CEOs of SMEs: How IT-Governance Compensates the Lack of Digital Competencies

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CEOS OF SMES: HOW IT-GOVERNANCE COMPENSATES THE LACK OF DIGITAL COMPETENCIES

Research paper

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Abstract
The literature assumes that the small and medium-sized enterprises enterprise (SMEs) depends on the (digital) skills of the chief executive officer (CEO). In this paper, we examine the influence of CEOs competencies regarding digital transformation of SMEs and show, based on explorative research, which competencies of CEOs are necessary for a successful digital transformation. We conducted five IT expert interviews within the framework of the study to examine these influences. Subsequently, 20 CEOs of different SMEs were interviewed to discover their (digital) skills. The interview data showed that not only competencies are responsible for a successful digital transformation, but that the organization's Information Technology (IT)-Governance makes a significant difference. The interviews show that IT-Governance decisions are closely linked to the competencies of the CEOs. Based on the implicit and explicit competencies, interesting insights into the structuring behavior of the CEOs were gained. Especially for CEOs with a good digital competence profile, some pitfalls became visible, which can only be avoided by IT-Governance measures. Access to IT knowledge became another decisive factor. Based on our findings, we propose IT-Governance strategies depending on CEOs competencies. This enables to implement IT-Governance structures which best suits CEOs individual level of competencies, giving insights of potential behavioral structures.

Keywords: Digital Competencies, IT-Governance, Exploratory Research, SMEs

1 Introduction
Digital transformation dominates current discussions on the future direction of companies (Bilgeri et al., 2017; Riasanow, Galic and Böhm, 2017). Due to external pressure from competitors, customers, or suppliers, well-established companies are obliged to digitize their processes and products. From this obligation, multiple challenges arise for the governance of companies, for instance: Who decides on how established processes and products are to be digitized? Who decides on the prioritization of digital transformation projects? How can the necessary digital competencies be obtained?
Especially for SMEs with more limited resources compared to large companies, these challenges are hard to face (Chen et al., 2016; Li et al., 2018). SMEs need to find a compatible way of digital transformation, in contrast to start-ups created by digital technologies. The digital transformation (Mergel et al., 2019) of these SMEs depends on the (digital) competencies of the CEO (Wilkin et al., 2016).
Traditionally, the governance structures of SMEs are more strongly oriented towards the CEO than those of large companies. The CEO gets involved in various activities regarding the organizations business units, processes, and products. Consequently, investments in the digital infrastructure of SMEs require decisions by the CEO. Here, the question arises on how decisions on the digital transformation of SMEs are made if the CEO has a low level of digital competencies.

It can be assumed that deficits in the digital competencies of CEOs can be compensated for by suitable IT-Governance structures. IT-Governance deals with the direction of IT-related decisions, actions and involves determining which individuals make IT-related decisions (Huang, Zmud and Price, 2010). It is therefore a task of the CEO to develop governance structures which, on the one hand, strengthen the CEO’s authority to make IT-related decisions if they are competent to do so or, on the other hand, shift the authority towards individuals with higher digital competence who can make better decisions.

Yet, there is little research on the relation between the digital competencies of the CEO and suitable IT-Governance. So far, research has identified several governance structures that have an impact on an organization’s digital transformation. For example, the relationship between IT-Governance and organization performance from different perspectives, such as strategic alignment, IT leadership, IT capability and process performance, resource relatedness, and culture (Vejseli and Rossmann, 2017). Board-level IT-Governance, for instance, positively influences organizational performance; however, this relation is negatively moderated by authoritarian governance style (Turel et al., 2017). Although the CEO plays an essential role for the digital transformation of SMEs, the focus of studies on IT-Governance and leadership lies on the chief information officer (CIO) (Vejseli and Rossmann, 2017).

Further studies dealing with competencies in enterprises focus on the organizational level under the term “skills of information systems” (Aydiner et al., 2019). Although such studies provide valuable insights into the importance of digital competencies for the organizational performance, they do not provide any indication about the importance of the digital competencies of the CEO. Accordingly, the goal of this study is to identify relevant digital competencies of CEOs for the digital transformation of SMEs and to derive appropriate IT-Governance measures dependent on the CEO’s existing or missing digital competencies. Hence, we propose the following research questions (RQs) guiding our research:

**RQ1:** Which digital competencies do CEOs of SMEs need for the successful digital transformation of their organization?

**RQ2:** Which governance structures support existing digital competencies or compensate for missing digital competencies of CEOs of SMEs?

The study presented in this article is part of a research project to explore and identify competencies among executives in SMEs in the digital age. The study is intended to exhibit possibilities for competence development in connection with the digital transformation of SMEs. SMEs are of great importance for the German economy. SMEs have often been established in the market for several decades, as our data show. As a result, SMEs have experienced a technical “revolution” or two since they were founded, which, for instance, led to the decline of mining in large parts of Germany or the emergence of IT in general. Digital transformation is another, but much faster, development, for which companies are looking for solutions and best practices.

