations.

(1) User focus: According to members of the executive board, the interaction with customers was and remains a major driver of success for *Power* after the implementation of DT. The introduction of DT was meant to establish a stronger user focus, which both employees and managers confirm. Department managers are now more actively engaging customers to collaboratively come up with new solutions, thus, increasing *market analysis and response* as well as building a more agile *organizational culture*. Moreover, internal users are now involved from the beginning of transformational processes until the end, thereby improving the overall awareness about *vision* and *strategic direction* through improved *communication*, which affects the entire organization and not only the DT teams. The integration of employees in the development of solutions (*empowerment)* also led to a higher acceptance of the organizational change (*change management)* and afforded that employees more actively search and propose ideas for improvement *(learning organization)*.

By (2) *framing problems* collaboratively with customers and with managers from different departments of the company to challenge the initial setting afforded project members, even the managers with a lower *tolerance for ambiguity,* to engage in the formulation of more open-minded and innovative solutions *(innovative mindset)*. Offering a structured approach to challenge existing practices, employees were *empowered* to contribute critical assessments and individual insight in- and outside of DT workshops *(learning organization)*. By examining solutions more openly, the environment of *Power* was evaluated more

extensively in regard to technological options and stakeholder (inter-)relationships *(market analysis and responsiveness)*.

DT also utilizes (3) *visualization* to make ideas more tangible and ease the communication of complex concepts. This "thinking by doing"-approach *empowered* non-experts to collaborate more, as visual methods were more inclusive. By *communicating* workshop results in the form of visual maps and mock-ups, employees from outside the project could assess and comment on the project more easily and build a better understanding of the respective projects in other departments. Visual methods quickly were adopted by employees outside of DT projects and reduced cultural distance towards DT.

> "As they already know visualization techniques, there are no more barriers regarding building tangible prototypes. They just give it a try." – *Department Manager 2*

(4) Experimentation with solutions and low-resolution prototypes reduced the fear of failure when formulating new services and also reduced inertia in the face of abundant and inconsistent information resulting from the legal and technological complexity of the market environment *(tolerance for ambiguity)*. A dedicated time frame to quickly test ideas with users, colleagues, and superiors inspired novel solutions, as common barriers and restrictions were questioned thoroughly *(learning organization)*. Potential solutions were iterated early in the process, thus, improving the effectiveness and efficiency of innovation processes according to managers.

The (5) *diversity* of participants amplified this notion of discovery and reflection as a multidisciplinary perspective fueled interdepartmental assessment of established structures. In these heterogeneous teams, decisions are now made more democratically or based on practical expertise. As hierarchical distance is reduced, employees feel *empowered* and are more open to change *(change management)* due to their increased agency and a deeper understanding of *strategic direction* and *vision* that drive change in *Power*.

4.5 The Influence of implementing DT on OA in an SME

In reference to our research question and the exploratory research framework (see *figure* 4) several causal relationships of DT themes and aspects of OA have been identified. In *figure* 7, the relationship between DT and OA is illustrated. We identified positive effects of the DT on the aspects of OA respectively, whereas the combination of DT themes and OC has the strongest interrelation. Negative effects were not reported by the interviewees.