Given its explorative nature, our study uses an exploratory research approach. In doing so, we first use the literature on IT competence and IT-Governance, particularly regarding organization leaders, to get a first insight into the subject. Based on this and five expert interviews, we develop a semi-structured interview guideline and interviewed 20 CEOs of SMEs. Our findings show that missing digital competencies of CEOs can be compensated by suitable IT-Governance measures. Subsequently, we discuss our findings by deriving practical and theoretical implications. We conclude by stating limitations of our study and recommendations for future research.
2 Related Work

2.1 Digital Competencies of Business CEOs and Leadership

IT competencies of business CEOs are defined as explicit and implicit (tacit) IT knowledge, whereby “explicit knowledge is the formal knowledge that can be clearly transmitted using systematic language” (Bassellier et al., 2001, p. 164) and tacit knowledge is the “ability to perform well” (Bassellier et al., 2001, p. 164). Explicit knowledge comprises five components: technology, applications, system development, management of IT, and access to IT knowledge, whereas tacit knowledge covers the manager’s experience and cognition (Bassellier et al., 2001). Based on the concept of CEOs’ IT competence, it has been shown to have a strong influence on the CEOs’ intentions to promote IT in their organization (Bassellier et al., 2003) as well as on the success of IT projects (Engelbrecht et al., 2017). Especially knowledge on applications has been shown to be a major success factor.

From a broader perspective, several studies demonstrate the importance of good leadership for the digital transformation of companies. Digital transformation, for instance, requires CEOs to be actively involved in planning, experiencing, leading, engaging, and establishing an appropriate organization culture (Kohli and Melville, 2019; Mergel et al., 2019; Pillay et al., 2012; Wiesböck, 2019; Yoo et al., 2010a, 2010b). At the same time, the digital transformation of companies changes good leadership. Digital transformation, as defined by Mergel et al. (2019), is expected to increase transparency and complexity or to remove hierarchies and to enable and enhance features of transformational leadership. Transformational leaders “attempt and succeed in raising colleagues, subordinates, followers, clients, or constituencies to greater awareness about the issues of consequence. This heightening of awareness requires a leader with vision, self-confidence, and inner strength to argue successfully what he sees is right or good […]” (Bass 1985, p. 17). Transformational leadership positively influences leader-member exchange (Wang, 2005). Although these studies deal with good leadership and the competencies of organization leaders regarding IT and digital transformation, the connection between the digital competencies of individual organization leaders and suitable IT-Governance measures is still missing.

2.2 IT-Governance

IT-Governance defines “the enterprise management system through an organization’s portfolio of IT systems is directed and controlled” (Peterson, 2004, p. 8) and deals with the centralization and decentralization of management decisions on business applications, IT architecture, and technology components, whereby in centralized structures and senior-level executives have decision-making authority for IT investments (Peterson 2004). Centralization “leads to greater specialization, economies of scale, consistency, and standardized controls, whereas decentralization enables business control, a sense of business ownership, and provides greater responsiveness and flexibility to business needs” (Peterson 2004, p. 10). Small as well as large organizations see strategic alignment of business and IT, clarity of accountability and of responsibility, and improved stakeholder engagement as key benefits of IT-Governance (Wilkin et al., 2016). This finding is reflected by empirical findings that show that IT-Governance mechanisms, including decision making structures, formal processes and communication approaches, positively influence organizational performance. This relationship is mediated by IS strategic alignment (Wu et al., 2015). However, not only alignment but especially strategic IT agility leads to high competitiveness, which means “consistently using IT to strategically outdistance rivals, who are constantly playing second fiddle” (Tiwana and Kim 2015, p. 656). Here, IT-Governance enhances IT strategic agility only when it is discriminatively aligned with departments’ peripheral knowledge, which is the department’s knowledge in the other’s domain but outside its own (Tiwana and Kim, 2015). IT government success, which includes top management commitment, increases the strategic controllability of IT which, in turn, contributes to IT effectiveness and business impact (Buchwald et al., 2014).

There are different ways to implement effective IT-Governance. For example, it is recommended to implement governance led by a board of directors to achieve organisational performance improvements but to avoid an authoritarian style as it is detrimental to performance (Turel et al., 2017). A study with
an explicit focus on SMEs argues that formal IT steering committees, composed of executives who have a consensus on their standards and values, positively influence the effectiveness of IT-Governance (Huang et al., 2010). Senior leadership is suggested to be an essential factor for successful IT-Governance (Weill and Ross, 2004; Liang et al., 2011). Top CEOs have great influence on the effectiveness of IT in the organization and are recommended to actively exhibit supportive actions to ensure that strategic visions are internalized, to adapt their level and content of support to fit what is needed, and to demonstrate the importance of ensuring their visibility throughout the entire IS implementation process (Dong, Neufeld and Higgins, 2009). Moreover, social capital or social alignment between business and IT has been identified as mediator between IT-Governance and business performance (Wagner et al., 2014; Schlosser et al., 2015). For example, this is confirmed by a study on the effects of leader-member exchange, which recommends positive relationships between leaders and their followers, on the performance of virtual teams (Goh et al., 2012).