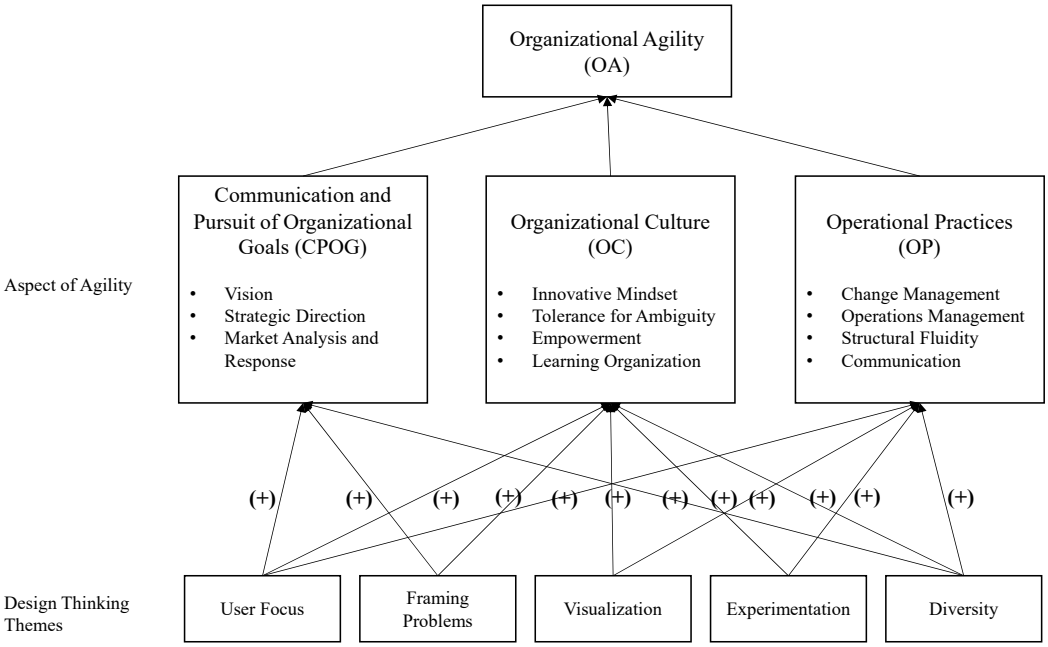

Figure 7: Influence of Design Thinking on Organizational Agility

5. Discussion

Based on the analysis of our data, we argue that DT related changes in the mindset predominantly triggered the restructuring of collaboration modes and processes towards more agile practices. An interviewee described the influence of the DT mindset as the major driver of inspiration for employees across all hierarchy levels, appreciation for diverse teams, and individual readiness to contribute ideas and exchange information. This supports the notion that the DT mindset is a major trigger for organizational change and a breaker of hardened organizational structures (*Grashiller et al.* 2017).

In order to identify the effects of DT on OA, we examined how the core themes of DT, user focus, problem framing, visualization, experimentation, and diversity, affected the case company. Our findings show that an increased user focus has affected *Power* in several ways. In line with *Lawson and Dorst* (2013), we found that DT positively affected market analysis and addressing customer needs by balancing and integrating stakeholder requirements through more thorough investigations of the organization's environment in the early stages of the innovation process. Focusing on the user needs afforded clearly formulated common goals, and promoted the organizational vision as well as strategic direction vividly in the projects, thus building a mutual understanding of its organizational goals among project members, which is consistent with findings from *Abildgaard and Christensen* (2018), and *Lew et al.* (2019). Empowering employees to actively develop solutions or act as consultants based on their own expertise as users made them more alert to sense and serve user needs. By that, DT affords an increasing awareness towards finding and fixing user pains (*Arar et al.* 2018). Perceiving customers as an invaluable source for feedback and, thus, sources of new ideas, fosters an innovative mindset among em-

ployees who then become more alerted and open to changes (*Carlgren et al.* 2014*; Grots/Creuznacher* 2016*; von Leipzig et al.* 2017).

DT inherently utilizes a divergent, interpretative, and generative as well as ambiguity-tolerant logic in order to enable project teams dealing with complex problems that are hard to define and that have multiple potential solutions (*Carlgren et al.* 2016b). Techniques for re-framing problems and challenges successively provided practitioners from *Power* with a practical approach so they feel more comfortable with uncertainty and ambiguity as also proposed by *Grots and Creuznacher* (2016). Reviewing a wide array of aspects related to e.g. a variety of stakeholders also broadened the awareness for sources of improvement in daily work among the employees of *Power*, thus, improving continuous learning in organizations (*Gurusamy et al.* 2016) and a mutual pursuit of overarching strategic goals (*Abildgaard/Christensen* 2018).