Since IT-Governance deals with the question about who makes IT-related decisions, competencies play a major role. IT-Governance “is less about who is vertically positioned to be in control, and more about the complementary - business and IT - competencies an organization possesses, and how it can integrate these to develop the strategic flexibility required for realizing and sustaining business value from IT in a complex and dynamic environment” (Peterson 2004, p. 20). Studies on IT-Governance and leadership emphasize the important role of the CIO or chief digital officer, since the CIO is assumed to have the highest competence on IT and is responsible for the digital transformation of an organization. CIOs are expected to be visionary, to have leadership, strategic, and analytical skills, to be competent in the organizational business domain and business models, and to have general knowledge about technologies and their impact (Tahvanainen and Luoma, 2018). A high social capital between the CIO and top CEOs is expected to have positive effects on organization performance (Karahunna and Preston, 2013). Here, the CIOs’ understanding of their CEO plays a more pivotal role in predicting the quality of CEO–CIO collaboration than CEOs’ understanding of their CIO (Benlian and Haffke, 2016). The CEO is an important factor in the digital transformation of SMEs, the identification of suitable IT-Governance structures dependent on the digital competencies of the CEO remains an open task.

3 Methodological Approach

3.1 Research Design

This research takes an explorative approach to understand what digital competencies CEOs need to deal with digital transformation processes. In a supportive way, this study examines the structures prevailing in the organization to identify possible correlations. Based on the explorative nature of this study, we have used tools from the coding methodology of Grounded Theory (Glaser and Strauss, 1967; Gioia and Chittipeddi, 1991; Urquhart et al., 2010; Gioia et al., 2013), which are explained below.

In order to determine the series of relevant interview questions to answer our research questions, we have chosen a multi-level research approach. (1) In the first exploratory phase, we conducted five expert interviews with proven experts from the fields of technical development and IT consulting. These were not CEOs of SMEs. Each of these experts has a minimum experience of 10 years in IT, digitization, digitalization or digital transformation (Mergel et al., 2019) topics. We had an open discussion about the research questions and the experiences in this area so far. This exchange resulted in an open interview guide that enabled us to address the research questions as precisely as possible. (2) After we had created the interview guideline, we conducted a two-stage interview series. In a subsequent pre-test phase, we conducted 5 interviews with CEOs of SMEs based on the guideline. In this way, we were able to test the interview guide. After these interviews, we were able to further optimize the guidelines accordingly. (3) The last step of our research comprised interviews with 15 CEOs of SMEs based on the guideline. In order to categorize the companies, we collected the structural data of the companies such as employees, fluctuation, age of the organization, age of the interviewee, and gender. In addition, all respondents had to evaluate their organization regarding digitization, digitalization and digital transformation in comparison to their competitors in their respective industries.
3.2 Data Collection and Analysis

We conducted a total of 20 interviews (16 men, 4 women) along the interview guideline. The participants were the CEOs of various owner-managed German SMEs. For this purpose, the regionally and nationally known companies were contacted. Of 64 contacted companies, 20 allowed us to interview them. This study concerns SMEs, as these organizations are particularly affected by the digital transformation. A start-up, for example, starts with all digital possibilities, and a large organization has the means and the personnel to successfully implement its own digitisation efforts. In contrast, the SMEs surveyed have been in the market for 96 years on average. Due to their special structures, such as the limited number of employees, employee retention in SMEs, and the connection to organization tradition, these companies face a special challenge in the digital transformation. Among them were organizations from the fields of industry, trade, and services. An overview of the respondents is given in table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>Gender</th>
<th>Educational background</th>
<th>Sector</th>
<th>Organization age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49</td>
<td>M</td>
<td>Mechanical engineering (M. Sc.)</td>
<td>Industry</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>F</td>
<td>Business administration (M. Sc.)</td>
<td>Industry</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>47</td>
<td>M</td>
<td>Master craftsman</td>
<td>Trade / Craft</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>58</td>
<td>M</td>
<td>Nurse</td>
<td>Service</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>46</td>
<td>M</td>
<td>Business administration (M. Sc.)</td>
<td>Trade / Craft</td>
<td>71</td>
</tr>
<tr>
<td>6</td>
<td>51</td>
<td>F</td>
<td>Mathematics (M. Sc.)</td>
<td>Service</td>
<td>275</td>
</tr>
<tr>
<td>7</td>
<td>59</td>
<td>M</td>
<td>Retail salesman</td>
<td>Service</td>
<td>13</td>
</tr>
<tr>
<td>8</td>
<td>55</td>
<td>M</td>
<td>Engineering (M. Sc.)</td>
<td>Service</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>50</td>
<td>F</td>
<td>Certified Pedagogy (M. Sc.)</td>
<td>Service</td>
<td>123</td>
</tr>
<tr>
<td>10</td>
<td>41</td>
<td>M</td>
<td>Insurance salesman</td>
<td>Service</td>
<td>18</td>
</tr>
<tr>
<td>11</td>
<td>43</td>
<td>M</td>
<td>Business administration (M. Sc.)</td>
<td>Service</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>51</td>
<td>M</td>
<td>Business administration (M. Sc.)</td>
<td>Industry</td>
<td>215</td>
</tr>
<tr>
<td>13</td>
<td>64</td>
<td>F</td>
<td>Business administration (M. Sc.)</td>
<td>Trade / Craft</td>
<td>97</td>
</tr>
<tr>
<td>14</td>
<td>45</td>
<td>M</td>
<td>Industrial engineering (M. Sc.)</td>
<td>Industry</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>50</td>
<td>M</td>
<td>Computer Science (M. Sc.)</td>
<td>Service</td>
<td>34</td>
</tr>
<tr>
<td>16</td>
<td>37</td>
<td>M</td>
<td>Industrial engineering (M. Sc.)</td>
<td>Industry</td>
<td>29</td>
</tr>
<tr>
<td>17</td>
<td>62</td>
<td>M</td>
<td>Metallurgy (M. Sc.)</td>
<td>Industry</td>
<td>102</td>
</tr>
<tr>
<td>18</td>
<td>45</td>
<td>M</td>
<td>Business economist (M. Sc.)</td>
<td>Trade / Craft</td>
<td>69</td>
</tr>
<tr>
<td>19</td>
<td>68</td>
<td>M</td>
<td>Industrial engineering (M. Sc.)</td>
<td>Industry</td>
<td>560</td>
</tr>
<tr>
<td>20</td>
<td>40</td>
<td>M</td>
<td>Business administration (M. Sc.)</td>
<td>Industry</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 1. Overview of interviewees

We carried out a two-stage approach. First, we conducted five semi-structured interviews. We took up open questions such as "How do you assess the importance of digital transformation for your organization" or "Is it part of your role as a manager to drive digital transformation forward by yourself?"

We have analyzed the data based on the grounded theory approach. First, we started with the Open Coding process (Glaser and Strauss 1967; Strauss and Corbin 1990) by using the MAXQDA software. Two of the researchers implemented the open coding procedure independently from each other. They have read the transcribed interviews and proposed code phrases that represent the content. Subsequently, similar codes were collected from the interviews and defined a common code, the axial coding. In our coding paradigm, the explicit IT competencies of the CEOs and their experience in the IT area could be assigned to the causal conditions, as well as access to internal and external expertise. The strategies and attitudes of the CEOs were assigned to the action strategies, the IT governance characteristics to the consequences. The coding paradigm for the type "weaker structured corporate relationships" is
presented below as an example. Subsequently, the axial codes were bundled according to subject areas, which can be found in the results section of the table. Differences of opinion were discussed with a third researcher and settled by agreement.

We ended this process after all researchers agreed that there was a low probability that significant new insights could be generated by additional interviews, since our data at this stage already included important aspects about the digital competencies and governance structures. Finally, it was a matter of identifying similar and different competence profiles and IT-Governance structures in order to summarize them in types. We found that the distribution of competencies within the organization is one of the most important factors in distinguishing between the different governance structures. It was helpful to first deal with outstanding cases. For the findings, we attempted to describe the various sets of IT-Governance structures. In the process of typing the various phenomena, we have identified the types of structuring. Structures and their nature create different relations, connections and relationships, through which the digital transformation in the organization is formed. Especially in small and medium-sized companies, these structures are shaped to a large extent by the CEO and influenced by his or her skills, as he or she assigns corresponding roles and functions and forges alliances. These structures are based on the concept of a horizontal and vertical organisational structure, which is concerned with the distribution of responsibilities and the design of action relationships. Additionally, if they are strongly structured, they are less flexible and adaptable, as they are already top-down, abstract and difficult to accept at the local level. Weak structures are more ad hoc and in the situation. Both times, the aim is to translate the corporate strategy into roles and interests in order to align them together. For the actors, the question is: Who are we and what should we do? If this question can no longer be answered clearly and with consensus, the organization becomes dysfunctional (Jacobides, 2007). The challenge is to keep the structure constant and at the same time flexible.

4 Findings

4.1 Overview

The interview data shows us that we can group the interviews. First, the continuum of the CEO’s explicit IT competence (IT-C). Secondly, the continuum of the CEO’s practical IT experience (IT-E). It should also be noted that access to further IT knowledge distinguishes the cases under consideration (IT-K). Based on this data, the selected IT governance structures (IT-GS) were examined and defined in more detail. The following table provides an overview of these; more detailed statements follow below.

<table>
<thead>
<tr>
<th>CEO IT-C</th>
<th>Organization IT-E</th>
<th>IT-K</th>
<th>IT-GS</th>
<th>Explanation / Definition</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>No</td>
<td>Internal</td>
<td>Weaker structured corporate relationships</td>
<td>These CEOs do not see their role as a digital actor, but as a driving force in digital transformation. With these impulses, the respective experts have a high degree of personal responsibility. It is therefore essential to avoid hierarchic structures, but rather to create network structures.</td>
<td>6, 7, 12, 14, 15</td>
</tr>
<tr>
<td>Low</td>
<td>No</td>
<td>External</td>
<td>Learning structures</td>
<td>Especially the smallest companies can be confronted with the problem that neither the CEO nor an employee has a high level of IT knowledge. Here it is necessary to fall back on external knowledge. However, one should use this knowledge to build up one’s own knowledge in these areas.</td>
<td>1, 10, 17</td>
</tr>
<tr>
<td>Medium</td>
<td>No</td>
<td>Internal</td>
<td>Structures of trust between business manager and IT</td>
<td>If the CEO recognizes a value of digital transformation for his organization, but is not an expert himself, it is advisable to build up a strong trust structure to external experts. The potential change of digital transformation can be profound.</td>
<td>9, 13</td>
</tr>
</tbody>
</table>
Table 2. Overview of discovered IT competencies and the associated IT-Governance types with characterization