Continuous learning in *Power* is supported through the introduction of iterative working modes in DT projects. Experimentation provides *Power* with a more complete awareness of relevant future fields, as it uncovered blind spots through open-minded experimentation as *Rudzinski and Maisch* (2018) have presented in a previous study. Effects of the DT implementation on structural fluidity and operations management were not perceived. However, managers claimed that the iterative approach reduced risk and afforded a more structured, cost-efficient process for solution formulation. This is in line with *o'Driscoll* (2016), who claims that through problem re-framing and experimentation managers get a better understanding of the business and of the underlying problems.

Embracing diversity in projects enhanced the level of collaboration through team interaction across hierarchies and contributed to building a mutual understanding of *Power's* vision, which is in line with the findings from *Carlgren et al.* (2016). While the generalization of our results remains limited, our findings also correspond with *Howard et al.'s* (2015) for large-sized companies, in the sense that DT allows changing a corporate collaboration style, breaking silos, and empowering employees to actively participate in all stages of innovation processes. Visualization of information and ideas is a powerful approach to facilitate collaboration across diverse fields of expertise (*Micheli et al.* 2019). In the company, DT helped to establish a common methodological ground among participants that was inclusive and supported building a shared understanding of problems and ideas. Visualization (e.g. through prototypes) was used as an efficient communication approach to include outside stakeholders. As effective and efficient communication is a determinant for overall OA, methods that facilitate multi-directional, open communication throughout an organization are essential to identify and react to market changes (*Harraf et al.* 2015*; Carlgren et al.* 2016b).

Our results show that DT and its inherent themes provide a rich processual, methodological, and cultural basis to induce an organizational transformation towards improved OA. The use of DT, specifically improved cross-departmental communication, empowerment of employees, organizational learning, and an innovative mindset that is less restricted by ambiguity and the fear of failure. This transition is a major challenge extensively discussed in research (*Carlgren et al.* 2016b*; Dunne* 2018; *Fischer et al.* 2019; *Hölzle/Rhinow* 2019; *Redlich et al.* 2019). While no negative influence of DT on OA is observed in *Power,* further exploration of potential short- and long-term effects on OA requires additional research.

In line with the suggestion from *Boisnier and Chatman* (2002), our analysis shows that DT can be used to develop an internal subculture in certain organizational units that build on core aspects of agility. As there are several calls for frameworks to assess the impact of DT on business operations, we suggest that linking OA and DT in this regard provides additional insight to identify its effect on organizational capabilities and innovativeness.

6. Conclusion

The aim of this explorative research was to examine how DT influences OA in an SME. To gain insights, we conducted a longitudinal, qualitative single case study over a period of two years. Based on our findings, we developed a framework, which identifies and explains the interrelations of key themes of DT and aspects of OA. In respect to three key aspects of agility the influences regarding (1) CPOG, (2) OC, as well as (3) OP were identified. Our major insights are: (1) DT led to the encouragement of interdepartmental teamwork with heterogeneous members from all organizational hierarchical levels. By that, the awareness and involvement of employees regarding the strategic direction of the organization arose and fostered an agile DT mindset. (2) The OC shifted towards the appreciation of heterogeneous expert competences exchanged in collaborative settings and increasingly open-minded, user-centered, and iterative development. (3) Operations management and structural fluidity were not affected by the implementation of DT; yet communication and change management profit greatly from higher acceptance and cross-departmental exchange. Overall, we can adhere that all three core aspects of OA can be intertwined with the DT themes and led to a noticeable increase in agile practices.

Consequently, our findings reflect that DT is not only an innovation development approach but also an approach to improve OA. These findings inform an exploratory framework that can guide further research exploring the effects of DT on OA such as to further reject, support, or enhance our research findings. Finally, we suggest advancing this research by designing constructs and items based on our framework to conduct quantitative research or by pursuing additional longitudinal studies comparing findings across multiple SMEs and industries.

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