<table>
<thead>
<tr>
<th>Medium</th>
<th>IT Competency Level</th>
<th>Governance Type</th>
<th>Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes Internal / External</td>
<td>Structures of nearness, adaptations and mediators</td>
<td>The CEOs know from their experience how to develop their employees and how to guide them through the digital transformation. Digitization is understood holistically, and digital transformation can lead to changes in the organization. The CEO is more likely to act as a mediator.</td>
<td>4, 8, 20, 18</td>
</tr>
<tr>
<td>Yes No</td>
<td>Strong structures of distance and resistances</td>
<td>The CEOs act as &quot;lone fighters&quot; in the field of digital transformation of SMEs. The companies are characterized by strongly hierarchic structures. The employees are at most involved in operational activities.</td>
<td>2, 16</td>
</tr>
<tr>
<td>Yes Internal</td>
<td>Everyone has to adapt</td>
<td>A field of tension can arise when the CEO and the CIO each have very high IT competencies. Networked, cooperative structures are recommended here.</td>
<td>5, 19</td>
</tr>
</tbody>
</table>

4.2 Digital Competencies of CEOs of SMEs

Evaluation of their competitive position. 19 respondents stated that their own organization was at least average in terms of digital transformation in comparison to the competition in their sector. 12 of the respondents said that their rating was even better than the industry average. Only one respondent said that his organization was currently lagging behind the average of its competitors, but that he was confident that this would change soon due to current efforts.

Low IT competence was particularly noticeable when the respondents used the organization's IT but did not understand the structure and essential background of these systems. The following interview extracts illustrate the lack of detailed knowledge:

"I can only give impulses. Stimulating and stimulating the thought, because I am not an IT specialist myself. I also don't want to lay power lines at home." - 7

"[..] I can only use Google, I'm not involved in day-to-day business, no matter if it's a phone line, Microsoft Office or licenses, I'm just not in business..." - 16

High level of IT competence we attributed to participants with detailed knowledge of the programming languages and methods used in software development.

"I'm scrum master and product owner myself [...]" - 5

"with Navision which is based on HTML5, the customer service can then complete their order with the iPad at the customer's site." - 15

However, most executives did not believe that explicit IT competence was important for them. Of the 19 participants who felt well positioned in the digital transformation, only two had explicit IT skills. We concluded that the explicit IT skills of CEOs are not decisive for the success of digital transformation. More important, however, is knowledge of the fundamental interaction between hardware and software.

Most respondents were concerned with interrelationships, dependencies and interfaces between enterprise systems or between software and the Internet. The CEOs were less interested in how the interfaces could be provided technically than in error-free and secure communication.

"If the Internet fails, it means standstill." - 12

"Of course, I don't always understand everything technical, but I must have so much experience in linking these things." - 20

Experience with IT projects and IT management reflects the manager's practical, local experience at the implementation level. This point is important because many CEOs tend to stay out of implementation issues. Their role in the projects varies greatly. The roles range from controllers and consultants to project CEOs and even employees.
"I'm the only one giving ideas, sometimes my brother together with me. We are the ones who often give the impulse. Then I am basically active in project management up to a certain point, but not down to the last detail". - 2

"I am less involved, this is usually done by one of our employees and my son has made himself very strong, especially in working with a start-up organization and the various companies that are still working there. [...] Because alone we are certainly not sufficiently trained and do not have enough knowledge." - 19

The implicit knowledge also includes the vision that the manager imagines of digital transformation. The CEOs' ambitions differed greatly from one another. Some of them talked about digital transformation processes, while others were talking about the next update of their ERP system.

"A vision, a little yes, I'm already worried about the next development, e.g. the ERP system needs a release change, which is now overdue" - 16

**Access to external IT knowledge** becomes critical to CEOs' competence preferences. Frequently, this advice is provided by service providers or research institutions, which can affect projects or strategies as well as parts of the organization or the entire organization.

"We were advised by a research institute and there were workshops in which we turned ideas into concrete concepts." - 1

"The external consultants advised us so that we talked to them every few weeks and they gave us orientation and help." - 16

**Access to internal IT knowledge** is guaranteed by the qualification of the organization's own personnel. This is done through training or autodidactic. Nevertheless, both CEOs and employees are dependent on internal and external impulses. In this context, the willingness for lifelong learning as well as open-mindedness and self-criticism were placed in the foreground by the interviewees.

"It is important to take your employees with you as far as possible and offer appropriate training opportunities. My experience is that if you do it well, people are willing to participate." - 8

"Through internal training and external training and to the point that we also work with other companies and exchange with external professionals." - 10

In addition to these explicit competencies, implicit IT competencies were also surveyed. These are personal experiences and points of contact with the topic of digital transformation that cannot be articulated directly but have an impact on the strategic view of the CEOs.

### 4.3 Supporting IT-Governance Structures

Current IT research expects that IT-competent CEOs are willing to manage IT, enter into a partnership with IT experts and participate in IT projects. In our study, we follow the CEOs and their IT competencies to find out how they define themselves and other actors, how they connect and interact with each other and what scope for action they allow themselves and others in their companies. The first step is to determine which competencies and which distribution of competencies in the organization goes hand in hand with which structures. They take on different roles and construct them for others, connect them with each other and mobilize them. The roles the leader assigns and the connections they try to establish depend on the knowledge and understanding of digital transformation that the CEO has.

**Strong Structures of Distance and Resistances: Experience with IT projects, IT management and no access to internal IT knowledge.** Structures become visible when there are disturbances. If the objectives of the actors do not coincide with those of the actors in the organization, or if the manager no longer represents the actors, resistance arises. Resistance blocks the executive's goals, making it very difficult for CEOs to realize projects. Two respondents with a lot of project experience and less experience in cooperation and partnership are confronted with such resistance:

"This stupid planning machine my locksmiths get to run in a week, but this new IT process has given us sleepless nights. So, it was really exhausting. It is resistance, excessive demands, a very important topic. The employees often feel extremely overwhelmed. " - 2
“I'm worried about the jump. Our ERP needs a release change that is overdue. [...] It took an extremely long time until we were ready, and if we now do a complete release update again, it costs money and time again and the employees are confused. [...] The older the people are, the more difficult it becomes.” - 16

What structure have these two respondents established? Both managing partners have structured their companies into departments as a structure of distance, some of which are staffed by siblings. All IT decisions are made by the CEOs themselves and they have a lot of room to maneuver.

“I decide. Both in the selection of the software and in the planning of the processes within the IT changeover, because I have an overview. This is the part that I also cover in our organization, to say I know how the processes run, I know the different IT systems in the organization and can decide best which process has an effect at which point.” - 2

A medium understanding of IT is enough for them to make IT-related decisions. It is important for them to have an overview of the processes in the organization. By controlling IT projects, these CEOs have an overview of IT implementation processes. They have an overview about the level of implementation and the internal processes and believe that they no longer must worry about local perspectives. In the perception of the CEOs, nobody else in the organization understands IT apart from them. Like many of our respondents who experience an IT competence vacuum, executives do not trust IT staff:

“In retrospect, it wouldn't have been wrong for an internal employee who understood the entire system to support me. [...] I don't regret anything, but it would have been good if someone with IT expertise had been there.” - 16

“And one of the biggest problems is that IT serves the process. This means that the IT staff is often overwhelmed with a complete overview of the organization and does not understand at all which processes need to be tackled and how. [...] And that's a big problem.” - 2

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Employee development is reduced to the bare minimum. IT contact persons are the executives themselves. There are hardly any regular meetings in groups or arrangements. This reduces participation. There are neither structures that help to transfer the strategic understanding of the manager to the employees, nor structures that integrate the local perspective of the employees into strategic considerations. Overall, these CEOs do not have access to external and internal sources of knowledge, which can impair the organization’s ability to innovate and act in the long term. The CEOs in this group are relatively young, as is their organization.

Structures of Nearness, Adaptations and Mediators: Experience with IT projects, IT management and access to internal IT knowledge. There are also participants who go a different way with a lot of project experience, but more experience in cooperation and partnership.

“Many think "I'm introducing a new technique" and change the organization and then it fails, but it wasn't the technique. There are a lot of examples and projects of companies, also big known companies, that did something like that and failed, because nobody was willing to tackle the organization.” - 8

In order to avoid resistance, it is important to create structures that involve employees and assign new roles to CEOs and employees.

“It is important to take existing employees with you as far as possible and to offer appropriate training opportunities. My experience is it works, if you do it well.” - 8

“I'm trying to get people to stand behind it and support it.” - 20

From this perspective, CEOs with project experience should exemplify new processes and working methods, collaborate and create closeness. In short, the manager must be one of them in small teams:

“We have no heights or distances here, otherwise we would not be successful. [...] We have to be really open and close and do living by example, so we have to really show the others how to do it and set an example, otherwise you won't be successful.” - 8

The strong hierarchy structure of the organization is similar, but there is a structural change that can undermine this structure. A possible solution, if the manager does not want to interact with the
employees themselves, is to give some employees the role of a "mediator". In this case they are called "key users". They are characterized by a high ability to communicate. The key users are the contact persons for the employees so that they have an overview of the processes and interfaces in the organization. They meet each month for a key user meeting where projects and problems are discussed and prioritized together.

In companies that do not have an internal IT expert, the management works more closely with the mediators. The manager needs external expertise. In this case it is IT specialists and project CEOs as freelancers. However, internal competencies are also being built up. The mediators are called influencers. They are supposed to teach employees how to enjoy IT and to convince them. The influencers are the extended arm of the managing director, who also sees himself as a motivator. Since the IT expertise is not available internally, the managing director sees his main talent in developing his employees:

"You have to imagine it this way, we don't have any professionals now, we have a freelancer who supports us a little bit, but my ability is that I can develop people quite well. [...] I chose this colleague because he was interested and wanted to continue his education." - 20

Employees who are responsible for IT but do not have the expertise act as translators or as interfaces to external parties. They have a basic understanding of IT and good communication skills. In addition, every training course is made possible.

There are also cases where the management alone acts as mediator. These executives attribute themselves little IT professional competence, but a high social competence.

"My competence lies more in introducing a program that we can pass on to our colleagues with enthusiasm and not as a burden or something. Above all, to take away the fear of it. I have the highest social competence that we have, so I have also developed the blind version, that calms down tremendously. Art is leadership in the truest sense of the word." - 4

Internally, there is no one with IT expertise. In decision-making processes, the management relies on the recommendations of the external IT specialist. Individual mediators are often used when the organization is decentralized, but a connection to the office still must be established. They are therefore external mediators. These companies have either different locations or a branched organization. This would explain why these CEOs have mediators who represent them and increase their sphere of influence. The challenge of taking everyone along in the event of spatial or organisational separation is more pronounced here.

Everyone has to adapt. Connecting, Cooperative Structures: High level of IT competence and experience with IT projects and IT management. Another way to undermine strong hierarchies is to create a whole area as a mediator and translator for digital transformation. CEOs are made just as competent as employees and the structure for cooperation is transformed. Heads of department and employees all work together in an interdisciplinary manner, understand each other, trust each other and think holistically. Digital transformation staff also implement a guide concept in which employees act as multipliers. CEOs of these areas are often Chief Transformation Officers or Chief Digital Officers, equipped with a lot of IT expertise, but also with IT project experience. They coordinate cooperation, remove barriers, give impetus and implement participative forms of communication.

"We have introduced a social corporate network with the aim of connecting employees and creating the conditions for cooperation.” - 5

They introduce formats such as digital fitness programs, leadership programs, explanatory films, a digital transformation day, or a digital breakfast. They also integrate external experts so that everyone can learn something about digital transformation, regardless of their position. The CEOs here all have contact with public institutions or are one themselves. This could be the result of a tendency to anchor ideas in organizations rather than individuals.

Structures of Trust: A close relationship between business manager and IT. If the IT expert has a close relationship to the business manager and is also part of the management, a strong trust relationship develops. Then the alignment between business and IT is high:
“What is also important for me, because it is my son, i have more than a hundred percent trust. [...] I realize that it's not the case in many companies and that they are not so well positioned with IT decision-makers. I think we are very well positioned in this respect.” - 13

Here, decisions can be made centrally without leaving employees behind, because IT decision makers are in active contact with employees and CEOs have the opportunity to reflect on each other. Many top-down controlled companies with little internal competence want such a relationship of trust, which they cannot build up with IT professionals. It is striking that such relationships of trust lead to stronger cooperation with external partners. In this group the IT experts are all part of the family.

**Weaker Structured Corporate Relationships: A high density of internal IT experts.** Executives who work in an organization with a high density of IT experts or an IT staff unit have a clear understanding of leadership:

“I think that's the leadership understanding we have today. Leading where the boss has all the ideas and knows all the designs and the customers and knows everyone, the times are over, so these one-man shows. Instead, today we lead transformational, we rely very strongly on the individual strengths of our colleagues and that is how I understand myself.” - 15

Decisions are increasingly made by the IT experts themselves, while CEOs accompany this process.

“IT has a duty to provide impetus” - 14

“For this, people have the confidence and sit accordingly on the project and then they have to be able to decide.” - 15

The IT experts have a lot of room to maneuver and are on the move throughout the entire organization. In contrast to other companies, it is the task of the IT experts to coordinate their work with the specialist departments. Business CEOs ask questions, help shape goals, set requirements, translate ideas, ensure transparency and mediate between business units. IT as a topic of understanding becomes central, since here interdisciplinary cooperation is required. The hierarchies here are rather flat, but great importance is attached to creating living project and networking structures. If the hierarchies are too strong, digital transformation will be established as a synergetic working topic or interdisciplinary working group. The CEOs here have a stronger business focus than in other groups.

**Learning Structures: Access to external IT knowledge.** At the end of the day, those CEOs are left who do not bring any special skills with them - both personally and internally. Yet they do have a special competence. They are very open-minded and learn constantly. That is why they get external help not only with implementation issues, but also with strategy issues.

“We also received this confirmation because we were given a hand in the introduction of digital transformation by a research institute. They accompanied us through the process and said that we have made a good progress in the meantime because we have also implemented a great deal together with them.” - 1

This gives the business CEOs self-confidence and structure, which are things that they can transfer to their employees. They also give their employees responsibility, as they have learned from external consultants, even if they often remain the decision-makers. Here, too, comparatively young CEOs can be found in young companies.

## 5 Discussion

If we now look at the relations between the different types of structuring, some exciting relationships emerge. First of all, three superordinate structuring levels seem to emerge. On the weakly structured level there are "learning structures” and "weaker structured cooperative relationships”. On the level of nearness are "structures of nearness, adaptations and mediators” and "structures of trust between business managers and IT”. Strongly structured, on the other hand, are "everyone must adapt” and "strong structures of distance & resistances". The weak structures tend to be formed by CEOs who have neither explicit IT knowledge nor IT experience. At the near level, explicit IT knowledge is increasingly found, while IT experience predominates in strongly structured companies. In strongly structured companies,
it is more common for both competencies to fall on the CEO. It is interesting to note, however, that at this level both the companies with the highest degree of digital transformation and the companies with the most deficits can be found. What could be the reason for this? Firstly, these two types differ in their excellence - these companies have the highest level of competence in both areas (everyone must adapt) and are so far advanced in their digital transformation. But there is another important point: the companies with the greatest challenges combine both competencies in their CEOs, but have neither internal nor external experts. In all types, the lack of internal experts tends to lead to CEOs deciding everything themselves, probably also because they feel they have to (also in the "learning structures" type). The companies that are furthest along have many internal experts - these companies are strongly geared towards cooperation and participation - all of them participate (as with the "weaker structured cooperative relationships" type). This prevents employees from blocking projects, as everyone works together and makes decisions. Due to the high density of experts, only a few really need to be convinced. If this is the case, however, closeness structures are better suited for this purpose, because even the highly structured "high performers" are not willing to do the work of persuasion - everyone must adapt. This is where structure makes the difference. The "structures of nearness" type of organization has a similar skill set to "strong structures of distance and resistances", but in addition to internal and external expertise it has a very different mindset. These companies work with mediators such as influencers, key users and the like. It is important to the CEOs in this group that employees enjoy digitalization, are enthusiastic and share a common vision. The CEOs act as role models and work very closely with their employees, taking them by the hand. So, despite having a common set of skills, these two groups are very different from each other. In this group, the enthusiasm and eagerness to experiment seems to have something to do with external expertise, because the "learning structures" group also likes to try out new things. Overall, it is noticeable that CEOs with a lot of IT experience and medium explicit knowledge often have a need to take employees by the hand. With these groups, one has the feeling that they are on the way to the next level. Either they manage to move many employees ("structures of nearness, adaptations and mediators"), or they look for a close confidant (applies to "strong structures of distance and resistances"). For the latter, this would probably be a first step, because companies that do not have internal experts have less confidence in experts. Internal expertise is widespread and appears to be an important building block in the transformation process. Overall, however, it can be said that only the group "strong structures of distance and resistances" does not see itself as far along the road to digital transformation. There is often a hierarchy of skills - first the explicit knowledge to be able to communicate, then experience. The former will help to carry out management tasks and provide impulses, the second will complete the transformation. It is important not to do and decide everything yourself, otherwise you will lose contact with the organization and the employees. Not having any IT skills as a CEO can work if CEOs remain flexible and adaptable and gain strength from this ("learning structures", "weaker structured cooperative relationships").

5.1 Implications for Theory

This study contributes to literature with three implications for theory: First, the study provides further insights into what “good” IT-Governance structures are and which factors influence the suitability of IT-Governance. In this case, good IT-Governance is dependent on the digital competencies of the CEO. For instance, “mediators” with high digital competence between the CEO and their employees are a tool to pass on and implement the decisions made by the CEO or, in turn, to compensate for missing digital competencies of the CEO. The centralization-decentralization continuum of IT-Governance (Peterson, 2004) can be adjusted according to the competencies and self-image of the CEO. Secondly, the concept of IT competence of business CEOs was placed in the context of CEOs of SMEs (Bassellier et al., 2001). The concept has been supplemented by the identification of digital competencies which are needed by CEOs of SMEs to successfully transform their companies. We found that, for instance, the most CEOs have little knowledge of technical details but rather require general knowledge about the software and hardware used in their organization. Third, we identified factors of “good leadership” in the digital age. Our study confirms other studies, who identified social capital as essential for successful IT-
Governance. The interviewees especially mentioned transformational leadership as their model in the digital age (Schlosser et al., 2015; Wagner et al., 2014; Goh et al., 2012).

5.2 Implications for Practice

Based on our findings, we can derive implications for practice. Firstly, it should be noted that the technological knowledge or IT competence of a CEO is not necessarily decisive for the success of an organization's digitisation. It is much more important to create a basis of trust for dealing with other key players. No internal or external expert knowledge is useful if the CEO does not trust this knowledge. Overall, trust played a major role in the surveys and there was often little trust from external experts when they were outside the university environment. This makes it more important to build internal competencies among employees in order to align digital transformation with the interests of the CEO and the business. In any case, however, it is important to use other sources of knowledge in order to transform oneself and the organization and to organize the transformation through the development of employees. The IT competence profiles developed in the findings can help CEOs to classify themselves and their competencies and to assess the consequences. Finally, we were able to identify functioning IT-Governance structures based on the CEO's competence profiles. This enables CEOs of SMEs to use identified best practices and transfer them to their organization.

6 Limitations and Future Work

This qualitative study is based on a total of 20 interviews and was conducted in Germany. Like every other empirical study, this study shows typical limitations of qualitative research (e.g. weak internal validation). Apart from those, it is important to acknowledge further limitations: The composition of the sample of 4 women to 16 men corresponds to the gender distribution in relation to management positions in the German economy. It has several limitations, motivating further research. Our approach uses a qualitative method to connect the identified competencies with the existing IT-Governance structures. It is difficult to discern which phenomena have caused other phenomena. For example, some governance structures may also have an impact on the distribution of competencies. In such cases, it may be helpful to examine interdependence by means of a qualitative analysis. Qualitative studies are also able to address a wider population and provide more generalizable insights. Additionally, it may be assumed that external factors such as organization size, sector, competition, or financial resources as well as personal factors such as character or interests play a significant role for IT-Governance in SMEs. These factors have been ignored, since the focus lied on the connection between IT-Governance and the CEO’s digital competence. Taking further factors into account could broaden the perspective on IT-Governance in SMEs. In addition, cultural aspects have been neglected.

Hence, this study offers potential for further research. It can be used to contribute to a more general theory on suitable IT-Governance measures for SMEs. This would open the opportunity to add external or personal factors to the analysis. Such a theory could then be tested by a quantitative approach. Furthermore, the study could be conducted in other cultures to get broader insights into the topic.

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